PURPOSE
The Toxic Materials Standard contains information on the safe use, handling, and storage of toxic materials at the University of Calgary to protect people, assets, and the environment. This Standard may be used in the development of site-specific Standard Operating Procedures (SOPs). As a minimum, this guiding document needs to be reviewed by all staff prior to commencing work with toxic materials. This Standard addresses the Occupational Health and Safety Code requirements for safety equipment and emergency response when working with toxic materials.

SCOPE
This Standard applies to all persons that are handling, using, storing and/or disposing of toxic materials under the auspices of the University of Calgary. Toxic materials are labelled according to either WHMIS 1988 or WHMIS 2015 requirements, to clearly indicate their contents. The symbols for toxic materials are as follows:
PROPERTIES

- Toxic materials are substances that may cause harm to an individual if it enters the body. Toxic materials may enter the body in different ways. These ways are referred to as the route of exposure and may be through inhalation, absorption, ingestion or injection. Toxicity can refer to the effect on a whole organism or a substructure of an organism. The effects are dose-dependent and species specific.
- Toxic materials can have both immediate and/or long-term effects that can affect the individual and/or developing embryo or foetus. Toxic materials may have other hazardous properties e.g. corrosive and/or flammable.
- Toxic materials are **Class 2.3** Toxic Gases and **Class 6** Poisonous/Infectious Substances dangerous goods as defined by the Transportation of Dangerous Goods (TDG) Act.
- Toxic materials under **WHMIS 1988** legislation are classified as **Class D** Poisonous and Infectious Materials (infectious materials are covered by the University of Calgary Biosafety Program) and are further divided by route of exposure and degree of toxicity;
  - **Oral Exposure Route**
    - Class D1A - LD50 ≤ 50 mg/kg body weight
    - Class D1B - LD50 > 50 and ≤ 500 mg/kg body weight
    - Class D2A & B - ≤ 10 mg/kg body weight induces a chronic health effect
  - **Dermal Exposure Route**
    - Class D1A - LD50 ≤ 200 mg/kg body weight
    - Class D1B - LD50 > 200 and ≤ 1000 mg/kg body weight
    - Class D2A - ≤ 20 mg/kg body weight induces a chronic health effect
  - **Inhalation Exposure Route**
    - **Gases**
      - Class D1A - LC50 ≤ 2500 ppmV
      - Class D2A - ≤ 25 ppmV gas or ≤ 10 mg/kg body weight induces a chronic health effect
    - **Vapours**
      - Class D1A - LC50 ≤ 1500 ppmV
      - Class D1B - LC50 >1500 and ≤ 2500 ppmV
    - **Dusts/Mists/Fumes**
      - Class D1A - LC50 ≤ 0.5 mg/L
      - Class D1B - LC50 >0.5 and ≤2.5 mg/L
- Toxic materials under **WHMIS 2015** legislation are classified in **Part 8** Health Hazard Classes:
  - **Oral Exposure Route**
    - Category 1 - LD50 ≤ 5 mg/kg body weight
    - Category 2 - LD50 > 5 and ≤ 50 mg/kg body weight
    - Category 3 - LD50 > 50 and ≤ 300 mg/kg body weight
    - Category 4 - LD50 > 300 and ≤ 2000 mg/kg body weight
  - **Dermal Exposure Route**
    - Category 1 - LD50 ≤ 50 mg/kg body weight
- Category 2 - LD50 > 50 and ≤200 mg/kg body weight
- Category 3 - LD50 > 200 and ≤1000 mg/kg body weight
- Category 4 - LD50 > 1000 and ≤2000 mg/kg body weight

o Inhalation Exposure Route:
  ▪ Gases
    - Category 1 - LC50 ≤ 100 ppmV
    - Category 2 - LC50 > 100 and ≤ 500 ppmV
    - Category 3 - LC50 > 500 and ≤ 2500 ppmV
    - Category 4 - LC50 > 2500 and ≤ 20000 ppmV
  ▪ Vapours - ≤ 0.5 mg/L
    - Category 1 - LC50 ≤ 100 ppmV
    - Category 2 - LC50 > 100 and ≤ 500 ppmV
    - Category 3 - LC50 > 500 and ≤ 2500 ppmV
    - Category 4 - LC50 > 2500 and ≤ 20000 ppmV
  ▪ Dusts and Mists –
    - Category 1 - LC50 ≤ 0.05 mg/L
    - Category 2 - LC50 > 0.05 and ≤ 0.5 mg/L
    - Category 3 - LC50 > 0.5 and ≤ 1 mg/L
    - Category 4 - LC50 > 1 and ≤ 5 mg/L

• The University of Calgary considers the following as highly toxic materials and have specific requirements for handling, storage and usage:
  o WHMIS 1988
    - Class D1A for all routes of exposure
  o WHMIS 2015
    - Category 1 & 2 for oral and dermal routes of exposure
    - Category 1, 2 & 3 for gases and vapours
    - Category 1 & 2 for dusts and mists

RESPONSIBILITIES
Supervisors
• Complete a Hazard Assessment and Control Form (HACF) that identifies the hazards of working with toxic materials and the controls used to mitigate the hazards.
• Communicate the hazards and appropriate controls to workers.
• Provide appropriate Personal Protective Equipment (PPE).
• Develop a Standard Operating Procedure (SOP) for the use, handling, storage and movement of toxic materials in your work area.
• Train staff in accordance to this Standard and any laboratory specific procedures involving toxic materials and ensure compliance.
• Maintain an inventory of toxic materials.
Workers

- Review this Standard and the applicable Safety Data Sheet (SDS) prior to working with toxic materials.
- Follow the requirements set out in this Standard, the HACF for your laboratory, and any laboratory specific SOPS.
- Report hazardous conditions immediately to their supervisor.
- Know the location of emergency equipment and how to respond to an emergency.
- Wear and properly maintain the required Personal Protective Equipment (PPE).
- Wear appropriate laboratory attire including long pants and closed-toed shoes.

Facilities

- Develop and implement University of Calgary Design Standards compliant with appropriate legislation, codes, standards and best practices affecting construction and renovations in areas where toxic materials will be used or stored.
- Installation of appropriate eyewash and emergency showers based on risk assessment, as per the University of Calgary Design Standards.

Environmental Health and Safety

- The development and review of this Standard.
- Advise users on appropriate legislation, codes, standards and best practices for use, handling and storage of toxic materials.
- Assist departments with interpretation and methods of compliance with this Standard.

USAGE

Toxic materials are present a wide range of products with varying properties and use. The hazards associated with toxic materials are heavily dependent on the concentration and route of exposure. The following are general guidelines for toxic materials. The SDS should be consulted for the specific hazards and controls prior to use.

- Industry best practice is to purchase toxic materials in liquid form to reduce the inhalation hazard posed by toxic powders/dusts and in the smallest quantity practical for the application.
- All procedures involving toxic materials that create gases, dusts, vapours or mists must be conducted in a chemical fume hood (biosafety cabinets must not be used) to protect against skin or inhalation exposure.
- If the use of a fume hood is impractical, acutely toxic materials may be handled in a glove box or a powder weighing station.
- An eyewash and emergency shower must be installed as per the University of Calgary Design Standards where toxic materials are being used.
- A spill kit must be available in the location where toxic materials are used. Please refer to UofC EHS Spill Kit information to ensure your lab space is properly equipped for chemical spills.
- For toxic materials listed under Schedule 1 of the Alberta Occupational Health & Safety Act, Regulations and Code follow the specific University of Calgary Codes of Practice as listed on the University of Calgary EHS website under Programs.
• Check the SDS for the appropriate type of glove.
• Always wear appropriate personal protective equipment (PPE) and appropriate laboratory attire when working with toxic materials.
• Use chemical splash goggles and face shield when there is a risk of splash from toxic materials.
• If a respirator is required, the user must follow the UofC EHS Respiratory Protection Program.
• Replace damaged or obsolete product labels as appropriate.
• Handle all toxic materials over a plastic-backed disposable paper sheet to minimize contamination. Dispose of paper sheet as chemically contaminated waste.
• When handling containers with toxic materials the outside should be wiped down before and after use with a damp paper towel. Dispose of paper towel as contaminated waste.
• When pouring toxic materials ensure the label is turned up so that any residual material does not come into contact with the label.
• Decontaminate surfaces and equipment that may have been exposed to toxic materials. Dispose of cleaning materials as chemically contaminated waste.
• Dispose of gloves as contaminated waste.
• Hands should be washed promptly after the use of any toxic materials.

HANDLING
Movement within a facility

Transport on Road
• Transportation of hazardous materials is subject to Transportation of Dangerous Goods (TDG) legislation and University of Calgary procedures. Private vehicles should not be used to transport dangerous goods. Contact Supply Chain Management for assistance when transport of oxidizing materials between buildings or between campuses is required.

Waste/Disposal
• Never dispose of toxic materials down any plumbing system.

STORAGE
Users of toxic materials must maintain their inventory as low as reasonably practical adhering to the requirements of this Standard for storage of toxic materials.
• Chemicals must be segregated according to chemical storage guidelines provided by the manufacturers’ SDS.
• All storage areas containing toxic materials must be appropriately labelled.
• Toxic materials are to be stored in a cool, dry location away from direct sunlight.
• Highly Toxic materials that have an oral or dermal route of exposure must be in a locked storage container.
EMERGENCY PROCEDURES

First Aid
• Provide first aid in accordance with the Safety Data Sheet.
• Contact Campus Security 403-220-5333, if additional first aid treatment is needed.
• Contact supervisor and follow the University of Calgary Incident Reporting and Investigation instructions on the EHS website.

Spill Procedures
• Ensure that you have an adequate spill kit for toxic materials.
• Follow the UofC EHS Spill Response Procedures.

REFERENCES
Alberta Occupational Health and Safety Act, Regulations and Code
UofC EHS Chemical Storage Guidelines
UofC EHS Emergency Station Compliance Program
UofC EHS Movement of Hazardous Materials Within Buildings
UofC EHS Respiratory Protection Program
UofC EHS Spill Kit Information
UofC EHS Spill Response Procedures
University of Calgary Codes of Practice
University of Calgary Design Standards