

# HAZARDOUS MATERIALS AND HAZARDOUS WASTE DIRECTIVE

Version 5.1 – English

Bureau de la gestion du risque  
Office of Risk Management

uOttawa.ca



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## 1.0 INTRODUCTION

The University of Ottawa is committed to taking all necessary steps to ensure that the use, collection, handling, storage, transportation and disposal of hazardous materials and hazardous waste generated during daily operations is conducted in a safe, efficient and environmentally responsible manner.

The Hazardous Materials and Hazardous Waste Directive (herein referred to as the Directive) establish specific guidance to ensure the University is respecting its policies and regulations on environmental matters. The Directive includes best management practices, standard operational procedures, roles and responsibilities for employees, contractors, supervisors, managers and other University personnel as well as training, protocols and guidelines for the reception, handling, storage and disposal of all hazardous materials generated by the University's activities and operations. The intent is to achieve a high degree of information and control over the purchase, use, collection, handling, storage and disposal of hazardous materials.

## 2.0 PURPOSE

The University of Ottawa stores thousands of chemical products within its facilities and generates many types of hazardous waste during daily operations. Especially, during the activities of, laboratory research (chemical, radiological, biological waste), building operations (heating and cooling waters, oils, batteries and fluorescent tubes), maintenance (cleaning solutions, wash water, paper waste, and garbage) and, from time to time, construction or renovation projects. The storage and handling of bulk chemicals and hazardous waste can pose a serious threat to the personnel or the environment if handled improperly. There are many levels of personnel at the University from students, professors and researchers to contract workers and support staff who can be exposed or injured through improper procedures.

The purpose of the Directive is to provide University personnel and contractors with a consolidated source of information on the safe and environmentally sound supply, transportation, storage, and handling of hazardous products used or generated at the University. The Office of Risk Management (ORM) is responsible for implementing overall Environmental Health and Safety Procedures and Guidelines for the University facilities and operations. Individual faculties must document, maintain and update their own specific procedures and guidelines when applicable. The University's goal is to provide a safe working environment that complies with all federal, provincial and municipal legislations while working to protect and improve the environment. This Directive document is the responsibility of the Office of Risk Management (ORM). Depending on your waste stream (hazardous, biohazardous/infectious or radioactive), for all enquiries regarding the safe storage, handling and disposal methods, obtaining storage containers and make arrangements for waste disposal you have the following resources:

- 1- For hazardous materials; contact the Environmental Health and Safety Technician directly at [enviro@uottawa.ca](mailto:enviro@uottawa.ca).
- 2- For biohazardous/infectious materials; contact the biosafety compliance specialist directly at [bio.safety@uottawa.ca](mailto:bio.safety@uottawa.ca).
- 3- For radioactive materials; contact the radiation compliance specialist directly at [rad.safety@uottawa.ca](mailto:rad.safety@uottawa.ca).

As one of Canada's top education and research intensive universities, we have a significant diversity of activities related to hazardous materials and a commitment to a safe and healthy work environment. Proper management of chemicals and hazardous waste is important in order to meet these goals. Proper management implies identification of work practices and operations, chemical inventory, wastes used and produced, collection and storage of wastes and proper disposal. Record keeping, inspections, continuous improvement, recycling and a pro-active attitude for reduction of waste or the use of environmentally friendly alternatives are all parts of this program.

This Directive is based on the University Environmental Policy (Policy 72), which establishes the University's policy on sound environmental management. This document also summarizes the regulatory requirements associated with the storage, handling and transportation of hazardous chemicals. This document is intended to be used by University of Ottawa trained personnel and is for internal use only. The University of Ottawa accepts no liability, whether in negligence, contract or arising on any other basis for damages or for indemnification arising from decisions or actions by others based on this document.

If you have questions regarding the purchase, handling, storage or disposal of hazardous materials and hazardous waste please contact your Faculty's or Service Department's Health and Safety, Risk Management (HSRM) officer.

### 3.0 TRAINING FOR PERSONNEL

All personnel using hazardous materials are required to have appropriate training. Depending on an individual's scope of work and responsibilities, training requirements may include:

- Workplace Hazardous Materials Information System (WHMIS) / Global Harmonized System (GHS) training
- Hazardous materials and hazardous waste management training (description, compatibility/risk group, safety marks/placards, shipping documents/data, means of containment)
- Transfer and dispensing procedures
- Procedures related to loading/unloading
- Laboratory risk management, biosafety, radiation safety, laser safety, emergency procedures and accidental release
- Emergency First Aid training
- Health and Safety at Hazardous Waste Sites (40 hrs HAZWOPER with annual refresher training)
- Training in accordance with part 6 of the Transportation of Dangerous Goods (TDG) regulations.

The development and implementation of accurate and detailed trainings in Faculties will ensure compliance with this Directive, as well as with Ontario's Occupational Health and Safety Act, WHMIS Regulation 860, the Ontario Fire Code, the TDG Act and Regulations and the Canadian Environmental Protection Act, 1999. Depending on the employees or student activities, training sessions may include, but are not necessarily be limited to, the following activities typically carried out when managing hazardous materials and hazardous waste:

- Definition and identification of hazardous chemicals and hazardous waste
- Container type, transfer and storage requirements
- Labelling, safe handling and transportation procedures

- Sampling and analytical requirements for disposal off-site
- Decontamination procedures for containers and other equipment in contact with chemicals
- Off-site disposal and sewer discharge requirements
- Requirements and restrictions for discharge to the municipal sewer
- Emergency Plan / Spill response

The University of Ottawa must maintain records of employees and students trainings. These records will be kept at Human Resources (HR) located at 550 Cumberland Street, Ottawa, Ontario, K1N 6N8. Training records will be kept for participants in all training sessions for a minimum of two (2) years after the expiry of a training certificate and will be available for review by the Ministry of the Environment (MOE) or Ministry of Labour (MOL) officers upon request through the Office of Risk Management (ORM).

#### **Supervisors:**

At the University of Ottawa, all supervisors are responsible for ensuring that their personnel is trained to handle hazardous materials they may become in contact in the context of the performance of their duties and that all hazardous materials used on the University property are handled and stored in a safe and environmentally friendly manner.

#### **Laboratory Supervisors:**

Laboratory Supervisors must supplement the general safety trainings discussed above with training sessions specific to all chemical, biological, radiation or other hazards in their laboratories or workshops. The training may be completed by the laboratory supervisor or their delegate. Only trained and qualified personnel shall be allowed to handle hazardous materials.

#### **Laboratory Users:**

Are responsible to obtain information on...

- Safety Resources available: Documentation, manuals, Safety Data Sheets (SDS), inventory systems and other safety resources that are available to lab users and information that the worker should be aware of and refer to as necessary. Lab-specific safe operating procedures identifying hazards associated with a specific experiment or process.
- Emergency equipment and personal protective equipment (PPE). It is extremely important that all lab users are aware of the location of emergency equipment and know how to operate it before they start working with hazardous materials so they are able to access it without delay in the event of an emergency. Emergency spill response training is also required, specific to each chemical use (e.g. acids, mercury, etc.).
- Chemical, Radiation and Biosafety preventions: Significant training and instruction is required for lab users working with chemicals, radioisotopes or biohazardous materials.
- Hazardous Waste Disposal: Hazardous waste storage and disposal procedures in the lab with the users that will be generating the waste and others activities.
- Laboratory Equipment: Use of laboratory equipment that the lab users will be required to use, for example, centrifuges, ovens, autoclaves, rotoVaps, UV, lasers or X-ray emitting devices.

## 4.0 ROLES AND RESPONSIBILITIES

All participants in the hazardous material stream at the University must adhere to specific regulations, standards and procedures. The participants are:

1. **Shippers and receivers** – ship and receive materials, enter the hazardous material into the chemical inventory system before delivery to the user. They have the responsibility of ensuring documentation, identification, proper labelling, inventory and transport or transfer to user.
2. **Generators and Users** – persons at the University who use hazardous materials and generate hazardous waste, have the responsibility to store and label it properly. Also responsible for scheduling collection requests for off-site disposal hazardous waste and any unwanted empty hazardous material containers (This does not apply to decontaminated empty containers, which can go to the regular recycling or domestic waste stream).
3. **Transporters** – any person at the University who move or transport hazardous materials and hazardous waste. They may also be generators or users. Responsible for ensuring all hazardous waste is properly stored, labelled and secured before safe transport.
4. **ORM** – act as the official “Consigner” for the University; Oversee, track and conform to all regulations regarding hazardous waste transport and offsite disposal.

### 4.1 Responsibilities of Supervisors and Managers

The Occupational Health and Safety Act outlines the responsibilities of all supervisors and managers to be as follows:

- 1) A supervisor shall ensure that a worker,
  - a. works in a manner and with the personal protective equipment, measures and procedures required by the Act i.e. according to WHMIS/GHS and any University of Ottawa procedures and guidelines; and
  - b. uses or wears the equipment, protective equipment or clothing that the University of Ottawa requires to be used or worn.
- 2) Without limiting the duty imposed by the above, a supervisor shall:
  - a. inform a worker of the existence of any potential or actual danger to the health and safety of the worker of which the supervisor is aware,
  - b. where so prescribed, provide a worker with written instructions as to the measures and procedures to be taken for protection of the worker,
  - c. take every precaution reasonable for the protection of the worker,
  - d. supply any and all necessary PPE and controls.

As a supervisor you are responsible for ensuring that your personnel in the laboratory, storage facility or office are fully aware of all University of Ottawa Directives, procedures and guidelines for the safe handling, storage, use and disposal of hazardous materials.

## 4.2 Responsibilities of the Worker

According to The Occupational Health and Safety Act, the responsibilities of the worker at the University of Ottawa are as follows:

**1) A worker shall:**

- a.** work in compliance with the provisions of the Act;
- b.** use or wear the protective equipment or clothing that the University of Ottawa requires to be used or worn;
- c.** report to his/her employer or supervisor the absence of or defect in any protective equipment of which the worker is aware and which may endanger him/herself or another worker; and
- d.** report to his/her employer or supervisor any contravention of the Act or Regulations or the existence of any hazard of which they become aware of (i.e. report missing MSDS, missing labels, outdated containers, etc.).

**2) No worker shall:**

- a.** remove or make ineffective any protective equipment required by regulation or by University procedure, without providing adequate temporary solution and, when the need for removing or making ineffective the protective equipment has ceased, the original protective equipment must be reinstated immediately;
- b.** use or operate any equipment, machine, tool, chemical, or thing or work in a manner that may endanger himself/herself or any other worker; and
- c.** engage in any prank, contest, feat of strength, unnecessary running or rough and boisterous conduct.

**3) A worker is not required to participate in a prescribed medical surveillance program unless the worker consents to do so.**

## 4.3 Responsibilities of the Carrier

The carrier is responsible for the following:

- 1) A carrier must not take possession of hazardous materials for transport unless the carrier has the shipping document in good order;**
- 2) Hazardous materials are in the possession of the carrier from the time the carrier takes possession of them for transport until another person takes possession of them;**
- 3) While the hazardous materials are in the possession of the carrier, the carrier must keep the shipping document in a specified location as indicated in the next paragraphs;**
- 4) Before or at the time another carrier takes possession of the hazardous materials, the carrier must give the shipping document or a copy of the shipping document to that other carrier/receiver or, with that other carrier's agreement;**
- 5) Before or at the time a person, other than another carrier, takes possession of the hazardous materials, the carrier of the hazardous materials must give to that person a document that identifies the hazardous materials;**
- 6) A carrier may replace a shipping document with a new shipping document or with a copy of the shipping document in a different format;**
- 7) Ensure that the required hazardous materials safety marks remain displayed on the small means of containment while the hazardous materials are in transport;**



- 8) Display the required hazardous materials safety marks on the large means of containment, unless they are already displayed on it, and ensure that they remain displayed while the hazardous materials are in transport; and
- 9) Provide and display, or remove, the hazardous materials safety marks if the requirements for hazardous materials safety marks change while the hazardous materials are in transport.

#### SAFETY MARKS

Hazardous materials safety marks during transport must be:

- (a) visible, legible and displayed against a background of contrasting colour;
- (b) made of durable and weather-resistant material that will withstand the conditions to which they will be exposed without substantial detachment or deterioration of their colour, symbols, letters, text or numbers (deterioration is considered substantial if the colour of the safety mark fades or darkens so that it is no longer the colour that represents the class of dangerous goods associated with it); and
- (c) displayed in the colours specified in section 5.3 of this document.

#### LOCATION OF A SHIPPING DOCUMENT DURING ROAD TRANSPORT

The driver of a semi-trailer that is attached to or is part of the cargo unit of a road vehicle transporting hazardous materials must ensure that a copy of the shipping document is kept, as follows:

- (a) if the driver is in the road vehicle, in a pocket mounted on the driver's door or within the driver's reach; or
- (b) if the driver is out of the power unit, in a pocket mounted on the driver's door, on the driver's seat or in a location that is clearly visible to anyone entering through the driver's door.

## 5.0 MANAGEMENT APPROACH FOR HAZARDOUS MATERIAL

The aim of the Directive is to implement and maintain sound procedures that will focus upon the principles of life cycle management, with the goal of managing hazardous materials from reception to off-site final disposal. The Directive's approach complies with the University of Ottawa following Policies:

- Policy 54 – Enterprise Risk Management;
- Policy 91 - Environmental Management;
- Policy 77 – Occupational Health and Safety; and
- Policy 72 – Environmental Policy.

The guiding policies for hazardous waste management and health and safety are outlined in policies 72 and 77 while the roles and responsibilities for services, faculties and personnel are set out in policy 91. A copy of these Policies is available at the following link:

<http://www.uottawa.ca/about/policies-and-regulations/administrative-policies>

This Directive document covers material supply, storage, handling, recycling and hazardous material disposal. The University of Ottawa is committed to ensuring proper life cycle management of all

materials used at all campus locations and other properties owned or occupied by University personnel, including hazardous waste. The University and its contractors shall work only with reputable, certified suppliers and carriers.

## 5.1 Hazardous Material Procurement

The decision to request the purchase of hazardous materials implies a commitment to handle and use the materials properly from the time of reception to ultimate off-site disposal and elimination. All involved personnel prior to the procurement of the chemical must understand information on proper handling, storage and disposal. Supervisors have the responsibility to ensure all of the necessary training, including spill response, has been provided to their personnel working with or handling hazardous materials.

There are 3 main areas for shipping and receiving chemicals at the University:

### Faculty of Science Stores

Contact : Purchasing and Science Store Manager  
 130 Louis Pasteur, Room 023  
 Ottawa, ON K1N 6N5  
 Fax : 613-562-5619  
[science.store@uOttawa.ca](mailto:science.store@uOttawa.ca)

### Faculty of Engineering

Contact: Faculty of Engineering Shipping and Receiving  
 161 Louis Pasteur, Room E011  
 Ottawa, ON K1N 6N5  
[engship@uottawa.ca](mailto:engship@uottawa.ca)

### Faculty of Medicine

Contact: Faculty of Medicine Senior Buyer  
 Purchasing and Receiving Services  
 451 Smyth Rd, Ottawa, ON, K0A 1W0  
[medpurch@uottawa.ca](mailto:medpurch@uottawa.ca)

## 5.2 Hazardous Material Receiving

It is important that hazardous materials are delivered to an area that is designed for proper storage. All hazardous materials are to be delivered to the University by commercial carriers in accordance with the requirements of the Canadian Transportation of Dangerous Goods Act (TDGA) and its regulations. The University of Ottawa must only contract suppliers and carriers with valid licenses and inspected as required by Transport Canada. All required permits, licences, and certificates of compliance are the responsibility of the carriers regarding transportation to and from University property. All shipments must be properly identified and placarded. Shipping papers must be accessible and include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire-fighting information, procedures for handling, procedures for leaks or spills, first aid measures, and emergency response telephone numbers.

Receivers must be TDG trained and hazardous material containers shall not be accepted without accompanying labels, material safety data sheets (MSDS) and packaging in accordance with all appropriate regulations.

Additionally, all chemical containers must be given a dedicated bar code upon reception by University personnel and entered into the University's chemical inventory system (Vertére). Upon receipt, the chemical must be labeled in accordance with section 5.3.

Supplier labels are provided by suppliers of controlled products, and are generally attached to the container prior to shipping. Therefore all controlled products arriving at the University should be WHMIS/GHS labeled (exceptions to this rule are discussed in section 5.3.2).

Each carrier doing business with the University of Ottawa is required to develop and submit a spill prevention, control, and countermeasures plan to the Office of Risk Management to address the materials they are bringing to the University. In the event of a release during transport, or before official reception, the commercial transportation company is responsible for first response and cleanup. Any goods damaged during transport and identified upon receipt must be reported to Transport Canada.

### 5.3 Identification

Workplace Hazardous Materials Information System (WHMIS), established under the *Hazardous Products Act (HPA)* and associated *Controlled Products Regulations (CPR)*, and the Transportation of Dangerous Goods Act and Regulations (TDG) are the two primary regulatory drivers governing the identification of hazardous materials (controlled products) / dangerous goods in Canada. WHMIS/GHS regulates the identification of stationary storage tanks and smaller containers at facilities and deals with hazards for a person working with a product generally at lower concentrations and volumes but over an extended period of time (biological or chemical agent to which a worker may be exposed in a work day or a work week i.e. time weighted average (TWA)). TDG provides a system of placards and labels used during the transportation of dangerous goods and that is more directed towards larger volumes at higher concentrations for a short period of time (i.e. immediately dangerous to life and health (IDLH)). The latter will be discussed in the following sections for information and education purposes only. The responsibility of proper labelling for off-site transportation belongs to the carrier and disposal contractors hired by the University.

In Ontario, hazardous waste products being transported, if handled in accordance with the requirements of the *Transportation of Dangerous Goods Act and Regulations*, are exempt from the Provincial WHMIS legislation. As provided for by paragraph 14(d) of the *WHMIS Controlled Products Regulations*, if an outer container has a label in accordance with the *TDG Regulations* (i.e., a TDG label), the outer container will not require a WHMIS label. Inner containers, however, must have WHMIS labels. If a product does not have any inner containers (e.g., a 205 L drum of acetone), then this exemption is not applicable (i.e. a WHMIS "workplace" label must be applied to the container as well). Please note that not all controlled products will require TDG labelling since the criteria for WHMIS controlled products are broader than the criteria for products subject to the *TDG Regulations*.

One of the most important sections of the hazardous materials and hazardous waste directive center's on the proper identification and labelling of hazardous substances, dangerous goods and controlled products by the appropriate labels and placards for the purpose of storage, handling and transportation. In most cases, the labeling requirement is met by means of the *supplier label*; however, in certain

instances University personnel must make a *workplace label*. All labels that deteriorate must be replaced without delay.

Any container used to store hazardous waste must be labelled in the same manner as raw chemicals. Labels for this purpose are available in designated hazardous waste rooms through the waste collection services. You can also contact the Office of Risk Management at [enviro@uottawa.ca](mailto:enviro@uottawa.ca). Each hazardous waste container is clearly labelled at a minimum with:

- contents (this is required to classify the waste for disposal);
- date the hazardous waste was stored;
- location of origin and room or laboratory number (service, laboratory or other); and
- generator's contact information.

Users must make every effort to identify all waste before submitting a collection request for an unknown chemical waste for disposal. This information may greatly reduce the hazards involved in handling and classifying the material. Include the name of the group it comes from, lab room number, contact person, telephone number, type of use (e.g. research, maintenance, etc), storage method, approximate age of the container/product and all relevant information (i.e. organic, acid, air reactive, pH, oxidizer, volatile, toxic, etc.).

Once hazardous chemicals are received at the University, WHMIS regulations apply. The WHMIS regulations call for the proper labelling of products, the availability of product information in the form of MSDS's, and employee education on how to identify and handle hazardous products. Safety data sheets of hazardous materials used on campus are available online, through ORM website, at the following link: <http://www.uottawa.ca/services/ehss/msds.htm>. You can also contact ORM directly by email at [enviro@uottawa.ca](mailto:enviro@uottawa.ca).

Following the reception and identification of the hazardous materials and hazardous waste, and prior to handling and transportation of such materials, University personnel (i.e. Environmental Health and Safety Technicians, store managers, lab managers, lab technicians or Supervisors) must review the MSDS associated with the materials. The MSDS information is then evaluated and assessed to determine the potential physical (fire and reactivity), health and environmental hazards associated with the materials.

The Controlled Products Regulations (CPR-WHMIS) also prescribe what elements of information must be on labels and MSDSs for WHMIS-controlled products. University of Ottawa personnel must use professional, scientific judgement and have the duty to report any hazard information of which they are *aware or ought reasonably to be aware*. The toxicology information must be presented in such a way so *as not to mislead a person as to the nature or extent of the hazard posed by the controlled product*.

The Reference Manual for the WHMIS Requirements of the **HAZARDOUS PRODUCTS ACT** and Controlled Products Regulations is located at:

[http://hc-sc.gc.ca/ewh-semt/pubs/occup-travail/ref\\_man/ref\\_manual\\_index\\_e.html](http://hc-sc.gc.ca/ewh-semt/pubs/occup-travail/ref_man/ref_manual_index_e.html)

Information on classification of wastes in general, and the use of professional judgement is available at: [http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/application/classification\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/application/classification_e.html)

### 5.3.1 Workplace label

A workplace label requires the following information:

- 1) Name of product, this can be a chemical name, trade name, brand name, generic name or code name.
- 2) Safe handling information i.e. precautions to take when handling, using or disposing of the product. The employer may use any expression they wish in this section, provided that the worker can understand and handle the product safely.
- 3) A statement indicating that an MSDS, supplied or produced, is available.

Supplier labels (section 5.3.2) must have a hatched border around the information on the label but labels prepared in the workplace do not necessarily have to have hatched borders. There are no colour restrictions or requirements for a hatched WHMIS border. University personnel may choose any one of many alternative approaches within the general guideline. There are no language restrictions for workplace labels and therefore personnel are free to use whatever language is commonly used in their workplace, as long as local users can understand the information provided. Example of a simple workplace label is given below. Note that additional information such as hatched border, hazard symbols, risk phrases, protective equipment symbols may optionally appear on the workplace label, but are not required.

#### WHMIS WORKPLACE LABELS



If you are using short hand names or acronyms on solutions, reagents, and aliquots of chemicals, you must maintain a cross-reference sheet that defines the short hand name or acronym in use (e.g. EtOH = ethanol or PBS = phosphate buffered saline). Review this list on a regular basis to ensure that all short hand names or acronyms in use are recorded and that the list is readily available to all users or other personnel that may come in contact with the materials.

### 5.3.2 Supplier label

Supplier labelling is necessary to deliver the relevant information needed to keep anyone that may come into contact with a hazardous product safe. The label should be the first thing that is noticeable. The label is a warning that the container contains a hazardous product. The supplier label applied to the hazardous material containers when they are to be left on site, for anytime period, shall disclose the following information:

1. The name of the product, which can be the chemical name, brand name, trade name, generic name, common name or code number where the product name is a trade secret. The name of the product must be identical to that on the MSDS.
2. The name of the supplier
3. A reference to the MSDS, which is a statement alerting the user that additional information on the controlled product is available.
4. Hazard symbols, as shown in the figure below, are symbols corresponding to each of the WHMIS classes, except for Class D, which has 3 hazard symbols, 1 for each division. The label should include a hazard symbol for each WHMIS class the controlled product falls into. The only exception occurs when a controlled product falls into both Divisions 1 and 2 of Class D, where only the symbol for Division 1 is required.
5. Risk phrases, which are short statements identifying hazardous properties of a controlled product (e.g. rapidly absorbed through skin, eye irritant, causes severe burns, may form explosive peroxides, may cause cancer etc.). The exact wording of risk phrases is up to the supplier; there may be several variations of the same risk phrase.
6. Precautionary measures, which are short statements describing the precautions to be taken when handling, using, disposing of or being exposed to the controlled product (e.g. keep in a cool place, avoid contact with skin, wear eye/face protection, keep away from sources of ignition). Occasionally suppliers may supplement this information, space permitting, with personal protection symbols (shown in the figure below). They do not specify the degree or type of risk for the product but serve as reminders for the safe use of the product.
7. First aid measures, which are short statements describing the immediate steps to be taken, either by a victim or co-worker, when an accident with a controlled product has occurred. These statements should be specific to the product. First aid measures do not include additional steps to be taken by a medical professional.

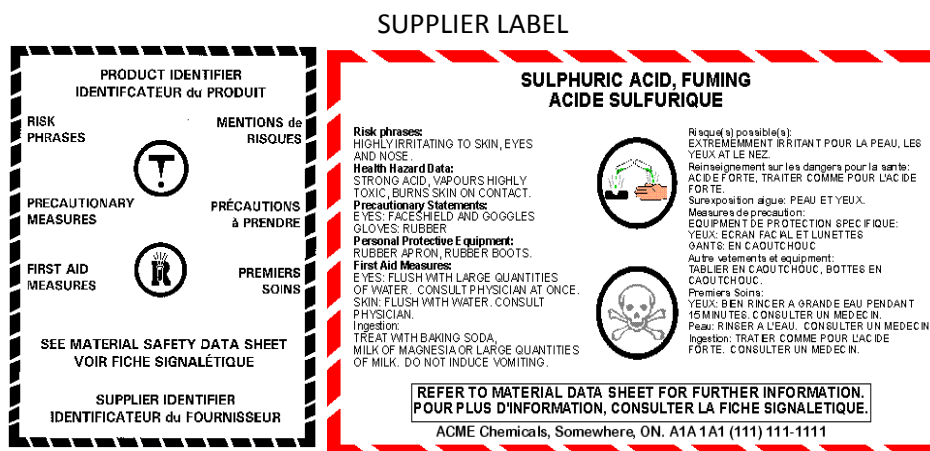
**Exceptions:**

1. Containers of volumes < 100ml (or equivalent size container of solid) require the name of the product, name of the supplier, a reference to an MSDS and the appropriate hazard symbols.
2. Supplies from the science store, where bulk chemicals are transferred into smaller containers (i.e. into 4 Litre bottles), those containers must be labeled with the name of the product, a reference to a MSDS, risk phrases, precautionary and first aid measures.

3. Laboratory samples i.e. a product packaged for evaluation, analysis or testing (volume < 10 kg) require the name of the product, chemical identity, approximate concentration of any controlled product or harmful component in the sample, name of supplier, the phrase "hazardous laboratory sample" and an emergency telephone number of the supplier (for information on the product and access to a medical professional if necessary). In this case, the provision of an MSDS is not mandatory. For example, samples sent off-site or to the University for gas chromatographic analysis. Samples sent in-house for testing (i.e. to another department) require only sufficient labeling to enable a lab employee to identify the product, its ingredients and how to get more information about the sample.

4. Controlled product originating from a laboratory supply house (i.e. BDH, Sigma-Aldrich, Fisher Scientific) that is intended solely for use in a laboratory (volume < 10 L) requires the name of the product, reference to an MSDS, risk phrases, precautionary and first aid measures. For example, a product purchased from a laboratory supply house outside Canada may include all the above information, however there is no requirement for a hatched border, hazard symbols or a supplier identifier.

Outer containers must be labeled with the transporter's name, address, registration number, and 24-hour emergency phone number. The following figures are examples of supplier labelling:



### 5.3.3 TDG Labels and Placards

Hazardous materials (controlled products) and hazardous waste safety marks are required to be displayed on means of containment containing such materials **in transport**. Hazardous materials (controlled products) and hazardous waste safety marks include labels, placards, orange panels, signs, marine pollutant marks, numbers, letters, abbreviations and words used to identify dangerous goods and to show the nature of the danger they pose.

Safety marks give a quick identification of the nature of the material involved in the event of an emergency situation such as an accident or an accidental release.

Safety marks are also an awareness tool for people involved in transportation including, but not limited to, truck drivers, train crews, loading dock, disposal site workers, reception personnel at a lab, a hospital or aircraft loading personnel.

Generally, **labels** are displayed on small means of containment and **placards** are displayed on large means of containment. TDG regulations mandate that labels be placed on small containers and placards placed on tanks and trailers. These labels and placards must clearly explain the hazard presented by the containerized material.

### 5.3.3.1 National Fire Protection Association (NFPA) Hazardous Substance Identification

Originally from the United-States, the NFPA Standard System for the identification of the hazards of materials for emergency response was adopted in Canada. It is used when large quantities of chemicals are stored. It quickly and easily identifies the risks posed by hazardous materials to help fire fighters and other emergency responders. NFPA uses a scale of numbers from 0 to 4 and a colour-coded diamond shaped label (NFPA Diamond) to identify the relative risk of Flammability, Reactivity, and Health Hazards associated with hazardous substances. Every person who works with or around hazardous materials must understand this labelling system.



#### NFPA Color Codes:

- **Yellow** - Reactivity
- **Red** - Flammability
- **Blue** - Health Hazard
- **White** - Special Information

#### Hazards - four basic hazards classifications for chemicals for the NFPA Diamond

- 1- **Reactivity** ratings describe the hazards of the material stability. Some chemicals will explode or react violently if exposed to heat or shock
- 2- **Flammability** ratings range from non-flammable to highly flammable. The NFPA ratings are based on the material flashpoint which is the lowest temperature at which a product generates enough chemical vapours to form with ambient air a gas mixture that will ignite with a spark or flame.
- 3- **Health Hazards** are those that can affect the immediate or long term health of an employee if exposed to a specific chemical. Acute effects of exposure are those that present symptoms when exposure occurs, such as when skin is exposed to an acid. Delayed or long term health effects can also occur from chemical exposure, such as cancer. Health effects for any given chemical will depend on the toxicity, duration of exposure and amount of exposure.
- 4- **Other Hazards.** Special markings are required if the material is radioactive, an oxidizer, acid or base or will react when exposed to other materials.



The following table illustrates hazards associated with numbers on the NFPA diamond:

### Colour Codes and Numbers

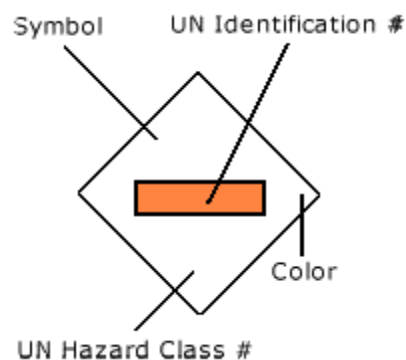
Number	Health	Flammability	Reactivity
0	<p>Combustible material</p> <p>Health Hazards: Not dangerous or not hazardous</p>	<p>Will not burn nor ignite.</p> <p>Flash Points: Will Not Burn</p>	<p>Normally very stable even when heated by fire or other external stimuli. Will not react with water.</p> <p>Reactivity: Stable</p>
1	<p>Usually only slightly hazardous. Hazardous substances that produce irritation but minor injury with no treatment provided.</p> <p>Health Hazards: Slightly hazardous</p>	<p>Will not spontaneously ignite.</p> <p>Flash Points:</p> <p>Above 93 ° C</p>	<p>Articles may be unstable if subjected to heat or under pressure. These items typically are stable but can become unstable at elevated temperatures or react with water.</p> <p>Reactivity: Unstable if heated.</p>
2	<p>Hazardous substances with continued exposure will cause temporary or permanent injury - if medical attention is not given quickly.</p> <p>Health Hazards: Hazardous</p>	<p>Materials and articles that must be heated prior to ignition.</p> <p>Flash Points: Below 93 ° C</p>	<p>These substances are typically unstable and will react violently with water or may form explosive complexes with water.</p> <p>Reactivity: Violent chemical change.</p>
3	<p>An extremely hazardous substance. Skin protection is essential and full protective clothing and equipment is required.</p> <p>Health Hazards: Extreme danger</p>	<p>Materials that can be ignited at standard temperatures. This includes both liquids and solids.</p> <p>Flash Points:</p> <p>Below 38 ° C</p>	<p>Materials that explode if heated or may react with water.</p> <p>Reactivity: Shock or heat may cause detonation.</p>
4	<p>Hazardous substances that cause severe injury or prove to be fatal even with quick medical attention.</p> <p>Example: Hydrofluoric acid</p> <p>Health Hazards: Deadly</p>	<p>Highly flammable. These particular materials burn readily at atmospheric pressure and normal temperatures.</p> <p>Flash Points: Below 73 ° F</p>	<p>Materials that by themselves can readily explode or violently react at normal temperatures and pressures.</p> <p>Reactivity: May detonate</p>

The white area of the diamond does not correspond with number ratings. It is reserved for “special hazards”. The information for the white area is as follows:

- OXY - Oxidizer
- ACID - Acid
- ALK - Alkali
- CORR - Corrosive W - Use No Water
- Radiation Symbol – Radiation

### 5.3.3.2 Department of Transportation Identification System (DOT Placard):

The DOT hazard classification system is based on the United Nations (UN) hazard classes.



#### Four sections to the DOT placard:

- UN Identification number
- UN hazard class number
- Hazard symbol
- Color of placard

There is a four digit UN Identification Number that identifies the hazardous material name which may refer to more than one chemical, and is found on the placard or the orange rectangular panel (as in the figures above). The UN ID number should also be placed on the manifest or shipping papers.

The UN Hazard Class Number is located on the bottom of the diamond and indicates the type or class of hazard. These numbers and their corresponding hazards are listed below:

**DOT Diamond Hazard Class Number and Description**

UN Hazard Class Number and Description	
1	Class A, B, C, Explosives
2	Nonflammable and Flammable Compressed Gases
3	Flammable Liquids
4	Flammable solids, spontaneously combustible substances, and water reactive substances
5	Oxidizing materials, including organic peroxides
6	Class A and B poisons, irritants and disease causing agents
7	Radioactive Materials
8	Corrosive Materials
9	Miscellaneous hazardous materials not covered by any other classes

The hazard symbols indicate a visual warning of the particular type of hazard by the hazardous material and the colour helps to identify the hazard.

**DOT Color and Corresponding Hazard**

COLOR	HAZARD
White	Poisonous
Yellow	Reactive
Orange	Explosive
Red	Flammable
White and Black	Corrosive
White and Red Vertical Stripes	Flammable Solid
Two Colors	Two Major Hazards

**5.3.4 Other types of Labels used at the University of Ottawa**

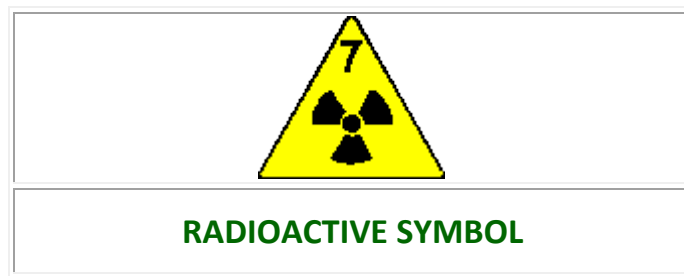
There are a number of other labels, personnel may come across at the University of Ottawa of which they should be aware of:

- 1) Hazardous Waste labels are used to identify hazardous waste chemical storage containers. The label (as shown in the figure below) must identify the type of waste in the container, the source of the waste (i.e. room number and building) and a contact number in case of emergency. The label is surrounded by a black and yellow hatched border.

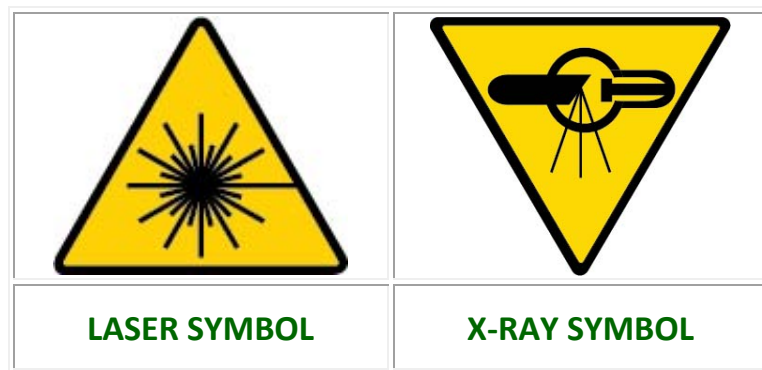
HAZARDOUS WASTE LABEL

RADIOACTIVE WASTE LABEL

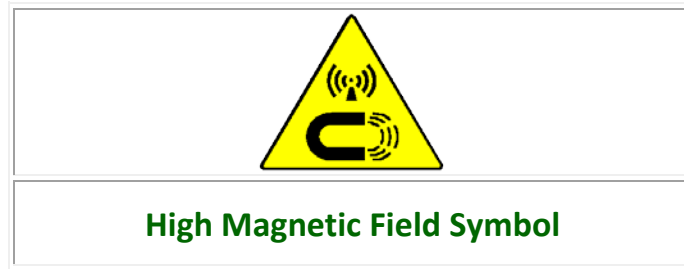
2) Radioactive Material labels identify materials which are designated "Radioactive" by the Canadian Nuclear Safety Commission (CNSC). These types of labels will be noticed at the entrance to any laboratory involved in research with radioactive materials and on the outer container of a radioactive product.



3) Laser and X-ray warning labels identify laboratories using high power lasers and X-ray sources. The approved label is shown in the figure below.



- 4) High Magnetic Fields labels are used to identify laboratories with strong magnetic fields (i.e. Nuclear Magnetic Resonance (NMR)) or Electron Spin Resonance (ESR)). These areas may be particularly harmful to anyone with a pacemaker. The label is placed at the entrance to a lab working with high magnetic fields and is shown in the figure below.



- 5) Biohazardous waste, also called infectious waste or biomedical waste, is any waste containing infectious materials or potentially infectious substances such as blood.



- 6) Pipe Identification labels are used to colour code pipelines carrying various types of materials (i.e. natural gas, compressed air, nitrogen, ammonia, fire protection equipment, etc.) The most commonly used classification system is given in the table below. On campus the large feeder pipes are predominantly underground, however, labeling can be noticed on natural gas and nitrogen lines that feed laboratories. Should a problem occur in one of these pipelines, personnel must be able to identify the level of hazard present from the pipe colour.

## COLOUR CLASSIFICATION OF PIPING SYSTEMS

<i>Classification</i>	<i>Colour</i>	<i>Example</i>
<i>Dangerous Materials</i>	Yellow	Ignitable, toxic, corrosives, explosives, electrical conduit
<i>Safe materials</i>	Green	Non-toxic, non-explosive, non-flammables or low pressures temperatures
<i>Protective materials</i>	Blue	Materials that are available to prevent or minimize the hazards of dangerous materials
<i>Fire protection equipment</i>	Red	Sprinkler systems and other fire-fighting equipment

**5.3.5 Some examples of labelling situations encountered at the University**

Situation	Labelling Requirements
Some controlled products that are in use at the University were acquired prior to October 31st 1988, the date when WHMIS came into effect.	Containers require name of product, safe handling information and MSDS statement.
A controlled product remains in its original container, but the supplier label is lost, defaced or becomes illegible.	Containers require name of product, safe handling information and MSDS statement.
A controlled product is generated, but is intended only for use at a University laboratory (i.e. the products from a research experiment being kept for further analysis or to study its stability in air or light, tainted blood removed from a virus-infected animal).	Containers require name of product, safe handling information and an MSDS statement. No label is required for a controlled product that exists only as an intermediate and is undergoing further reaction within a process or reaction vessel.
Existing controlled products that were imported for use at the University, but were not supplied with suitable supplier labels (i.e. a controlled product from outside Canada).	Containers require name of product, safe handling information and MSDS statement.
A controlled product is decanted into another container for use in the workplace (i.e. preparing standard solutions for future use).	Containers require name of product, safe handling information and MSDS statement. The labelling requirements do not apply if: <b>a)</b> the controlled product is used immediately (no label required), or <b>b)</b> the controlled product is decanted and used for a single use only during the shift of the day it was filled (contents of container must be identified, no other labeling is required). However, the entire content of the container

	must be used prior to the end of the shift. Otherwise, the container will have to be labeled.
A laboratory reagent is decanted (i.e. Grignard reagent prepared in the lab and stored under nitrogen for future use).	Containers only need to be identified by product name.
A hazardous material that is exempted from requirements for supplier labels and MSDS is decanted into another container for use in the laboratory (i.e. an explosive or radioactive material).	Containers require name of product, safe handling information and MSDS statement.
Hazardous waste (i.e. solvent waste stored in the five barrels of 20 Litre polypropylene drums).	Use University of Ottawa Hazardous Waste label.
Laboratory samples (i.e. controlled products undergoing analysis, tests or evaluation in a laboratory such as spectroscopic standards).	Laboratory samples need only be "clearly identified" using codes, numbers, sampling dates, chemical names, etc.
Samples and Research products / chemicals used on a small scale (i.e., < 10ml and the container is too small for a legible workplace label).	These only require clear product identification on outer container (if samples stored together in a larger container or desiccator), safe handling information if known and reference to MSDS if available. If samples are stored in a locked cabinet, no label is required but cabinet needs to be identified.
Broken glass bottles contaminated by PCB oil.	University of Ottawa hazardous waste label and broken glass warning label.
Broken glass from the kitchen.	Broken glass warning label.

### 5.3.6 Material Safety Data Sheet (MSDS)

As discussed in the previous sections, the WHMIS label identifies the product and the hazard by including the product identifier, hazard symbols and risk phrases. However, the limited space available on most hazardous material containers restricts the amount of information that can be provided to the user. The label therefore refers the worker to the Material Safety Data Sheet (MSDS) for more information on the product.

The Office of Risk Management (ORM) maintains a web page containing current internet links to the manufacturers supplying products to the University. To see this website go to: <http://www.uottawa.ca/services/ehss/msds.htm> or contact ORM directly by email at [enviro@uottawa.ca](mailto:enviro@uottawa.ca) to obtain a copy. For help with finding MSDS of non-typical products please contact the Faculty's or Service Department's Occupational Health and Safety Specialist.

#### ***What is a Material Safety Data Sheet?***

The MSDS is a technical bulletin or document that summarizes the health and safety information on a controlled product. The MSDS provides a list of all the hazardous ingredients, information on safe storage, handling and use, information on protective measures and emergency procedures for workers.

The information appearing on a MSDS must be comprehensive and must include all the information available to the supplier about the product.

Canada has aligned the Workplace Hazardous Materials Information System (WHMIS) with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Information below is based on the federal legislation - the amended Hazardous Products Act and the new Hazardous Products Regulation (HPR).

WHMIS regulation is flexible regarding the design, format and wording of the MSDS, however it must be available in French and English and contain the following information<sup>1</sup> (category headings may be different on some MSDSs from the U.S.A):

### 1. Identification

- Product identifier (e.g. Product name)
- Other means of identification (e.g. product family, synonyms, etc.)
- Recommended use
- Restrictions on use
- Canadian supplier identifier
  - Name, full address and phone number(s)
- Emergency telephone number and any restrictions on the use of that number, if applicable

### 2. Hazard identification

- Hazard classification (class, category) of substance or mixture or a description of the identified hazard for Physical or Health Hazards Not Otherwise Classified
- Label elements:
  - Symbol (image) or the name of the symbol (e.g., flame, skull and crossbones)
  - Signal word
  - Hazard statement(s)
  - Precautionary statement(s)
- Other hazards which do not result in classification (e.g., molten metal hazard)

### 3. Composition/Information on ingredients

- When a hazardous product is a material or substance:
  - Chemical name
  - Common name and synonyms
  - Chemical Abstract Service (CAS) registry number and any unique identifiers
  - Chemical name of impurities, stabilizing solvents and/or additives\*
- For each material or substance in a mixture that is classified in a health hazard class\*\*:
- Chemical name
- Common name and synonyms
- CAS registry number and any unique identifiers
- Concentration

NOTE: Confidential business information rules can apply

### 4. First-aid measures

- First-aid measures by route of exposure:
  - Inhalation

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<sup>1</sup> Source: Canadian Centre for Occupational Health and Safety



- Skin contact
- Eye contact
- Ingestion

- Most important symptoms and effects (acute or delayed)
- Immediate medical attention and special treatment, if necessary

#### 5. Fire-fighting measures

- Suitable extinguishing media
- Unsuitable extinguishing media
- Specific hazards arising from the hazardous product (e.g., hazardous combustion products)
- Special protective equipment and precautions for fire-fighters

#### 6. Accidental release measures

- Personal precautions, protective equipment and emergency procedures
- Methods and materials for containment and cleaning up

#### 7. Handling and storage

- Precautions for safe handling
- Conditions for safe storage (including incompatible materials)

#### 8. Exposure controls / Personal protection

- Control parameters, including occupational exposure guidelines or biological exposure limits and the source of those values
- Appropriate engineering controls
- Individual protection measures (e.g. personal protective equipment)

#### 9. Physical and chemical properties

- Appearance (physical state, colour, etc.)
- Odour
- Odour threshold
- pH
- Melting point/Freezing point
- Initial boiling point/boiling range
- Flash point
- Evaporation rate
- Flammability (solid; gas)
- Lower flammable/explosive limit
- Upper flammable/explosive limit
- Vapour pressure
- Vapour density
- Relative density
- Solubility
- Partition coefficient - n-octanol/water
- Auto-ignition temperature
- Decomposition temperature
- Viscosity

#### 10. Stability and reactivity

- Reactivity
- Chemical stability
- Possibility of hazardous reactions
- Conditions to avoid (e.g., static discharge, shock, or vibration)
- Incompatible materials
- Hazardous decomposition products

#### 11. Toxicological information

Concise but complete description of the various toxic health effects and the data used to identify those effects, including:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact)
- Symptoms related to the physical, chemical and toxicological characteristics
- Delayed and immediate effects, and chronic effects from short-term and long-term exposure
- Numerical measures of toxicity

#### 12. Ecological information\*\*\*

- Ecotoxicity
- Persistence and degradability
- Bioaccumulative potential
- Mobility in soil
- Other adverse effects

#### 13. Disposal considerations\*\*\*

- Information on safe handling for disposal and methods of disposal, including any contaminated packaging

#### 14. Transport information\*\*\*

- UN number
- UN proper shipping name
- Transport hazard class(es)
- Packing group
- Environmental hazards
- Transport in bulk, if applicable
- Special precautions

#### 15. Regulatory information\*\*\*

- Safety, health and environmental regulations specific to the product

#### 16. Other information

- Date of the latest revision of the SDS
- Other information

Notes:

\* These impurities and stabilizing products are those that are classified in a health hazard class and contribute to the classification of the material or substance.

\*\* Each ingredient in the mixture must be listed when it is classified in a health hazard class and is present above the concentration limit that is designated for the hazard class in which it is classified or is

present in the mixture at a concentration that results in the mixture being classified in any health hazard class.

\*\*\* Sections 12 to 15 require the headings to be present, but under Canadian regulations, the supplier has the option to not provide information in these sections.

### ***Comparison of MSDS headings in former WHMIS legislation and the new GHS***

WHMIS		GHS	
Item	Heading suggested	Section	Heading
1	Hazardous Ingredients	1	Product and Company Identification
2	Preparation Information	2	Hazards Identification
3	Product Information	3	Composition/Information on Ingredients
4	Physical Data	4	First Aid Measures
5	Fire or Explosion Hazard	5	Fire Fighting Measures
6	Reactivity Data	6	Accidental Release Measures
7	Toxicological Properties	7	Handling and Storage
8	Preventive Measures	8	Exposure Controls/Personal Protection
9	First Aid Measures	9	Physical and Chemical Properties
		10	Stability and Reactivity
		11	Toxicological Information
		12	Ecological Information
		13	Disposal Considerations
		14	Transport Information
		15	Regulatory Information
		16	Other Information

### ***Appearance of an MSDS***

The MSDS varies in format and content detail from one supplier to another. Within the general guidelines, the specific contents of the MSDS are performance oriented. Thus, the supplier is given a great deal of latitude in the design and wording. Therefore, an MSDS may vary in length, presentation and amount of detail provided.

Chemicals and products purchased outside of Canada may be accompanied by an MSDS which does not necessarily comply with Canadian WHMIS/GHS standards. The headings might be slightly different, but most of the information is there. Some MSDS may come without a preparation date since it is not required by any states in the U.S.A. University personnel must include a date (such as date of reception or order) on the MSDS for internal record purposes. The waste disposal procedures on a foreign MSDS may be the appropriate procedures for the U.S.A or Europe, but NOT necessarily for Canada or Ontario. Therefore, if a foreign MSDS indicates that disposal of a material to the sewer is acceptable, it is mandatory to confirm with the Office of Risk Management (ORM) beforehand. Sewer use and discharge protocols are discussed in more details in section 5.4.4.

The University of Ottawa orders chemicals from many sources, in some cases the same chemical is ordered from several different companies i.e. ethanol may be obtained from BDH, Sigma-Aldrich, Fisher, etc. In each case, the company will send out its own generic MSDS for that product, and as a result a laboratory could find itself with three duplicate MSDSs for the same product. If the products possess exactly the same chemical composition, it is acceptable to retain only one MSDS and discard the others.

It is required to prepare a “workplace” MSDS for products produced in the laboratory on a regular basis and which are stored for longer periods. ORM can supply MSDS templates upon request and can assist in the production of the final workplace MSDS.

## 5.4 CHEMICAL HANDLING

Hazardous materials and hazardous wastes include all gas, liquids or solids designated as such under either federal or provincial regulations (i.e. hydrocarbons, used batteries, various chemicals used during concrete operations, mercury thermostats, coating materials and a wide variety of other materials including any containers with residual amounts of hazardous materials). Even timber that is chemically treated shall be considered as hazardous waste. Generally, chemicals or materials of unknown properties will be considered as hazardous waste unless it can be demonstrated and documented otherwise.

Hazardous materials and hazardous waste must only be handled by trained personnel and comply with the appropriate legislation. The University of Ottawa participates in the Higher Education Cooperative for Hazardous Materials and Equipment Tracking (as known as HECHMET) project. The HECHMET project is underpinned by the Vertère Inventory Manager (VIM) software, a modular, web-based enterprise application used to track chemicals and other materials within the university working environment. The location-specific inventory contains, at the very least, the following information: Chemical name, quantity, hazard class (es), measures to prevent exposures, date received, location, MSDS available and date when removed from the inventory.

All hazardous waste generated and stored must be clearly labelled and at no time shall hazardous waste be combined with other solid non-hazardous or domestic waste. Spill kits are available inside the hazardous waste storage areas and in all the laboratories or workshops. As discussed in section 5.1, supervisors have the responsibility to ensure all of the necessary training for spill response, has been provided to their personnel working with or handling hazardous materials. Should a discharge, leak or spill event become out of Faculty’s control, ORM will be contacted by Protection Services to ensure efficiency and safety of the response plan, oversee cleanup procedures, removal of contaminated material and reporting to authorities, if required.

It is important to mention that biological and radiological materials are two special classes of hazardous materials. Specific Management Plans and Emergency Procedures have been developed by ORM for these special classes which are available at:

- <http://www.uottawa.ca/services/ehss/biosafety.htm>, and
- <http://www.uottawa.ca/services/ehss/ionizing.htm>

Biological and radiological materials require special attention. The nature of such materials and wastes requires separate packaging, handling, storage and disposal procedures. All such waste shall be

packaged, labelled and transported for disposal to a facility licensed to dispose of such waste. It is important to contact the University of Ottawa radiation and biological compliance specialists (at ORM) if you have any questions about the purchase, transportation, use, storage and disposal of all biohazards (including sharps) and materials containing radioisotopes.

## 5.4.1 Hazard control methods

For the safe handling of hazardous materials and waste, hazard controls can be classified in three categories: engineering controls, administrative controls and personal protective equipment. At the University of Ottawa, the combination of these methods is typically required to adequately control all the potential hazards with regards to personnel safety and environmental protection.

### 5.4.1.1 - Engineering controls

Engineering controls can be ideal methods of hazard control because the hazards are eliminated or minimized at the source by substitution, isolation, automation or exhaust ventilation (e.g. fume hoods or other local exhaust ventilation). The following paragraphs demonstrate some of the most common engineering controls implemented at the University of Ottawa.

#### FUME HOOD

Fume hoods are the most common engineering control in laboratories. Their sole purpose is to protect laboratory workers from exposure to airborne hazardous materials. Before beginning any work in the fume hood, confirm that the hood is operational. Check that the local ON/OFF switch is in the "ON" position. Adequate airflow and the absence of excessive air turbulence are necessary for the safe operation of a fume hood. Basic rules to ensure continued safe operation:

- If the fume hood is not operational, refrain from using the equipment and contact Physical Resources Service (PRS) Department at 2222 and send a report to the Faculty's, Service or Department's HSRM for a follow-up on the repairs.
- Sash openings should be kept as far down as possible while working in the fume hood. When the fume hood is not in use, the sash should be completely closed.
- **Do not block** the air baffles at the back of the fume hood. Do not place anything closer than 3 cm (1 inch) from the back of the inside of the fume hood.
- Keep apparatus at least 15 cm (6 inches) away from the front of the fume hood. Use stands to elevate bulky apparatus so as to avoid disrupting the air flow through the fume hood.
- Keep the fume hood clean and uncluttered. Apparatus and chemicals should normally be kept in the fume hood only if they are a component of the operation for which the hood is being used.
- Do not use fume hoods for long-term storage of chemicals or apparatus.
- Do not modify the interior of the hood (e.g., installing shelves). Some older fume hoods may have asbestos-containing liners.
- Minimize foot traffic around the fume hood. A person walking past a fume hood can create air turbulence, allowing contaminants to flow out.
- Keep windows and doors near fume hoods closed. Open windows and doors can disrupt airflow.
- Do not use fans near fume hoods. Fans in the laboratory can cause turbulence that can disrupt proper air flow throughout the fume hood, allowing contaminants to flow out.
- Obtain adequate training from the laboratory supervisor prior to using any fume hood.

#### LOCAL EXHAUST VENTILATION SYSTEM

Local dust extraction and exhaust ventilation systems are a very common engineering control in laboratories, workshops and chemical storage rooms. Depending on the chemical(s) involved, they can be an excellent solution as employee exposure to contaminants is minimized and the contaminant itself can be collected for recovery or safe disposal. These systems generally have four basic components: hood(s), duct network (including the exhaust duct, discharge stack and/or recirculation duct), air cleaning device and fan. Basic rules to ensure continued safe operation:

- When using new materials, ensure the unit is designed to take the hazardous substances (e.g., chemical and biological agents) with regards to construction material and cleaning device compatibility.
- Confirm with hood static pressure gauges or direct measurement that rate of air exhausted is in accordance with normal operating standards with flow monitors.
- Ensure equipment failure alarms are functional.

#### **5.4.1.2 - Administrative Controls**

When engineering controls are not possible or not sufficient, administrative controls such as additional training, safe or standard operating procedures (SOP), emergency preparation, regular inspections, internal audits, effective repair/maintenance and housekeeping programs are implemented. The following paragraphs demonstrate some of the most common administrative controls implemented at the University of Ottawa.

#### HAZARD SIGNS

Laboratory, workshop and chemical storage hazard signs are required on every door of a public hallway or common access that leads into a space where hazardous materials are stored and/or used. To request a new sign for your laboratory, workshop or support space (i.e. autoclave room, chemical storage room or cold room), please contact PRS or your Faculty's, Service or Department's HSRM.

#### REGULAR INSPECTIONS

A good way to help ensure that a ventilation system is operating properly is by regularly checking the direct measurement of air flow rates/velocities at appropriate points. For laboratory ventilation (e.g., general use laboratory hoods), flow rate or face velocity measurements are good indicators of system performance. For a local exhaust ventilation system, hood static pressure measurements can also serve well. The University of Ottawa has an internal audit and inspection program to ensure that all engineering controls are in good working order. If supervisors suspect a malfunction of equipment used as an engineering control, please contact PRS at 2222 to schedule an inspection.

#### LABORATORY, WORKSHOP AND STORAGE ROOM INSPECTIONS

Regular workplace inspections play a key role in preventing accidents and injuries by identifying hazards, implementing corrective measures and monitoring the effectiveness of the controls. It is recommended that supervisors conduct inspections of their facility on a monthly basis. A generic inspection checklist can be supplied by ORM and supervisors are welcome to customize this form so as to meet the specific circumstances of their laboratory, workshop or storage facility.

#### PEROXIDIZABLE COMPOUNDS MANAGEMENT

Some materials are ordered in small quantities (less than 6 month supply) and dated when the container has been opened. Examples include acetal, decahydronaphthalene, dicyclopentadiene, diethylene glycol, dioxane and isopropyl ether. Even if a commercial inhibitor has been added by the manufacturer,

organic peroxide formation can begin within 6 months following exposure to air. The ordering of smaller quantities and the reduction of the volume of these materials in storage encourages the quick turnover of inventory and reduces the likelihood of peroxide formation (organic peroxides are explosive).

## EMERGENCY RESPONSE PROCEDURES IN LABORATORIES, WORKSHOPS AND CHEMICAL STORAGE ROOMS

All supervisors are responsible for developing and implementing emergency response procedures specific to their laboratory, workshop, chemical handling or storage room. ORM is available to assist supervisors in the creation or update of specific emergency response procedures. All users must be trained by a supervisor or a qualified delegate and be aware of what actions are to be taken in the event of an emergency. Users and University personnel must be aware to call Protection Services at 5411 for all emergencies.

### Chemical Contact/splash

*(Make sure to verify with SDS)*

Eyes: Flush with water for 15 minutes. Seek immediate medical attention.

Skin: Flush with water for 15 minutes while removing contaminated clothing. Seek medical attention.

Ingestion: Drink water and seek medical attention. Do not induce vomiting.

Inhalation: Remove the victim from exposure and move to fresh air. If the person is not breathing or experiencing breathing difficulty, seek medical attention.

### Emergency Shower and Eyewash Stations

Emergency shower and eyewash stations are installed in areas where the eyes or body of any person may be exposed to harmful chemicals. Signs indicating “Emergency Shower and/or Eyewash” are posted at each installation. The Health and Safety Department at ORM should be consulted for additional emergency shower and eye wash needs.

The emergency shower and eyewash stations should be installed within 8 meters of any hazardous materials location or within 10 seconds of travel. The area around the emergency shower and eyewash station must be unobstructed at all times and have a continuous water supply. They are also located away from hazardous material storage areas and electrical sources.

Emergency shower installations must be inspected by Facilities services personnel every six months and flushed monthly by the laboratory manager. Eye wash stations are inspected once a year and flushed either every week, for a tepid water supply or, every month, for a cold water supply by lab personnel.

### Chemical Spill

- Spill kits with appropriate spill cleaning supplies and spill prevention equipment are readily accessible in conspicuously marked location.
- Supervisors must ensure all laboratory users and personnel are trained in the proper spill response and clean-up protocols for the type and quantity of hazardous materials handled, within their capabilities.
- Refer to the University's Emergency Response Plan available in section 6.0 of this document for more information regarding spill response protocol.

General actions to take in the event of a spill:

The following instructions aim to be as a summary only. Spill response procedures are detailed in the University Lab Safety training and special training sessions can be arranged through ORM.

- Stay clear and warn others in the immediate area of the spill.
- Isolate the area around the spill and proceed with clean-up.
- Complete an incident report on the following uOttawa link:  
<https://web30.uottawa.ca/v3/riskmgmtfrm/aioreport.aspx?lang=en>

If spill is of greater importance:

- Assist injured or contaminated persons if you are trained to do so.
- Call Protection Services at 5411, available 24 hours a day / 7 days a week, and remain on the scene in safe area.
- If safely possible, stop spill discharge and/or prevent hazardous materials to reach sewer drains and the natural environment (land, surface water). For airborne discharge, ensure adequate ventilation is supplied.
- Proceed to clean-up the spill if it is within capabilities.
- Dispose of contaminated materials in accordance with section 5.4.4.
- Complete an incident report on the following uOttawa link:  
<https://web30.uottawa.ca/v3/riskmgmtfrm/aioreport.aspx?lang=en>

Fire

In the event of a fire or explosion:

- Warn others in the immediate area of the fire or explosion.
- Activate the building fire alarm system.
- Contain the fire by closing doors and fume hoods in the area of the fire, if safe to do so.
- Evacuate the area of the fire or explosion and the building. Use stairs, not the elevator.
- Call Protection Services at 5411 and provide details.
- Meet emergency personnel at the main entrance of the building.

**5.4.1.3 - Personal Protective Equipment (PPE)**

Personal protective equipment (PPE) is a method of controlling hazards only when neither engineering controls nor administrative procedures can effectively minimize the impact of the hazard. PPE is considered a last line of defense because the potential for exposure has not been removed and any breach (e.g. improper fit or use) will result in user exposure. The following paragraphs demonstrate the most common PPE requirements implemented at the University of Ottawa. Detailed instructions about the University's complete Personal Protective Equipment Guideline are available through the Office of Risk Management (ORM) or directly, at:

[http://www.uottawa.ca/services/ehss/documents/PPE\\_21092011english1.pdf](http://www.uottawa.ca/services/ehss/documents/PPE_21092011english1.pdf)

**MANDATORY PPE**

When using hazardous substances that may come into contact with skin or eyes the following PPE must be worn at all time as a minimum:



- Safety glasses with side shields or goggles
- Laboratory coat with snap buttons
- Long pants
- Closed-toe shoes
- Appropriate gloves (selected based on the type of chemical being used, duration of use and the method of use)

#### RESPIRATORY PROTECTIVE EQUIPMENT

Respiratory protective equipment is used to protect against exposure to airborne dusts, gases, vapours, mists and aerosols. Respirators are used as a means of protection once determined that the airborne hazard cannot be controlled efficiently using engineering or administrative methods alone. It is the responsibility of the supervisors to determine the need and the type of respirator required. Faculties HSRMs and ORM's Occupational Health and Safety Specialist can be contacted during working hours for assistance. The following steps assist in determining the need for a respirator:

- Identify the airborne hazards.
- Can the process be substituted with less hazardous materials?
- Can the experiment/process be conducted inside a fume hood or other ventilated enclosure?
- Can safe work procedures and training be used to minimize the hazard?

Once it is determined that a respirator is required, the supervisor must contact the University's Health, Wellness and Leave Sector from the Human Resources department to:

- Ensure worker is medically fit to wear a respirator. To arrange for a medical and respirator wearer's health screening consult the Assistant Director, Health, Wellness and Leave sector, Human Resources. Once screening is completed, send results to the Department of Environmental Health & Safety (EHS) at ORM.
- A fit test is required to ensure the respirator is appropriate, fits properly and is comfortable to wear. Please note that following the initial fit test, consecutive tests must be done at a 2 year interval. The results of the fit tests are shared with the user and their supervisor.
- Instructions on the proper use, care, maintenance and limitations of the respirator are also provided at that time.

Health, Wellness and Leave Sector  
 Tabaret Hall, Room 017  
 Tel : 613-562-5832, ext. 1473  
[santetr@uottawa.ca](mailto:santetr@uottawa.ca)

## 5.4.2 Chemical Transfer

### 5.4.2.1 Chemical Transfers (*Refilling/Transferring Chemical*)

The preferred technique for chemical transfer at the University of Ottawa is based on minimizing user exposures to chemicals and minimizing the risks for environmental spill. In order of effectiveness:

1. Designed engineering controls, such as bulk-fed delivery systems;
2. Local engineering controls, such as an articulating arm with snorkel exhaust; and
3. Having the employee pour chemicals by hand in a designated area while wearing PPE.

In a laboratory, workshop or storage room environment, it is not always practical to bulk feed smaller amounts of chemicals in ways other than by hand. The University of Ottawa allows the transfer of chemicals by hand provided the following requirements are met:

- All hand pouring of hazardous materials or hazardous waste requires local exhaust, such as a fume hood or an articulating arm with snorkel exhaust and HEPA filter to minimize user exposures, odor issues and explosion risks.
- No more than 4 L of hazardous liquids may be hand poured at a single time and must be dispensed to and from approved containers.
- If an equipment requires more than 205 L (aka a full drum) of a single chemical in a two-week period, it must be bulk supplied.
- Job-specific training must be given by the supervisors to all users or personnel performing the hand pouring task and written procedures, such as Standard Operating Procedures (SOPs), shall be in place. The procedures shall include, at the very least, proper use of PPE and detailed spill emergency and clean-up procedures in accordance with the chemical hazards present.
- All hand pouring/dispensing of hazardous materials or hazardous waste requires secondary containment such as spill trays or berms with sufficient capacity to accommodate overfills and must be done in an area without floor drains or potential discharge to the environment.
- Spill clean-up supplies must be prepared according to the material(s) transferred and available in the immediate work area.

Note: Special circumstances that do not meet this specification must be authorized by the HSRM officer at the Faculty. A written consent from the HSRM specifying the specific exception and time limit is required at the location of transfer at all times.

#### **5.4.2.2 Moving Chemicals – Hazardous Materials Transfer Request**

Moving (sometimes referred to as “transporting”) hazardous materials from one location or area to another can be a very dangerous activity unless safe handling precautions are practiced. As part of the Hazardous Materials Technical Services Program, The Office of Risk Management offers the transfer of hazardous materials and hazardous waste within the main campuses of uOttawa.

Some examples of this service would be:

- Ordering a bottle of Acetone from Science store and having it delivered to ARC or CBY
- Laboratory move where chemicals need to be relocated from one laboratory to another

In order to request this service the user must complete an online form available at <https://orm.uottawa.ca/transfer-request>. The service will be scheduled in the next available time slot (generally within 2 business days).

In order to request a transfer involving Science Stores, it is important that the requester have all of the paperwork required (including delegation forms) prior to submitting a transfer request.

Important note: Students and staff are not permitted to transport hazardous materials on public roads (i.e King Edward).

### 5.4.2.3 Moving chemicals within the campus while not using public streets

The following paragraphs explain the basic hazardous material handling and storage precautions to be taken when moving hazardous materials at the University of Ottawa:

**1.** Perform a pre-move visual inspection and inventory of the hazardous materials that will be moved. Know the properties of the hazardous materials you move and use.

- Make a list of the hazardous materials and note the type (e.g. Acid, Base, Reactive, Toxic) and quantity of the hazardous materials to be moved.
- Make sure that each container is correctly labeled.
- Observe the general condition of each container.
- Observe each containers cap or closure seal for the formation of crystals. CAUTION: DO NOT TOUCH, TIGHTEN, OPEN OR MOVE CONTAINERS THAT HAVE CRYSTALS FORMING ON THE CAPS AND SEALS.
- If possible, observe whether crystals, which could be the signs of decomposition, have formed INSIDE the container. Ethers and other classes of organic peroxides can decompose and produce potentially dangerous and explosive crystals.

**2.** Locate and review the Material Safety Data Sheet (MSDS) for each hazardous material to be moved. Each MSDS has chemical specific handling and safety information that must be properly followed in order to move the hazardous material safely.

**3.** Plan the move. Choose the best route to take from point A to point B. Do not take containers up or down stairs, if possible.

**4.** Prepare the hazardous materials for the move.

- Remember to use the proper goggles, gloves and other personal protective equipment before handling any hazardous materials. Refer to the University's PPE guidelines mentioned in section 5.4.1.3.
- Group the containers for the move by Hazard Class. Make a separate move for each Hazard Class.
- Transfer salvageable hazardous materials from deteriorating or contaminated containers to new containers with new labels, following safe practice further discussed in section 5.4.2.
- Box hazardous material containers if possible, using the correct packing material (e.g. Vermiculite, original packaging boxes).
- Properly dispose of unsalvageable and excess hazardous materials as Hazardous Waste. Refer to section 5.4.4.
- If you use a cart to move containers make sure containers can be secured properly. Place heavy containers on the bottom rack of the cart. Do not overload the cart: make several trips if necessary.
- Take a chemical spill kit with you in the event you have a spill along the move. Also make sure you carry a floor drain cover if floor drains were identified on your route.

**5.** During the move.

- Stay with the containers at all time. Do not let them out of your sight while you are moving them between points A and B.
- Be aware of your surroundings. Watch for doors opening in your way. Warn people of the hazard before they get close to you.

*Special notes regarding compressed cylinders*

- Always remove regulators from the cylinders before moving.
- Always replace the metal valve cover on the cylinder before moving.
- Move the cylinder with a cylinder dolly made especially for moving cylinders. Make sure the cylinder is securely chained or strapped to the dolly.
- DO NOT lay cylinders on their sides. Laying a cylinder on its side can cause condensed liquids in the cylinder to enter the valve. When the valve is opened the liquid can rapidly vaporize and expand. This can produce potentially explosive conditions.

#### **5.4.4 Hazardous Waste Disposal**

The use of hazardous materials for research, teaching and support services at the University of Ottawa generates hazardous waste and liquid industrial waste. These wastes require special handling to prevent harmful effects to human health and the environment. As a general rule, all precautions followed when handling, storing, and using hazardous materials also equally apply to hazardous waste. Remember that only trained and qualified personnel are allowed to handle hazardous materials. Supervisors are responsible for ensuring that personnel are adequately trained to handle hazardous materials, including hazardous waste, and that all hazardous materials are stored in a safe manner.

The disposal of hazardous materials must be done in accordance with federal, provincial and municipal regulations. Ontario has a comprehensive legislative and regulatory framework to ensure that hazardous wastes are managed in an environmentally safe manner. Through the Environmental Protection Act and accompanying regulations, the Ministry of the Environment has established a cradle to grave management system. This system controls the collection, storage, transportation, treatment, recovery and disposal of hazardous waste.

At the University, all hazardous waste is collected and transported to one of four official hazardous waste storage rooms prior to disposal. Waste storage room locations, operation and construction are discussed in more details in section 5.4.4.3 of this document. Hazardous waste products are disposed of centrally as part of the University's Hazardous Waste Program.

The Office of Risk Management (ORM) will cover the disposal cost of hazardous waste generated through normal research and teaching activities. ORM does not cover the cost of laboratory decommissioning, larger laboratory cleanups, or large amounts of hazardous materials marked as "special". The cost for these disposals must be covered by the researcher's research grant, department or by an associated project budget.

##### **5.4.4.1 Characteristics of Hazardous Waste**

Hazardous waste is unwanted material which no longer has research value and poses potential threats to public health or the environment. This waste generally exhibits one or more of the following characteristics:

1. Flammable materials can rapidly vaporize and burn in air. Examples:
  - Liquids that have a flash point less than 37.8°C.
  - Solids that can cause fire through friction or adsorption of moisture will burn vigorously and persistently causing a hazard.
  - Flammable compressed gases whose vapours ignite easily and rapidly.

2. Oxidizing materials stimulate combustion of organic materials. Examples:
  - Gases – fluorine, chlorine, ozone, nitrous oxide, and oxygen
  - Liquids – hydrogen peroxide, nitric acid, perchloric acid, and bromine
  
3. Strong corrosive liquids have a pH of 0-2 or 12-14. Most common acids or bases are corrosive. Never mix strong acids with strong bases!
  - Strong corrosive liquids can generate corrosive vapours. Ensure that bottles are tightly sealed when transporting them to the waste room.
  
4. Toxic materials can cause damage or death to living organisms. Toxicity of different types of hazardous waste can vary. Examples of toxic substances are compounds containing cyanides or mercury, and pesticides.
  - Acutely toxic materials are those that have adverse effects from a single exposure.
  - Chronically toxic materials are those that have adverse effects from repeated exposures.

#### **5.4.4.2 Containers and Packaging for Hazardous Waste**

Waste containers should be clearly labelled and kept closed at all times, except when contents are being added. Do not leave filter funnels in the open necks of containers, even if the waste is in a fume hood. Fume hoods are not to be treated as a method of waste containment or disposal. The following general requirements related to packaging hazardous waste apply:

1. All materials must be collected in a suitable waste storage container. The appropriate containers are available from the Science Store upon request. Please refer to the table below to help determine which containers are appropriate for specific waste if using containers from another source.
2. Each container must be properly labelled to reduce the possibility of mixing incompatible materials and prevent injuries or accidents during handling of the waste. Please see section 5.3 and 5.3.4 for labeling requirements.
3. It is the hazardous material user's responsibility to package, identify and properly label all hazardous materials and wastes prior to arrange for a waste collection event. The disposal company cannot legally transport or dispose of unidentified/unknown waste. If they are abandoned at the drop off or pickup site they remain the responsibility of the department or the faculty.
4. Incompatible, highly reactive and highly toxic wastes must always be packaged and stored separately. Even if only in residual amounts on solid waste materials. This is done to minimize fire and explosion hazards and to ensure proper handling procedures by the Environmental Health and Safety Technician. An incompatibility summary table is available in section 5.5.8 or contact ORM at [enviro@uottawa.ca](mailto:enviro@uottawa.ca) for clarification and information.
5. Each waste container must have only one type of waste material inside. Chemical, biohazardous and radioactive wastes are handled differently and cannot be stored together.
6. 20 Litre closed head carboys containers are available for hazardous liquid waste storage (Inorganic and Organic). These containers have a maximum life of two (2) years. If today's date is greater than the date on the container do not use the container; inform the Environmental Health and Safety Technician and obtain a new container.
7. All hand transfer of chemicals and/or wastes must be done within a spill protection area.
8. All 20 Litre closed head carboys containers are to be placed inside secondary containment to prevent spillage.
9. Do not fill liquid containers above 80% of their total volume. This allows for safe handling, safe liquid transfer and is easier to lift and transport.

**List of Appropriate Waste Containers for Disposal of Hazardous Materials at uOttawa**

Application	Description	Size
<b>Liquid Waste</b>	Amber glass bottle – Reused <sup>1</sup>	1L
	Amber glass bottle – Reused <sup>1</sup>	4L
	White plastic carboy	20L
	Plastic waste drum <sup>2</sup>	205L
<b>Solid Waste<sup>3</sup></b>	White bench top plastic <b>Non-Bio hazardous</b> sharp containers <sup>3</sup>	4.5 L
	Black reusable plastic pail	20L
	Metal waste drum <sup>2</sup>	205L
<b>Bio hazardous Waste / infectious</b>	Yellow bench top plastic <b>Bio hazardous/infectious</b> sharp containers	4.5L
<b>Radioactive Waste</b>	White single use plastic pail	20L
<b>Compressed Gases, including aerosol cans (empty)</b>	Original container	Original container

1. Original label defaced and replace with hazardous waste label. These laboratory containers are reused from liquid chemicals bought in either 1 L or 4 L glass containers.
2. These containers are for special request and their use at the workplace must be approved by ORM.
3. Includes hazardous sharp waste materials (non-bio hazardous, such as chemically contaminated broken glass and syringes).

The background for the segregation of bio hazardous and non-bio hazardous sharp waste originated from a review of the University's waste management process for biomedical waste. It was found that approximately 66% of the generated waste deemed bio hazardous was associated with Research Institutes and that many of the biomedical containers were used for non-infectious sharp waste. Disposal of bio hazardous materials is much more expensive than for hazardous materials.

**5.4.4.3 Disposal logistics, waste storage facilities and schedules**

The Office of Risk Management can provide the necessary advice and assistance regarding the disposal of hazardous materials and manages its storage and off-site disposal once laboratories, workshops or services decide it is waste. The collection and storage of hazardous waste materials prior to collection by ORM remains the responsibility of the Faculty or Service Department (the generator). Each Faculty or Service Department at the University is responsible for implementing an internal system to track their hazardous waste materials before ORM takes responsibility of the materials.

Waste should be separated as follows:

- Separate liquid and solid waste.
- Separate liquid organic waste from liquid aqueous waste (with various chemical products).
- Separate strong acids and bases from other aqueous waste.
- Separate flammable, acid, base and oxidizer wastes.

There are three official hazardous waste storage rooms managed by ORM at the University of Ottawa. These facilities are located in the faculties of Engineering, Medicine and Science. Some faculties or departments may have designated individuals for hazardous waste collection internally. ORM is ultimately responsible for the materials once stored in the official hazardous waste storage rooms. The

system is designed to streamline the waste handling process and enable users as well as Environmental Services staff to process the removal and disposal of hazardous waste in a safe, timely and efficient manner.

For normal operating generation of hazardous waste (not including biological and radiological waste) users and University personnel must complete a “**Regular Collection Request**” Form which is available online at the following url: <http://orm.uottawa.ca/content/hazardous-materials-technical-services-regular-collection-request> to have hazardous waste collected directly from their facility. The form has been designed to provide the hazardous waste disposal contractor staff with a summary of the type and volume of waste each laboratory or workshop is requesting to be collected so that the proper collection and replacement equipment will be brought. Chemical waste collection request forms must be received no later than 10:00 a.m. on the previous day of the scheduled collection day.

For regular hazardous waste services, the schedule is organized by Faculty and each faculty has a dedicated week day and time frame for door to door collections. Please refer to *Annexe A* for a detailed copy of the Schedule. The schedule is subject to variations and updates as deemed necessary by the Environmental Risk Management Specialist of the Office of Risk Management.

If you require an “ad hoc” or a “**special**” collection that cannot be scheduled within regularly scheduled collection (e.g. laboratory decommissioning), users and University personnel must submit a “Special Request / Ad Hoc Event” collection request Form available at <https://orm.uottawa.ca/hazardous-special-request> . A representative of the environmental management team will contact you with a scheduled date and time. These services are performed outside of the regular schedule and we therefore strongly suggest planning ahead of time as we cannot guarantee service in the same week. Some examples of specialty hazardous waste are empty compressed gas cylinders, damaged containers, laboratory clean-up, a potentially high risk material, unknown materials, used hazardous spill bags\*, contaminated soil and water, etc.

#### Un-identified hazardous waste

For safety reasons, the University’s Environmental Health and Safety Technician and the hazardous waste disposal contractor will not accept “unidentified” or “unknowns” containers of any kind, at any time. Every effort has to be made by users and generators to properly identify all waste before submitting for disposal. If identification of the “unknown” cannot be made, then a characterization of the waste (based on physical and chemical properties) is required prior to acceptance of the material by the disposal contractor.

#### Controlled Goods

Due to regulatory requirements and special handling procedures, for substances controlled under the Controlled Drugs and Substances Act, Defence Production Act, and specifically, the Controlled Goods Regulations, their disposal has to be coordinated directly with the University’s Controlled Goods Designated Official (DO). Therefore, these products cannot be disposed of in the exact same manner as regular hazardous waste.

The University Environmental Health and Safety Technician and the hazardous waste disposal contractor will not accept controlled goods unless they are provided with a completed “Special Request / Ad Hoc Event” request form from the University’s DO. Please contact the Controlled Goods Designated Official (DO) at the Office of Risk Management (via the [enviro@uottawa.ca](mailto:enviro@uottawa.ca)) to arrange for disposal of Controlled Goods:

Upon reception of the completed “Special Request / Ad-Hoc Event” form, the authorized University Environmental Health and Safety Technician will supervise the hazardous waste contractor and ascertain that the process of destruction of any controlled goods sent for disposal is completed before the contractor disposes of the chemicals, as required by the Provincial legislations.

#### Radioactive and Biological Waste

For radioactive and biological waste disposal, call the appropriate specialist within the Radiation and Biosafety group at ORM. ORM’s Environmental Health and Safety Technician and the hazardous waste contractor will not be picking-up this waste. Please contact the relevant following resources to arrange for disposal:

Radiation Compliance Specialist  
[rad.safety@uottawa.ca](mailto:rad.safety@uottawa.ca)

Biosafety Compliance Specialist  
[bio.safety@uottawa.ca](mailto:bio.safety@uottawa.ca)

#### Hazardous Material in original containers

Any material still in its original container with a legible label may be safely sent for disposal with the exception of metal containers. Refer to section 5.4.4.4 on empty containers for their disposal or recycling.

#### Sharp waste materials

Non-hazardous sharp waste materials (such as non-contaminated broken glass) can be disposed in regular garbage given adequate containers (as referred to in section 5.4.4.2) and labelling is use to prevent injuries to the waste handling staff. Chemically contaminated (**not** infectious or biohazardous) sharp waste can be disposed of as solid hazardous waste.

#### Infectious and Biohazardous Sharps and contagious

To obtain biohazardous sharp waste containers, contact the Biosafety Compliance Specialist at [bio.safety@uottawa.ca](mailto:bio.safety@uottawa.ca) as these are not available from the Science Store directly. Please note that these containers are not to be used for chemically contaminated sharp waste (hazardous waste) that is not biohazardous waste.

#### Batteries

There are numerous white collection boxes for safe disposal of batteries. Separate alkaline from rechargeable batteries before disposal. Housekeeping services regularly empties these containers. The batteries are sorted and sent for recycling or for safe disposal. For disposal of large batteries (car type batteries, CPU power back-ups, etc.) call housekeeping (ext. 2222). Please place batteries in a suitable container for transport.

Exceptions: If batteries are damaged or leaking, contact ORM directly at [enviro@uottawa.ca](mailto:enviro@uottawa.ca) for their disposal.

#### Paint

Latex paint containers can be disposed in the regular garbage, provided the cans have been allowed to dry and no liquid paint residue is present. ORM will collect all other paints upon request. Ensure cans are sealed and not leaking. For easier handling, place cans in a cardboard box and attach a completed hazardous material label to the container.



#### Photographic developer and fixer

Photographic waste is picked up in 20 L plastic canisters with a wide mouth. The containers must be clean and clearly labeled. Hold containers for disposal until they are 80% full, unless you produce very small quantities of waste (i.e. less than one full can per month).

#### Silica gel and sand

Waste silica will be picked up in 20 L plastic pails. Do not place waste silica in glass containers.

#### Mercury thermometers and fluorescent lamp tubes

Mercury thermometers and fluorescent lamp tubes for disposal should be treated as hazardous waste. Broken thermometers should be considered contaminated and all free liquid mercury should be collected and packaged in a leak-proof container, together with all contaminated solids such as glassware, gloves used during the clean-up, etc. For instructions or assistance on cleaning up mercury spills contact the Faculty's or Service or Department's HSRM.

#### **5.4.4.4 Empty containers**

Empty chemical containers are not usually regulated as hazardous waste with the following exceptions:

- 1- Severely toxic contaminants: Containers for substances listed in Schedule 3 of Ontario Regulation 347 at an unknown concentration or greater than 1 ppm. Listed contaminants are Aflatoxin, pesticides, Tetrachlorodibenzo-p-dioxins (TCDDs), Pentachlorodibenzo-p-dioxins (PeCDDs), Hexachlorodibenzo-p-dioxins (HxCDDs) and Tertachlorodibenzofurans. These containers are to be considered hazardous waste and should not be rinsed or washed.
- 2- Pathological waste: Containers and liners of pathological waste are regulated unless they have been autoclaved or otherwise sterilized to make them non-infectious. These containers are to be considered hazardous waste and should not be rinsed or washed.

Empty containers generated by the University of Ottawa should not readily be disposed of in the regular solid waste or recycled, without precautionary measures. Containers that actually held hazardous materials or hazardous waste must be triple rinsed with water or a suitable solvent and air-dried before disposal to ensure that it is free of liquid or other visible chemical residue. If a solvent is used for rinsing the emptied container, it must be air-dried in a fume hood or a ventilated area.

Clean, empty, rinsed containers can be delivered to the hazardous waste storage rooms during open door periods, or collected during hazardous waste regular collection events when the request has been identified on the waste collection form.

All the rinse/washing water generated from containers used for products identified in section 5.4.4.5- 1), 2) and 3) must be collected and disposed of as hazardous waste with proper labelling and packaging. To reduce production and disposal of rinse/washing water for volatile organic solvents (e.g. acetone, etha nol, ethyl acetate, ethyl ether, hexane, methanol, methylene chloride, petroleum ether, toluene, xylene, etc.), the emptied containers can be air-dried in a fume hood or ventilated area without triple rinsing. As long as they are not listed in Schedule 2 Part A or Part B of Ontario Regulation 347 (Acute Hazardous Waste Chemical or Hazardous Waste Chemical).

Upon reception of the chemicals by the Science Store, every container is entered into the University's inventory (Vertere) and identified with a dedicated barcode. The Environmental Health and Safety Technician and hazardous waste disposal contractor have access to a barcode reader to keep the

inventory updated upon disposal. It is important that, if containers are disposed using general housekeeping, users make sure to take every bar code off from all empty containers and submit them during waste collection event.

The re-useable 20 L closed head “carboy” containers available for liquid hazardous waste at the University are labelled with a date. These containers have a maximum life of two (2) years. If the current date is greater than the date on the container, laboratory, workshop or service personnel should not use the container, return it to the Environmental Health and Safety Technician or the hazardous waste contractor and obtain a new container.

Broken glass containers (and any other sharp objects) that are free of chemical residue (aka non-hazardous) and are not biohazardous or infectious, can be placed in a suitable broken glass receptacles or placed in a puncture-resistant container, such as a rigid plastic container or corrugated cardboard box. The plastic container or box should be sealed, clearly labeled as non-hazardous broken glass or sharp materials and disposed with regular garbage. It is important to keep separated the sharps from the regular trash so maintenance personnel can handle them safely.

The following are initiatives that can result in waste reduction:

- Use Alconox soap and a brush as a first step.
- Filter and reuse solvents for cleaning glassware.
- When using solvents for cleaning, minimize the amount used by rubbing instead of using the pressure flow from a squeezed bottle.
- Try to use ethanol instead of methanol when possible.
- Review chemical inventory regularly. This can avoid the purchase and the expiry of chemicals already on hand (but forgotten).

#### **5.4.4.5 Sewer Discharge**

The University of Ottawa’s Environmental Policy (No. 72) and the Environmental Management Policy (No. 91) require that University activities comply with all applicable laws, regulations, codes, by-laws and guidelines. This section has been prepared to assist and educate the University community of the limitations and prohibitions of discharges that may adversely impact sewer systems, sewer treatment processes, sewer workers and the quality of natural environmental ecosystems. Therefore, not only do these guidelines serve as a tool to ensure regulatory compliance, but also promote pollution prevention through concrete actions: controlling, monitoring and/or preventing the release of harmful substances into the City’s sewer system.

The discharge into sewer and drain systems within the University of Ottawa premises is regulated under the City of Ottawa Sewer Use By-law No. 2003-514. According to the By-law, the University is deemed “industrial” (as opposed to a “domestic” or “residential”) with regard to sewer use regulatory responsibilities (e.g. discharge monitoring and reporting). Most pertinently, the By-law specifies 1) substances that should not be discharged into the sewer system in any amount (i.e. Prohibited) and 2) substances to which restrictions apply (e.g. concentration limits). It is important to understand that it is the responsibility of the each Faculty, service or department managers to ensure restrictions and concentration limits are respected by their personnel and users. ORM is responsible for answering to the Municipal Compliance Officers, for monitoring the discharge and keeping records of the monitoring data for reporting purposes upon request by the municipality or the Ministry of the Environment.

The intent of the Municipal By-Law is three-fold:

- 1- To protect receiving waters such as the Ottawa River from discharges of harmful contaminants that the sewage treatment plant is incapable of handling;
- 2- To protect sewer systems and sewage treatment plant workers from substances that may affect their health and safety; and
- 3- To protect the sewer system infrastructure from damage as a result of disposal of certain substances into the system.

In some occasions, under specific conditions and following a written authorization from the City, it is possible to negotiate agreements that allow discharges of certain parameters that do not respect the Sewer Use By-Law. ORM is also responsible for negotiating, obtaining and monitoring these agreements. Do not contact the City directly, the environmental department at ORM ([enviro@uottawa.ca](mailto:enviro@uottawa.ca)) will make arrangements for special agreements.

The City closely monitors discharges from industries such as the University through their Sewer Sampling and Analysis Program. The City conducts sampling at specific locations that are indicative of discharges emitted by an identifiable source, such as the University premises. Should the City monitoring results demonstrate that one or several By-law limits have been exceeded or that prohibited materials are detected from the University premises, the University will be asked to investigate the causes and institute corrective actions and practices to rectify the situation. Note that the City can lay penalties such as charges and fines if the University persists in failing to meet the By-law requirements after the first notification.

As part of the University's Environmental Management System, the University developed an internal Sewer Monitoring Program, managed by ORM, to identify, minimize and mitigate potential illegal discharges into the municipal sewer network. The Sewer Monitoring Program and its objectives are supported by the aforementioned University of Ottawa Environmental Policy 72.

#### PROHIBITED SUBSTANCES INTO SANITARY AND COMBINED SEWERS

The following wastes must NEVER be discharged to the sanitary sewer, sink or floor drain in ANY concentration. These wastes must be collected and managed as hazardous waste.

##### 1) Rinse water

Empty containers that are being rinsed should be triple rinsed with a considerable amount of water and the rinse water collected and managed as hazardous waste, if the container held any of the wastes described in the following paragraphs 2) and 3).

##### 2) Matter of any type, at any temperature, or in any quantity, which may:

- Represent a health or safety hazard to a sewer worker
- Interfere with the proper operation of the sewage works
- Impair or interfere with the sewage treatment plant process
- Pass, untreated, through the sewage treatment plant (e.g. heavy metals and toxic organics)
- Cause the biosolids to fail to meet the criteria for beneficial reuse
- Result in a hazard to any person, animal, property or vegetation.
- Result in the production of hazardous gases of such quality that prevents a manhole lid from being lifted securely

- Solid or viscous substances in quantities or of such size that they may obstruct the flow in a sewer
- Sewage that may cause an offensive odour
- Water that has originated from a source separated from the City's water distribution system\*
- Sewage, which consists of two or more separate liquid layers
- Sewage containing dyes or coloring materials

**3) The following materials or hazardous waste:**

- Acute hazardous waste chemicals
- Biomedical waste\*
- Combustible liquid
- Corrosive waste (pH less than 5.5 or greater than 11)
- Fuels
- Hauled liquid waste\*
- Hazardous industrial waste (such as Rinse Water)
- Hazardous waste chemicals (such as Acetone)
- Nuclear waste\*
- PCBs\*
- Ignitable waste
- Pathological waste\*
- Pesticides
- Reactive waste
- Severely toxic materials
- Severely toxic waste
- Sludge\*
- Waste disposal site leachate\*

\*NOTE: The discharge of some of these products may be permissible when the City has given authorization and specific conditions are met. For more information, please contact ORM.

Difficulty can arise in determining the class of a substance in question. When in doubt, the decision to dispose of a material or waste into the sewer should be based on permissible discharges. By default, substances not covered under permissible discharges should be regarded as prohibited. Personnel and students are encouraged to contact the ORM to obtain guidance on disposal options for their particular situation.

**PERMISSIBLE DISCHARGES INTO SANITARY AND COMBINED SEWERS**

With regard to Sanitary and Combined Sewers, this section lists parameters that can be contained in sewage if their concentrations are below the limits as per the following Table 1 of Schedule A of the City of Ottawa Sewer Use By-Law. It is important to understand that if you do not have accurate data or records that clearly demonstrate compliance with the concentrations as per the table below you must dispose of the product as hazardous waste. Also, wastes must NOT be intentionally diluted to comply with sink/sewer disposal requirements. It is illegal to do so from a regulatory perspective.

[City of Ottawa Sewer Use By-Law No. 2003 - 514 - Parameters and Discharge Limits \(sanitary/combined sewer\)](#)

Parameter	Limit (mg/L)	Parameter	Limit (mg/L)
Biochemical Oxygen Demand	300	1,4-Dichlorobenzene / p	0.017
Cyanide (total)	2	1,1-Dichloroethane	0.2
Fluoride	10	1,2-Dichloroethane	0.21
Total Kjeldahl Nitrogen	100	1,1-Dichloroethylene	0.04
Oil and Grease, Animal / Vegetable	150	cis-1,2-dichloroethylene	0.2
Oil & Grease, Mineral / Synthetic	15	trans-1,2-dichloroethylene	0.2
Phenolics (4AAP)	1	1, 2-Dichloropropane	0.85
Phosphorous (total)	10	cis-1,3-Dichloropropylene	0.07
Sulphates	1500	trans-1,3-Dichloropropylene	0.07
Sulphide	2	Ethylbenzene	0.057
Suspended Solids (total)	350	Methylene Chloride	0.211
Aluminum (total)	50	Styrene	0.04
Antimony (total)	5	1,1,2,2-Tetrachloroethane	0.04
Arsenic (total)	1	Tetrachloroethylene	0.05
Bismuth (total)	5	Toluene	0.08
Boron (total)	25	1,1,1-Trichloroethane	0.054
Cadmium (total)	0.02	1,1,2-Trichloroethane	0.8
Chromium (total)	5	Trichloroethylene	0.054
Cobalt (total)	5	Trichlorofluoromethane	0.02
Copper (total)	3	1,3,5-Trimethylbenzene	0.003
Lead (total)	5	Vinyl Chloride	0.4
Manganese (total)	5	Xylene (total)	0.32
Mercury (total)	0.001	Bis(2-chloroethoxy)methane	0.036
Molybdenum (total)	5	Bis(2-ethylehexyl)phthalate	0.28
Nickel (total)	3	Benzylbutylphthalate	0.017
Selenium (total)	5	Diethylphthalate	0.2
Silver (total)	5	Di-n-butylphthalate	0.057
Tin (total)	5	Di-n-octylphthalate	0.03
Titanium (total)	5	Fluorene	0.059
Vanadium	5	Indole	0.05
Zinc (total)	3	1-Methylnaphthalene	0.032
Benzene	0.01	2-Methylnaphthalene	0.022
Bromodichloromethane	0.35	Naphthalene	0.059
Bromoform	0.63	Total PAHs	0.015
Bromomethane	0.11	2,4-Dichlorophenol	0.044
Carbon Tetrachloride	0.057	Dioxins and Furans (total)	0.00072
Chlorobenzene	0.057	Formaldehyde	0.3
Chloroethane	0.27	Hexachlorobenzene	0.0001
Chloroform	0.08	N-Nitrosodimethylamine	0.4
Chloromethane	0.19	Nonylphenols	0.0025
Dibromochloromethane	0.057	Nonylphenol ethoxylates	0.025
1,2 Dibromoethane	0.028	Temperature	60 °C
1,2 Dichlorobenzene / o	0.088	pH	5.5 - 11
1,3 Dichlorobenzene / m	0.036		

## 5.5 STORAGE AND CONTAINMENT FACILITIES REQUIREMENTS

Hazardous materials and hazardous waste storage facilities, Aboveground Storage Tanks (ASTs) and Underground Storage Tanks (USTs) on the University of Ottawa property must be located and

designed to limit the potential for contaminant releases into the environment as well as to ensure a safe environment for all personnel. Areas and rooms in which hazardous materials are stored, in excess of the short-term in-use quantities, must be designed and maintained in accordance with Ontario's Technical Standards & Safety Authority (TSSA), Ministry of the Environment and Climatic Change's (MOECC) Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities, the requirements of Ontario R.R.O 1990, Regulation 347 – Waste Management, Fire Protection and Prevention Act (Part 4 of Fire Code), Building Code, Occupational Health and Safety Act and all associated regulations. It is essential that all storage facilities promote the following:

- Personnel protection
- Environmental protection (air, soil and water)
- Fire protection

Storage and handling of hazardous materials inside laboratories and workshops is the responsibility of the faculties, Services and Departments. The labelling, storage, use and disposal are the responsibility of the users and their supervisors.

Faculties, Services and Departments are responsible for the design, construction, general maintenance and the safe operation of storage areas. The Faculty's Health and Safety and Risk Manager (HSRM) and ORM can be contacted for interpretation and application of the appropriate codes. Some examples of important considerations are:

- Accessibility to the fire department
- Stability of the containers
- Segregation
- Labelling
- Seals to minimize storage evaporative losses
- Adherence to the preventive maintenance program
- Double walled tanks / secondary containment equipped with a recovery sump
- Sealed spill recovery vault installations
- Use of synthetic liners

The means of containment used by University personnel and contractors for storage and transportation of hazardous materials and hazardous waste must be designed, constructed, filled, closed, secured and maintained so that under normal conditions, including handling, there will be no accidental release of the products that could endanger public safety, cause an environmental risk or lead to an accidental release.

"Storing" for transport is storage in which the waste will not be further handled at or by the University personnel other than for it to be loaded directly onto a transport vehicle for the purposes of removal from the facility.

### **5.5.1 Hazardous Materials Container choice**

The following general chemical storage requirements apply to most hazardous materials containers:

- Store in original container when possible or in containers manufactured to store hazardous waste;
- Sound, sealable, undamaged containers;
- Store in 16 gauge (or lower) metal or plastic drums, or other appropriate container;
- Label according to WHMIS/GHS;
- Keep containers closed or sealed at all times unless in use;
- Protect containers from damage and weather;
- Store in secure area with controlled access;
- Store in manner to prevent spills to environment; and
- Never store with food or in food containers.

Important factors for University personnel in the selection of appropriate means of containment for hazardous materials and hazardous waste are:

- Class and quantity of material/product
- Type and size of means of containment
- Type of on-site transportation (e.g. rolling table, by hand, dolly, etc.)
- Destination (e.g. shelves in a lab, storage room in basement, etc.)

### 5.5.2 Hazardous materials storage areas

Most design parameters and requirement decisions regarding the implementation of a bulk storage area can be made based on user needs and optimum handling conditions. Prior to implementation, a “specific arrangement plan” should be completed in collaboration with the users and ORM. The design of storage facilities and their respective safety measures and procedures falls within the definition of professional engineering, and is subject to the Professional Engineers Act. Therefore, a qualified Engineer must design all hazardous material storage facilities on the University property.

In summary, to ensure a maximum level of safety and protection associated with flammability and toxicity of the chemicals stored, all hazardous materials bulk storage areas at the University of Ottawa should abide by the following criteria:

- Bulk storage areas for hazardous materials and hazardous waste are of impermeable construction or equipped with adequate secondary containment with a capacity of at least 110% capacity of the volume of the largest tank/container of the stored materials;
- All containment areas must be structurally sound, able to withstand chemical deterioration and away from sewer drains;
- When applicable, all entry doors are bermed to contain any spillage and prevent discharge to the environment or sewers;
- Adequate ventilation, gas detector/sensors and alarms are installed inside the storage areas;
- Incompatible wastes are segregated by chemical compatibility to ensure safety of users and facility;
- Number of stacks should be limited and made only with similar containers;
- Ensure enough space is provided between aisles for adequate access at all time;
- Labelling of all containers with identification and fill date;
- The bulk storage areas are secured with controlled access;
- Regular inspections are performed and recorded;
- Containers are placed so that each container can be inspected for signs of leaks or deterioration;
- Leaking or deteriorating containers are immediately removed and their content transferred to a sound container by personnel trained to do so;

- Waste chemicals are not stored for a period exceeding 90 days and an inventory is kept with date of arrival in storage area, material identification, location inside storage area, volume level and fill date; and
- Bulk storage areas have emergency response equipment appropriate for the hazardous materials and hazardous waste stored.

In indoor situations, it is possible that the facility itself be deemed as “secondary containment” but only if the storage area represents a low-risk and it is in accordance with the items discussed above. A thorough assessment of the installation is required from ORM before such a decision can be made. Please contact ORM at [enviro@uottawa.ca](mailto:enviro@uottawa.ca) to assist in the design of storage areas or detailed assessment of facility conditions.

### 5.5.3 Storage of chemicals inside laboratories and workshops (in-use storage)

The following guidelines are provided for the safe storage of hazardous materials:

- Chemicals purchased throughout the year must be added to the Vertère inventory as soon as they are brought into the work area. Post chemical hazard summary on the entry door for emergency response purposes;
- Maintain a cross-reference sheet that defines the short hand name or acronym;
- Store all hazardous liquid chemicals in drip trays that are chemically resistant. Photo trays provide good containment and are widely used. Install Plexiglas lips or use equivalent means to prevent materials from falling off storage shelves;
- Storage must be in a flammable storage cabinet.
- Avoid storing chemicals on countertops or in fume hoods except for those being currently used;
- Avoid storing chemicals above eye level. Select low shelves or cabinets for heavy containers. Never store chemicals or any other item closer than 0.45m (18”) to the ceiling. Storing an item close to the ceiling may impede the effectiveness of automatic fire suppression systems;
- Do not store chemicals on the floor. Chemical containers could present a tripping hazard or could be knocked over causing a spill;
- Avoid exposure of chemicals to heat or direct sunlight. This may lead to the deterioration of storage containers as well as the degradation of the chemicals;
- Use approved corrosive storage cabinets (constructed of chemically resistant components) for storing acids and bases;
- Use flammable storage cabinets to store flammable liquids;
- A maximum of 50 L of Flammable liquids (pure or waste) is allowed in the work area of a laboratory;
- Refrigerators used for storing chemicals, samples or media must be labeled with words to the effect as follows: “Caution – Do Not Store Food Or Beverages In This Refrigerator”. Labels may be fabricated by users provided they are legible and securely affixed to the refrigerator. Do not install refrigerators for food storage in or near areas where chemicals are handled or stored (workshops and labs); and
- Refrigerators and freezers for storing flammable liquids (including ethanol) must be designed, constructed and approved for that purpose. Domestic refrigerator/freezers as well as units that have been modified to remove spark sources are not acceptable alternatives.

### 5.5.4 Aboveground storage tank (AST)

Aboveground storage tanks (ASTs) for hazardous substances present a considerable hazard to human health and the environment if not managed adequately. Spills, leaks and product transfer operations



may result in the discharge of contaminants to air, soil or water. ASTs also represent fire, explosion and chemical exposure hazards.

In order to address and mitigate potential risks associated with ASTs and their related systems, the University of Ottawa has developed a *Hazardous Materials Storage Tank Systems Management Plan*, including inventory control, monitoring and regular maintenance. This program aims to keep operating personnel safe, informed about existing conditions and ensure prompt leak or deviance detection. Also, before the installation of new ASTs on any property of the University of Ottawa, design and specifications must be reviewed by ORM to ensure the planned installations are in compliance with applicable regulations. If an AST becomes inactive, the supervisor responsible for its operation must contact ORM to ensure proper tank decommissioning procedures and environmental compliance.

Essential risk assessment measures for all ASTs and storage tank systems must be performed to ensure sound tank management. The initial assessment of a tank system should include the following general management requirements:

- Identification of potential risk sources;
- Determination of potential sources of spread and pathways of chemical product;
- Assessment of potential storage tank system emergencies;
- Establish storage tank system risk mitigation strategies;
- Assessment of health and safety and environmental risk consequences of storage tank system emergencies (e.g. leaks and spills, fires and explosions); and
- Establish a storage tank system Emergency Procedure for each tank system and include it in the general Emergency Response Plan for the facility.

### 5.5.5 Underground storage tank (UST)

Underground storage tank systems (USTs) are subject to the same general management requirements as discussed in the previous section for ASTs. Most of the design requirements for ASTs also apply to USTs. The following are additional design and management requirements that apply specifically to USTs.

- All fill lines must be clearly marked to indicate the capacity of the tank, the type of product stored in the tank and must be clearly visible to the delivery driver;
- USTs must be equipped with a liquid-tight container (spill bucket) around the fill pipe to collect any spills that may occur during deliveries;
- USTs must have equipment to prevent overfilling the tank. If the UST receives pressurized deliveries, a high level alarm or specifically designed flapper valve must be installed;
- A leak detection system, like any electronic or mechanical system, is subject to wear, tear, and failure. Routine maintenance of the equipment is necessary to make sure it is operating correctly. Records must be kept on file; and
- Inventory control must be completed by operators. Measurements (each day the UST has product added to or removed from it) of the contents and calculations that allow comparison of "stick" inventory (what is measured) to "book" inventory (what record keeping indicates) must be completed.

While a Hazardous Materials Storage Tank Systems Management Plan has been developed by ORM for tank system management for all the University's facilities, each facility is responsible to ensure that the

integrity of their tank system(s) and operation(s) remains safe, effective, and functional during emergencies.

### 5.5.6 Design, installation and maintenance of AST/UST

In addition to the general requirements discussed in paragraph 5.5.4 and 5.5.5, the following design requirements are applicable for all ASTs/UST, and associated piping and equipment:

- ORM is responsible for the hazardous materials tank monitoring program and must be contacted when modifications, repairs and upgrades are made to existing tank systems owned by the University of Ottawa;
- Construction materials, including internal coating for every part of the tank system, must be compatible with the chemical stored. Any change of operation should be thoroughly assessed to ensure compatibility;
- Bottom of tank must be ventilated (not in contact with ground, gravel, absorbent, etc.) and protected from corrosion;
- Tank systems must be protected against physical damage (bollards, elevated foundation, etc.).
- Tank systems must be vented to the exterior, including emergency vents, at a height which will not impinge on personnel or users;
- Tanks should be equipped with a fill inlet secondary containment that helps prevent spills during filling procedures;
- Tanks must be equipped with an electrical or mechanical device which helps prevent the tank from being overfilled;
- Tanks should be equipped with a fill level indicator; and
- Storage tank areas should not be located near sewer connections or floor drains. If this is not possible to avoid, mitigation measures must be put in place to prevent contaminant discharge into the sewers;

### 5.5.7 Filling procedures

A few simple precautions can go a long way towards preventing spills and overfills while receiving a delivery of hazardous materials.

#### BEFORE THE DELIVERY:

- Only order the quantity of product that will fit in the tank. (Tank should only be filled to 90%-95% of the tank's capacity);
- Pre-arrange hazardous material deliveries so that a University representative is present at the time of delivery;
- Keep all fill ports secured until the delivery person requests access;
- Make sure that the hazardous material delivery person is aware of what type of system and overfill device is present and what to do if the overfill protection device is activated;
- The delivery driver should verify that the spill bucket is clear of debris and liquid and make sure that the drain valve is in the closed position; and
- Have an emergency spill kit available at the time of hazardous material deliveries.

#### DURING THE DELIVERY:

- Only the delivery driver should make hose connections;
- The driver must stand by during the entire hazardous material delivery and be prepared to stop flow from the truck should any unusual conditions, leaks or spills be observed;
- Provide adequate lighting and safety barriers around the fill area; and
- In the event of any spills or leaks, the driver will be responsible for stopping flow from the truck and the University representative will notify the university's facility manager(s). If 25 litres or more are released to the environment, Protection Services must be notified as quickly as possible by calling 5411 (24-hours/7-days).

#### AFTER THE DELIVERY:

- Verify the amount of product delivered using either manual methods (i.e., stick with water indicator paste) or by checking automatic tank gauge after delivery and checking against delivery receipt;
- Ensure fill ports are properly replaced and secured; and
- Ensure that any secondary containment is free of products and hazardous materials.

### 5.5.8 Compatibility and storage

The items listed below are incompatible with one another and precautions must be taken to store these hazardous substances away from one another, regardless of containers and storage conditions. The chemical incompatibilities discussed below are by no means exhaustive. As a result, it is important for laboratory, workshop or service personnel to thoroughly research the properties and know the materials safety datasheet of the chemicals they are using. Contact the Faculty's or Service or Department's HSRM officer or ORM for any concerns or questions regarding chemical storage configuration and compatibility.

CHEMICAL	AVOID CONTACT WITH
Acetic acid	Nitric acid, chromic acid, hydroxyl containing compounds (ethylene glycol), perchloric acid, peroxides and permanganates
Acetone	Concentrated acid mixtures of nitric and sulfuric acid
Acetylene	Halogenated compounds such as fluorine, chlorine, bromine, and mercury, copper and silver
Anhydrous Ammonia	Mercury, calcium hypochlorite, and halogenated compounds
Ammonia Nitrate (fertilizer)	Various acids, flammable liquids, sulfur, and organics: Key ingredient in the Oklahoma City Bombing
Aniline	Nitric acid and hydrogen peroxide
Bromine	Turpentine, benzene, ammonium, acetylene, butadiene, butane and other petroleum gases
Calcium Oxide	Water
Carbon (as in activated)	Calcium hypochlorite
Copper	Acetylene, hydrogen peroxide
Chlorates	Ammonium salts, acids, sulfur and metal powders
Chromic Acid	Acetic acid, naphthalene, camphor, glycerin, turpentine, and flammable liquids
Chlorine	Ammonia, acetylene, butadiene, butane and other petroleum gases, hydrogen,

	sodium carbide, benzene and fine metal particles
Chlorine Dioxide	Ammonia, methane, phosphine, and hydrogen sulfide
Fluorine	Will react with most chemicals; therefore, keep segregated from all chemicals
Hydrocyanic Acid	Nitric acid, alkalis
Hydrogen Peroxide	Copper, iron, most metals, flammable liquid, combustible materials, aniline, caustic soda, and other strong alkalies
Hydrogen Fluoride	Ammonia, aqueous or anhydrous
Hydrogen Sulfide	Fuming nitric acid, oxidizing gases
Various Hydrocarbons	Fluorine, chloride, bromide, chromic acid, sodium peroxide
Iodine	Acetylene, ammonia
Mercury	Acetylene, fulminic acid, ammonia
Oxygen	Oils, grease, hydrogen, flammable liquids, solids or gases
Oxalic Acid	Silver, mercury
Perchloric Acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils
Peroxides-organics	Acids
Phosphorus	Air, oxygen
Potassium Chlorate	Acids
Silver	Acetylene, oxalic acid, ammonium compounds
Sodium Nitrate	Ammonium nitrate, and other ammonium salts
Sodium Oxide	Water
Sulfuric Acid	Chlorates, perchlorates, permanganates

## 6.0 EMERGENCY RESPONSE PLAN (ERP) for Hazardous Material Discharge

Emergency preparedness and a comprehensive Emergency Response Plan (ERP) are essential for any organisation handling or using dangerous or hazardous substances. The following ERP ensures that University of Ottawa personnel are able to quickly and effectively respond in the event of a chemical spill or other serious emergencies that may arise from or have an adverse effect on the storage, handling and/or the transportation of hazardous materials and hazardous waste. The effectiveness of an emergency response system is dependent on the documentation of the response process, adequate resources and training of those responsible for its implementation. It is the responsibility of all supervisors to ensure their personnel, users and contractors have adequate emergency response training.

Contaminant releases can impact air, soil and water. Any chemical spill can pose a serious threat to human health and the environment, require remediation that may extend beyond the University's property boundary, and result in substantial cleanup costs. Even a small spill can have a serious impact. A single litre of waste oil released into surface water can cover one acre of water surface area and can seriously damage an aquatic habitat. A spill of only 4 litres of waste oil can contaminate a million gallons of water. It may take years for an ecosystem to recover from the damage caused by an oil spill. The location of the facility must be considered in relation to streams, ponds and ditches (perennial or intermittent), storm or sanitary sewers, building drain tiles, or the Rideau River. Factors such as volume

of material stored, worse case weather conditions, drainage patterns, land contours, and soil conditions must also be taken into account.

## 6.1 Prevention

Aim to eliminate or reduce the probability of unplanned release of chemicals and reduce the degree of damage that could occur to the surrounding personnel and the natural environment. In situations where a spill risk exists, consider the following recommendations:

- (a) Prior to proceeding with any work in relation to hazardous materials and hazardous waste, complete an assessment of risk scenarios potentially leading to spills and probable impacts;
- (b) Always proceed with spill-risk activities (such as chemical transfer, transportation, etc) in presence of readily available equipment to mitigate the effects of any spill;
- (c) Proceed with spill-risk activities away from sensitive environment and after careful planning for containment and recovery if there is a spill;
- (d) Use secondary spill containment;
- (e) Avoid risky activities at times when storm or other weather events may magnify the harm caused by a spill;
- (f) Ensure drainage structures can be sealed to halt passage of spilled fluids (where practical); and
- (g) Train personnel, users and contractors on good environmental practice and incident response.

## 6.2 Spill Reporting

Any person who creates or notices a spill is asked to contact Protection Services at 5411 who will then initiate the emergency response and contact ORM. Further details on emergency response procedures are discussed in sections 6.8 to 6.10.

Section 92 of Ontario Environmental Protection Act (EPA) requires the person responsible for the discharge to report a spill to the Ministry; to the municipality; where the discharger is not the owner, to the owner of the spilled pollutant; and under some circumstances to others. O. Reg. 675/98 further requires that the discharger contact the Spills Action Centre (SAC) and provide information to the person who answers the call. In general terms, s. 92 of the EPA sets out that those who spill, those who cause or permit a spill, and those who had control of the pollutant that spills, are made responsible for reporting the event to SAC as quickly as possible. Similarly, s. 92 of the EPA states that spills must also be reported as quickly as possible to the municipality. The Office of Risk Management (ORM) is responsible to contact and report to the authorities on behalf of the University for any type of incident or spill that takes place within the property of the University of Ottawa.

Furthermore, under section 93 of the EPA, there is a duty to contain and clean up the pollutant, and to restore the spill site to essentially pre-spill conditions where this can reasonably be expected. Those who had control of the spilled contaminant, and the owner of the contaminant (in our case the

University), are both given responsibility for containment and cleanup where the spill causes or is likely to cause the adverse effects (as defined in s.1 of the EPA), regardless of contributing circumstances.

### 6.3 Hazard Identification

Throughout the University's facilities there are approximately 84,000 chemical products stored in various quantities on any given day. Storage quantities can vary from a small 10 ml vial in a laboratory up to 181,600 L of heating oil in a UST.

During regular operations the University generates hazardous waste chemicals. On average, the University can generate approximately 3,500 L and 2,000 kg of hazardous waste monthly.

### 6.4 Potential Contaminants

Most chemicals and hazardous waste at the University are considered contaminants and will pose a significant risk to the natural environment or human health if released or spilled.

### 6.5 Preventative Measures to be completed by all University Personnel, Users and Contractors Involved in Emergency Response for Hazardous Materials and Hazardous Waste

- Ensure that MSDS for hazardous products are available.
- Ensure that all personnel and users are aware of basic emergency response procedures detailed below. Review procedures before handling and ensure personnel and users have a spill kit on hand and recommended additional personal protective equipment for specific chemicals involved.
- Ensure that all containers are the appropriate type for the type of chemical waste, in good condition, properly closed, liquid-tight, sealed, properly identified, and well secured during transport.
- Ensure vehicles or any other means of transport are equipped with complete spill recovery and clean-up kit and traffic/public access control equipment. Acquire sufficient quantities and types of appropriate spill control materials to contain any spills that can be reasonably anticipated. The need for equipment to disperse, collect and contain spills (e.g., brushes, scoops, sealable containers, etc.) should also be considered.

### 6.6 Spill Recovery Equipment

Spill recovery material will vary according to the chemicals of concerns and volume stored. Below is a list of typical emergency spill recovery items. The Office of Risk Management (ORM) must review and determine with the facility's supervisor which spill recovery equipment and procedures are necessary prior to handling hazardous materials.

#### 6.6.1 Absorption Materials

- 4x 3M POWERSORB spill pillows (or equivalent)

- 1x 3M POWERSORB spill sock (or equivalent)
- 2x DOT pails (20 Litres) with polyethylene liners
  - 1 filled with loose absorbent, such as vermiculite
  - 1 with loose absorbent in the bottom

Bulk absorbents and many spill pillows do not work with hydrofluoric acid. POWERSORB (by 3M) products and their equivalent will handle hydrofluoric acid. Specialized hydrofluoric acid kits (and others) are available upon request through ORM at [enviro@uottawa.ca](mailto:enviro@uottawa.ca).

### 6.6.2 Neutralizing Materials

- Acid Neutralizer
- Caustic Neutralizer
  - Commercial neutralizers, such as Neutrasorb (for acids) and Neutrakit-2 (for bases) have built in colour change features to indicate complete neutralization
- Solvent Neutralizer
  - Commercial solvent neutralizers, such as Solusorb, act to reduce vapors and raise the flashpoint of the mixture

### 6.6.3 Mercury Spills

- Small manual mercury vacuum or similar device to pick up large drops
- Hg Absorb Sponges - amalgamate mercury residue
- Hg Absorb Powder - amalgamates mercury
- Hg Vapor Absorbent - reduces concentration of vapor in hard to reach areas
- Mercury Indicator - powder identifies presence of mercury

### 6.6.4 Recommended Minimum Clean-up Tools

- Polypropylene scoop or dust pan
- Broom or brush with polypropylene bristles
- 2 polypropylene bags
- Sealing tape
- pH test papers
- Hazardous waste stickers of the University of Ottawa
- Floor sign - DANGER Chemical Spill - Keep Away

### 6.7 Emergency Response Actions

- 1) Identify hazards, determine the extent and type of spill, and make sure area is secured and safe;
- 2) If injuries have occurred, there is a risk of injury or danger to human health, the spill is large, generates damage to property or if there has been a release to the environment contact Protection Services – **call 5411**;
- 3) Remain near the scene at a safe location and available to answer questions;
- 4) Note proximity of spill to watercourse or storm and sanitary sewers, the quantity of spill and areas of known contamination;
- 5) If necessary, secure site from general public access with the assistance from Protection Services; and

- 6) Proceed with emergency clean-up plan.

## 6.8 Emergency Clean-up Plan

Typically, the individual(s) who caused the spill is (are) responsible for prompt and proper clean-up. This includes their direct supervisor and ultimately their Faculty or Service Department. It is also the Faculty's or Service Department's responsibility to have spill control and personal protective equipment, appropriate for the chemicals being handled, readily available. The following are general guidelines to be followed for a chemical spill. More detailed procedures may apply to specific projects or chemicals products.

1. Immediately alert area occupants and supervisor/manager, and evacuate the area, if necessary.
2. If there is a fire, medical attention is needed or the spill is beyond your control, contact Protection Services at 5411.
3. Attend to any people who may be contaminated/ injured. Contaminated clothing must be removed immediately and the skin flushed with water for no less than fifteen minutes as soon as possible.
4. If a volatile, flammable material is spilled, immediately warn everyone, if safely possible control sources of ignition and ventilate the area.
5. Wear personal protective equipment, as appropriate to the hazards. Refer to the Material Safety Data Sheet or other references for information.
6. Using the definitions below, determine the extent and type of spill. If the spill is large or if there has been a release to the environment contact Protection at 5411.

**Low Impact** - applies to any one or a combination of the following:

- There is no perceived threat to human health or property;
- The incident is outside or out of reach of sensitive environments;
- The incident poses no immediate or long-term threat to environmental receptors; or
- A chemical spill of less than 25 litres enters the environment or storm sewer; and
- The spill response is managed and financed within operating budgets and resources.

**Moderate Impact** - applies to any one or more of the following:

- There is significant (but not immediate) threat to human health, environment or property;
- The incident may result in chronic or long-term harm to native fauna and flora;
- A long term (but not immediate) observable impact on environmental receptors is possible; and
- Chemical spill is between 25 litres and 10,000 litres reaching environmental receptors or municipal sewers, requiring minimal effort and budget to study or fix.

**High Impact** - applies to any one or more of the following:

- There is an **immediate** threat to human health, environment or property;
- The incident could be associated with significant harm to the environment;
- The incident creates an immediate observable harm to environmental receptors;



- The incident occurs in water catchments that have recognized conservation and scientific values (e.g. Rideau River);
- The incident has the potential to seriously contaminate soil, surface water and/or groundwater;
- Chemical spill exceeding 10,000 litres and enters the environment; and
- Due to their nature, quantity, complexities (diversity of materials, products and waste, legal implications, etc.) chemicals products have the potential to create significant long term environmental damage, which can't be overcome immediately.

7. Protect floor drains, ditches, sewers or other means for environmental release.
8. Contain and clean-up the spill. If applicable, loose spill control materials should be distributed over the entire spill area, working from the outside, circling to the inside. This reduces the chance of splash or spread of the spilled chemical.
9. When spilled materials have been absorbed, use brush and scoop to place materials in an appropriate container. 20 L pails or 205 L drums with polyethylene liners are usually appropriate.
10. Complete a hazardous waste label identifying the material as "Spill Debris, involving XYZ Chemical", and affix onto the container. Decontaminate the surface where the spill occurred using a mild detergent and water, when appropriate.
11. Report all spills to immediate supervisor and ensure completing and incident report form at the uOttawa link <https://web30.uottawa.ca/v3/riskmgmtfrm/aioreport.aspx?lang=en>. Once a report is submitted your spill kit will be replaced for free.

## 6.9 Roles and Responsibilities of University of Ottawa Personnel

The following table summarize roles and responsibilities of University personnel regarding emergency response for environmental spills or any chemical discharges to the environment (air, water, soil) that is beyond control or involved personnel is not able to recover.

Role	Responsibilities
Person or party involved with the spill or discharge or third party who noticed the spill	<ol style="list-style-type: none"> <li>1. Call Protection Services at 5411.</li> <li>2. Remain available near the scene, at a safe location.</li> </ol>
Protection Services	<ol style="list-style-type: none"> <li>1. Protection Services must alert and evacuate (if required) occupants and secure the area.</li> <li>2. Ensure everybody is safe.</li> <li>3. Ensure person or party involved with the spill or discharge remains in a safe place near the incident site.</li> <li>4. Prevent anybody to enter the area unless authorized by the Incident Commander (IC).</li> </ol>
Incident commander (IC)  <u>Who's IC?</u> <ol style="list-style-type: none"> <li>1. Protection Services (PS)</li> <li>2. PS will surrender IC to civic authorities upon their arrival.</li> <li>4. Protection Services can surrender IC to Faculty, service or department representative when the incident is under control.</li> </ol>	Incident response, information gathering and management of available resources to address health and safety and spill/discharge.
Faculty personnel, faculty service or department	Initiate clean up and recovery,

representative and the Health, Safety and Risk Manager (HSRM).	if within training and resources abilities. <i>Each individual faculty is responsible for implementing Emergency Response Plans for Health &amp; Safety issues, damage to property and environmental spills for their specific activities.</i>
Protection Services Faculty HSRM representative	Record overall event and details of spill and ensuing events with detailed notes and pictures.
ORM	Notify authorities (if necessary)
ORM	Write post-incident evaluation

**Emergency Contact Information:**

Contact	Phone number
Protection Services / Emergency response	5411
HSRMs (9am-5pm)	See Annex B

**6.10 Reporting**

**6.10.1 Mandatory Reporting Details**

Once the incident is under control, it is important to report the following to ORM’s Environmental planning Department Manager:

- The caller’s name, email, telephone number and position/title.
- The location of the discharge.
- The date and time the discharge was discovered and, if known, when it occurred.
- The name, telephone number and role of each person contacted and/or responsible for coordinating a response to the discharge (Not intended to include every crew member).
- The approximate duration of the discharge and whether the discharge is continuing.
- The identity and quantity of products or solutions discharged and any known hazards of the constituents. Hazards may typically be found on the MSDS for the pollutant.
- The location of the source of the pollutant and the best available information regarding the circumstances and cause of the discharge. It is understood that information regarding cause may change and any significant revision should be reported as per s.13 (7) of O. Reg. 675/98. If the cause is not known when the spill is reported, then provide a description of the measures that are being taken or will be taken to determine the cause.
- Description of containment and clean-up efforts with associated results.
- Disposal methods used for the contaminated materials.
- A description of any adverse effects that occurred or may occur. These effects may include, but not be limited to, any public safety or health threats, potential impacts soil and water, impacts to private property offsite from the spill location, impacts to fish and wildlife habitat or flood plain areas, other environmental impacts, or any other of the adverse effects described in the Ontario EPA.

### 6.10.2 Reportable Details if Relevant

- A description of any conditions that aggravated or mitigated the adverse effects, or that may do so, including weather, surface water and groundwater conditions. Wind speed and direction may be particularly relevant to air discharges and precipitations may aggravate spills to land.
- If the discharge of the pollutant is to other properties, confirmation of whether the owners or occupants of the properties affected by the discharge will provide access to a person who is required under the EPA or by an order to take steps to prevent, eliminate or ameliorate any adverse effects that are caused or may be caused by the discharge. For example, if a spill of a liquid pollutant flows offsite from the University property to an adjacent property then the University, as discharger, should be allowed access to the adjacent property to carry out their cleanup.
- Any other pollutants that were or may be discharged into the natural environment as a result of the circumstances that gave rise to the notification. Any adverse effects of a chemical reaction between a spilled pollutant and other stored materials, or creation of an unsafe environment for personnel or users.
- Any actions that were taken or will be taken to prevent, eliminate or ameliorate any adverse effects. Any actions taken to satisfy the person's duty under section 93 of the EPA and the name and telephone number of every person responsible for carrying out these actions. Where one person is coordinating the action of others only the name of the coordinator is required. As well, any circumstances, including weather or traffic conditions that may interfere with these actions.

### 6.10.3 Post incident evaluation

Following an incident, a post incident evaluation and debrief meeting should be undertaken. The evaluation should include the following information and be kept on file by ORM and Protection Services.

Description of the incident	Amount of spill recovered (%)
Source and cause of the incident	Itemized clean-up costs
Description of spill response	Suggested prevention and mitigation plans
Quantity of spill	Recommended upgrades to response plan

## 7.0 REFERENCES

- Handbook of Environmental Compliance in Ontario, 3 edition, 2002, John-David Phyper, Brett Ibbotson, 403 pages.
- Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities, May 2007, Ministry of the Environment, Ontario, 36 pages.
- Sewer Use By-Law No. 2003-514, City of Ottawa, Ontario, 26 pages.
- Sewer Use Program, Guide for Discharging Wastewater from Industrial Facilities, City of Ottawa, Robert O. Pickard Environmental Center, 8 pages.
- Spills Reporting – A Guide to reporting Spills and Discharges, May 2007, Spills Action Center, Ministry of the Environment, Ontario, 21 pages.
- Ontario Environmental Protection Act and Regulations R.S.O. 1990, CHAPTER E.19, Ministry of the Environment, Ontario.
- Ontario Occupational Health and Safety Act and Regulations R.S.O. 1990, CHAPTER O.1, Ministry of Labour, Ontario.
- Fire Protection and Prevention Act, 1997, and Fire Code (O.Reg. 213/07) 2007, Ministry of community Safety and Correctional Services, Ontario.
- Transportation of Dangerous Goods Act and Regulations, 1992 (1992, c. 34), Transport Canada, Government of Canada.
- Environmental Code of Practice for Aboveground and Underground Storage Tank Systems containing Petroleum and Allied Petroleum Products, 2003, CCME Canadian Council of Ministers of the Environment, 50 pages.
- National Fire Code, Part 4 Flammable and Combustible Liquids, 2005, National Research Council Canada.
- CANADIAN ENVIRONMENTAL PROTECTION ACT, 1999 – Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations SOR/2008-197, Government of Canada, 33 pages.
- University of Alberta – Chemical Safety Plan, Occupational Hygiene & Chemical Safety Division, Department of Environmental H&S, September 2011.
- University of Toronto – Laboratory Hazardous Waste Management and Disposal Manual, Environmental Health and Safety, March 2009.

**Annexe A**  
**Regular Hazardous Waste Collection Schedule**

Below is the regular hazardous waste schedule, based on a calendar of 6 weeks for the collection of hazardous waste across the entire University. The schedule includes the door service schedule as well as the drop off schedule to the hazardous waste rooms (satellite accumulation areas).

Horaire pour collecte et transfert régulière - Regular Collection and Transfer Schedule

HEURE TIME	LUNDI/MONDAY	MARDI/TUESDAY	MERCREDI/WEDNESDAY	JEUDI/THURSDAY	VENDREDI/FRIDAY
8:00					
8:30					
9:00		<b>TRANSFER -TRANSFERT</b> 9AM -10AM <i>Préavis de 24 hrs requis 24 hr notice required</i>	Service porte-à-porte Door to Door Service <b>MÉDECINE/MEDICINE</b> 9AM – 12PM	<b>TRANSFER -TRANSFERT</b> 9AM -10AM <i>Préavis de 24 hrs requis 24 hr notice required</i>	<b>TRANSFER-TRANSFERT</b> 9AM -10AM <i>Préavis de 24 hrs requis 24 hr notice required</i>
9:30		Service porte-à-porte Door to Door Service <b>SCIENCE</b> 10 AM – 12 PM		Service porte-à-porte Door to Door Service <b>SCIENCE</b> 10 AM – 12 PM	Service porte-à-porte Door to Door Service <b>MÉDECINE/MEDICINE</b> 10 AM – 12:30 PM
10:00		<i>Porte ouverte Open Door DRO 129 12 PM – 12:30 PM</i>	<i>Porte ouverte Open Door RGN1145 12-12:30</i>	<i>Porte ouverte Open Door DRO 129 12 PM – 12:30 PM</i>	
10:30					
11:00					
11:30					
12:00					
12:30					
1:00					
1:30		Service porte-à-porte Door to Door Service <b>GÉNIE / ENGINEERING</b> 1:30 PM – 3:00 PM	Service porte-à-porte Door to Door Service <b>PETER MORAND</b> 1:30 PM – 2:30 PM	<b>200 LEES</b> 1:30 PM – 2 PM	Service porte-à-porte Door to Door Service
2:00		<i>Service porte ouverte Drop off Service CBY E09 GÉNIE / ENGINEERING 3:00 PM – 4PM</i>	<b>ARTS</b> <b>ÉDUCATION/EDUCATION</b> <b>GÉOGRAPHIE/ GEOGRAPYHY</b> <b>PSYCHOLOGIE/PSYCHOLOGY</b> <b>TRANSFER REQUESTS</b> 2:30 PM – 4:30 PM		
2:30					
3:00					
3:30					
4:00					
4:30					
5:00					

Schedule is subject to change. L'horaire est susceptible à changement. Last Revised September 25<sup>th</sup> 2017.

A current copy of the schedule is available on the hazardous waste management website:

<https://orm.uottawa.ca/programs/hazardous-waste>

**ANNEX B**

**Emergency Contact Personnel During work Hours  
9am – 5pm**

The following table identifies the Health and Safety Manager Representative (HSRM) of every faculty.

<b>Faculty &amp; Service</b>	<b>Contact Name</b>	<b>Employee Contact Info</b>
Science	Pubalee Bera	613-562-5800 Ext 6425
	<i>Assistant</i>	613-562-5800 Ext 4580
Engineering	Pierre Laflamme	613-562-5800 Ext 6829
Medicine	Charles Mulcahy	613-562-5800 Ext 3210
	<i>Assistant</i>	613-562-5800 Ext 8628
Facilities	Guy Leblanc	613-562-5800 Ext 6992
All other faculties	Paul Fortin	613-562-5800 Ext 2627