University of Windsor

Policies and Procedures Reference

HAZARDOUS MATERIALS DISPOSAL GUIDE

Chemical Control Centre

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1 Purpose

This guideline was developed to ensure that hazardous waste generated in laboratory or other workplace settings at the University of Windsor are managed in a safe and compliant manner. The following procedures address the packaging, segregation, transportation and collection requirements for hazardous waste at the point of generation. While this guide addresses the most common practices and types of hazardous waste generated on campus, we do recognize that there will be unique situations that require assistance of the specialists here at the Chemical Control Centre.

2 Introduction

Hazardous wastes are wastes that, when present in quantities and concentrations that are high enough, pose a threat to human health or the environment if they are improperly stored, transported, treated or disposed. This includes a broad range of materials such as manufacturing residues from researchers (e.g. waste acids, contaminated oil and complex chemicals), biomedical wastes, photo-finishing chemicals, pesticides, PCBs, motor oil, unused cleaning products and discarded batteries.

Ontario has a comprehensive legislative and regulatory framework in place to ensure that hazardous wastes are managed in an environmentally safe manner. Through the Environmental Protection Act (EPA) and accompanying regulations, the Ministry of the Environment (MOE) has established a waste management system, which governs the collection, storage, transportation, treatment, recovery, and disposal of this waste. Transportation of both hazardous materials and hazardous waste is primarily regulated by the Ministry of the Environment, under the authority of the Transportation of Dangerous Goods Act. While the University of Windsor has stringent practices in place to meet all legal requirements, everyone involved in the generation of hazardous waste has a role to play in reducing its impact on public health and the environment.

3 Responsibility

- It is the responsibility of all University of Windsor students, staff and faculty who generate hazardous waste to be familiar with and follow these procedures accordingly.
- It is the responsibility of the Chemical Control Centre to assist University waste generators with hazardous waste safety and handling practices and to coordinate campus wide collection, consolidation and transportation for final disposal with external contractors within the prescribed legislative framework.

4 Laboratory Representative

While it is the responsibility of all personnel to observe proper waste handling procedures in the course of their work, Supervisors, Principal Investigators, or delegates are encouraged to designate a Representative to oversee waste management practices for a specified area and/or group. This Representative should be an experienced, technician, postdoctoral fellow or graduate student. The Representative will work with the Chemical Control Centre's Hazardous Materials Technician to ensure that collection systems are in place which meet the individual needs of the group, regularly inspect and

arrange for disposal through the Chemical Control Centre, and ensure that all group members are made aware of these procedures.

5 General Waste Requirements

5.1 Safety

- Always wear the appropriate personal protective equipment when handling hazardous waste. This includes safety glasses or chemical splash goggles, lab coat, chemical resistant gloves, and closed toed shoes.
- Hazardous liquids must not be flushed down drains as a method of disposal. This practice is illegal in accordance with city bylaw and provincial legislation and may lead to dangerous reactions and damage to the drainage system.

5.2 Containers

- Waste collection containers must be provided by or pre-approved the Chemical Control Centre to ensure the integrity of the container and that the waste is compatible with the container material.
- Lids and caps must be closed tightly when not in use.
- Do not leave funnels in waste containers unless it in active use.
- Do not fill liquid waste containers more than 80% capacity. Sufficient headspace above the surface of the liquid is needed to allow room for expansion.

5.3 Labels

- Containers must have a “Hazardous Waste” tag, or equivalent, attached. Hazardous waste labels are used to communicate the contents of all waste containers to laboratory researchers, facilities services, and chemical handling staff. Pre-printed labels are available free of charge from The Chemical Control Centre.
- Start to fill out the Hazardous waste label as soon as the container is put into use. Immediately record the owner name, location, and start date on the label. As ingredients are added to the container, record the chemical name and approximate amount. Do not use chemical formulas or short forms.
- In addition to pre-printed Hazardous waste labels, the Chemical Control Centre accepts hazardous waste materials which have an alternative notification label. Acceptable labels include WHMIS labels, University of Windsor workplace labels, and/or the original supplier label

5.4 Storage

- Hazardous wastes should be stored according to their characteristics. Acids and bases should be stored in corrosive cabinets. Flammables should be stored in flammable cabinets.

- Designate and label “Satellite Waste Accumulation Area(s)” in the lab where waste can be safely stored pending disposal to the Chemical Control Centre.
- Do not store waste chemicals on the lab bench, on the floor, or in the fume hood.
- Incompatible and highly reactive chemicals must always be packaged separately to minimize fire and explosion hazards in case of accidental breakage.
- Do not store waste for more than 60 days in the lab. Contact the Chemical Control for periodic removal, even if the containers are not full.

5.5 Transportation

- Proper PPE is required when transporting hazardous waste.
- Spill proof carts or secondary containers are required when transporting waste within a building.
- Use a freight or chemical elevator to transport waste between floors, never a passenger elevator.
- Do not transport waste on outdoor public walkways between buildings.

6 Hazardous Waste Characteristics

Hazardous waste is surplus material which is no longer of either commercial or research value and poses substantial or potential threats to public health, the environment or property and generally exhibits one or more of the following characteristics: (1) ignitability/flammability; (2) corrosivity; (3) reactivity; and (4) toxicity.

6.1 Ignitability/Flammability

Wastes that are hazardous due to the ignitability or flammability characteristic include any liquid, solid, or gaseous material with a flash point less than 60 °C (140 °F) or, when ignited, burns so vigorously that it creates a hazard. This encompasses most organic solvents (ether, xylene, toluene, etc.), alcohols (methanol, ethanol, butanol, etc.), paint thinners, and strong oxidizing materials. Oxidizers, such as hydrogen peroxide and benzoyl peroxide, may cause a material to ignite spontaneously and are therefore included in this category.

6.2 Corrosivity

Wastes that are hazardous due to the corrosivity characteristic include aqueous wastes with a pH of less than or equal to 2, a pH greater than or equal to 12.5 or based on the liquids ability to corrode steel. Examples include strong acids (hydrochloric acid, sulfuric acid, etc.), strong bases (sodium hydroxide, potassium hydroxide, etc.), and any other materials which will cause steel to rust significantly.

6.3 Reactivity

Wastes that are hazardous due to the reactivity characteristic may be unstable under normal conditions, may react with water, may give off toxic gases and may be capable of detonation or explosion under

normal conditions or when heated. Examples of reactive materials include cyanide or sulfide bearing waste, sodium metal, potassium metal, dry picric acid, and sodium azide.

6.4 Toxicity

Wastes that are hazardous due to the toxicity characteristic are harmful when ingested or absorbed. Toxic wastes present a concern as they may be able to leach from waste and pollute groundwater. This category includes known carcinogens, mutagens, and teratogens such as pesticides and heavy metals.

7 Specific Waste Categories

Chemicals of different hazard groups require different disposal methods; therefore, every effort must be made to help identify the hazards associated with a chemical prior to disposal. The following waste categories are examples of typical wastes streams generated on campus. Please note, this list is not exhaustive, and many wastes have unique segregation requirements. Please consult with the Chemical Control Centre's Hazardous Materials Technician to develop a site-specific waste segregation plan prior to generating or combining any waste materials.

7.1 Organic Solvents

7.1.1 Non-Halogenated Solvents

Non-Halogenated solvent waste are organic solvents that do not contain F, Cl, Br, or I. Examples of some non-halogenated organic solvents that can be combined together are acetone, acetonitrile, ethanol, ethyl acetate, formaldehyde, hexane, toluene, etc. This also includes any aqueous solutions contaminated with non-halogenated organic solvents.

7.1.2 Halogenated Solvents

Halogenated solvent waste are any organic chemicals that contains F, Cl, Br, or I. This segregation is necessary because halogenated substances require more extensive treatment in order to minimise environmental pollution during waste disposal. Examples of halogenated organic solvents include methylene chloride, chloroform, carbon tetrachloride, bromoform, and mixtures of both non-halogenated and halogenated organic solvents.

7.2 Silica Gel

Silica gel contaminated with solvents, heavy metals, or other toxic chemicals should be accumulated in leak proof containers such as a 20 L lined pail. When labeling Silica gel waste, be sure to list all of the contaminants, including solvents, and the approximate percentages on the Hazardous Waste Label.

7.3 Ethidium Bromide

All material contaminated with ethidium bromide, including solids (e.g. gloves) should be packaged in a secure container, labelled and treated as chemical waste. Gels contaminated with ethidium bromide should be packaged in leak proof plastic containers (not garbage bags) and disposed of as chemical waste.

7.4 Surplus or Expired Chemicals

Surplus or expired chemicals for disposal should remain in their original container; additional labeling is not required if the manufacturer or workplace label is intact.

7.5 Sharps

Sharps are hypodermic, surgical, suture, or IV needles, syringes with needles, lancets, scalpels, blades and similar metallic sharp or pointed items for disposal that are capable of causing punctures, cuts or tears in skin or membrane. The must be placed into sharps containers which can be purchased through the Chemical Control Centre.

7.6 Lab Glass

Place clean broken or whole glass in the designated glass waste receptacles provided by the Caretaking staff. Glass contaminated with chemicals should be triple rinsed or deactivated in accordance with the procedures outlined in the chemical's Safety Data Sheet, prior to disposal. Do not place anything in the glass pails that pose any biological, chemical or radioactive hazard.

7.7 Controlled Substances

In Canada, the Office of Controlled Substances is responsible for the development of legislation, regulations, policies, and procedures related to the control of illicit drugs and other substances, including cocaine, heroin and barbiturates. The disposal of controlled substances requires an “Authorization to Return” or “Authorization for the Destruction” of controlled or narcotic substances from Health Canada. Individuals who have been issued an exemption permit should contact The Chemical Control Centre to make disposal arrangements.

7.8 Designated Substances

A designated substance is defined by the Ministry of Labour under the Occupational Health and Safety Act as “a biological, chemical or physical agent or combination thereof prescribed as a designated substance to which the exposure of a worker is prohibited, regulated, restricted, limited or controlled.” An exposure means exposure by inhalation, ingestion, skin absorption or skin contact. Designated substances include the following: Acrylonitrile; Arsenic; Asbestos; Benzene; Coke Oven Emissions; Ethylene Oxide; Isocyanates; Lead; Mercury; Silica; and Vinyl Chloride.

Some of these substances are present in University research labs and in the construction materials of some of the buildings on campus. In addition to exposure controls, special consideration must be given to disposal practices. As a waste material, they should be kept separate from other waste material as much as possible (i.e. do not comingle with other waste). Discuss waste handling and container options with the Chemical Control Centre when using these materials in a laboratory setting.

7.9 Explosives

An explosive substance is any chemical compound or mechanical mixture that, when subjected to heat, impact, friction, detonation, or other suitable initiation, undergoes rapid chemical change, evolving large volumes of highly heated gases that exert pressure on the surrounding medium. Examples of

explosive substances include ammonium nitrate, peroxide forming agents, diazo compounds, dry picric acid and hydrazine compounds. Package each container of potentially explosive substances separately from other chemicals. Please note on the Hazardous waste label the waste's characteristics and any special handling precautions.

7.10 Radioactive Waste

The disposal of radioactive waste (liquid scintillation vials, solids, liquids, etc.) is regulated by the Canadian Nuclear Safety Commission (CNSC). The University of Windsor's Radiation Safety Program outlines the specific policies and procedures related to the disposal of radioactive waste on campus. Please refer to the University of Windsor's Radiation Safety Program for more information regarding radioactive waste http://www.uwindsor.ca/ccc.

7.11 Biohazardous Waste

Hazardous biological materials include biotoxins and biomaterials capable of infecting or causing harm to persons, animals or plants. Infectious agents are any biomaterial capable of transmitting disease to persons, animals or plants. The University of Windsor's Biological Safety Program outlines the policies and procedures related to the disposal of hazardous biological/biomedical waste, including incineration and steam sterilization requirements. Please refer to the University of Windsor's Biological Safety Program for more information http://www.uwindsor.ca/ccc.

7.12 Unknowns

Every effort must be made to identify any waste that you want to dispose of. The Chemical Control Centre can still dispose of waste that cannot be identified but a charge back to the principal investigator or department of $95.00 per unknown will apply. Any information that can be provided may greatly reduce the hazards involved in handling and testing the material, including the name of the research group, telephone number, type of research, storage method, approximate age of container, and all relevant information (i.e. organic, acid, air reactive, pH, oxidizer etc.).

7.13 Tricaine Methanesulfonate (MS-222)

Tricaine Methanesulfonate, also known as TMS and MS-222, is a commonly used general anesthetic and euthanasia agent for fish and amphibians. Depending on the species, MS-222 is administered by immersion into dilute solutions (water baths), by direct application, or injection. Solutions typically range from 10 mg/L to 250 mg/L, depending on the species and desired outcome. Disposal of waste MS-222 requires special consideration in order to comply with provincial and local authority regulations.

Dilute aqueous solutions of MS-222 (≤ 250 mg/L) may be disposed down the municipal sanitary sewer with an excess of water (minimum 1:5). If in a remote location, where a sewer is not readily available, further dilute the solution (minimum 1:5) with water and dispose the wastes on land, in a location away from waterways. Never dispose MS-222 directly into surface water or storm water conveyances (storm sewers, catch basins). Waste solid MS-222 (powder, tablets) and concentrated solutions must be sent to the Chemical Control Centre for proper disposal.

7.14 Light Tubes and Bulbs, Fluorescent and Incandescent

All lights and tube are collected by the Caretaking staff and put out for proper recycling. Do not throw them into the garbage.

8 Departmental Waste Collection Procedures

8.1 Essex Hall and Essex CORe

- Contact the Chemical Control Centre for a waste pick up by sending an Email with a detailed inventory of the types and quantity of waste ready for disposal.
- Waste labels must be complete on each container prior to pick up. Items will not be picked up if the labels are incomplete.
- Waste is typically picked up directly from the labs on Fridays. Please plan ahead and submit requests by end-of-day on Thursday.
- Full containers will be exchanged with empties at the time of pick up. Additional containers can be provided upon request.
- Any direct deliveries to the Chemical Control Centre must be pre-approved. The Representative, supervisors, or staff must contact the Chemical Control Centre to obtain consent prior to dropping off any waste items.

8.2 Biology Building

- A satellite waste collection site is located in the Biology Stock Room, 316.
- Deliver waste in person to a Stock Room Technician during hours of operation only.
- Observe all safety measures when transporting waste within the building.
- Additional waste supplies are available from the Biology Stock Room.
- For disposal of non-standard/special waste items, please contact the Chemical Control Centre.

8.3 Centre for Engineering Innovation (CEI)

- The satellite waste collection site is located in Room 1197 CEI.
- Please email the lab technician at bmiddleton@uwindsor.ca or call ext. 2564 to schedule a delivery time and obtain additional waste supplies. If the technician is unavailable, please contact the Chemical Control Centre directly.
- All deliveries must be made in person and with prior consent.
- Observe all safety measures when transporting waste within the building.
- For disposal of non-standard/special waste items, please contact the Chemical Control Centre.

8.4 Great Lakes Institute (GLIER)

- The satellite waste accumulation site is located in the Lab Services Room, 127.
- Place waste containers in the designated areas: non-flammable waste in a secondary container (bin) on the shelf, flammables in the flammable cabinet, and large solid waste containers to the side of the shelf against the wall.
- Ensure containers and labels are properly prepared prior to transport and disposal.
- Observe all safety measures when transporting waste within the building.
- Obtain replacement supplies from the shelf as needed. Contact the HMT for any additional supplies.
- For disposal of non-standard/special waste items, please contact the Chemical Control Centre.

8.5 All Other Buildings

- Please contact the Chemical Control Centre to schedule a waste pick-up and obtain waste supplies.

9 Spill Response

In case of a spill involving hazardous materials, it is important to reduce the possibility of further contamination outside the initial spill area. By preventing the spreading of contamination, you effectively reduce the potential exposure of others. For more information, refer to the University of Windsor's Hazardous Materials Spill Response Manual or contact the Chemical Control Centre. Spill training is also available online through the Chemical Control Centre website.

9.1 Quick Reference Steps

- Remain calm and move away from affected area: Offer assistance to individuals who are disabled, and others as needed until help arrives.
- Summon Aid: If you are unsure of how to effectively clean the spill, contact the Chemical Control Centre (ext. 3523) or Campus Community Police (dial 911), from a safe area.
- Treat Injured People First: Providing first aid to injured people takes priority over cleaning a biohazardous spill. Inform emergency personnel that spill involves biohazardous material.
- Alert Everyone in the Area: Inform everyone within the vicinity of the spill that an accident involving biohazardous material has occurred. Mark the spill zone and post appropriate signage to reduce the potential for further contamination.
- Control Contamination: Take action to prevent the spread of contaminated materials. If the spill is dry – apply a small amount of water and cover. If the spill is wet, cover with absorbent material.
- Clear Area: Remove all unnecessary individuals from the area of the spill. Attempt to reduce the movement of people within the spill zone.

- Decontamination: Apply decontamination procedures in priority order: (1) personnel; (2) laboratory; and (3) equipment.

10 Resources

Autoclave Guidelines, University of Windsor Chemical Control Centre.

Biomedical Waste Disposal Procedures, University of Windsor Chemical Control Centre.

Hazardous Materials Spill Response Manual, University of Windsor Chemical Control Centre.

Government of Canada. (2015). Canadian Biosafety Handbook (2nd ed.). Ottawa, ON, Government of Canada. https://www.canada.ca/en/public-health/services/canadian-biosafety-standards-guidelines/handbook-second-edition.html

Ontario Ministry of the Environment. Guideline C-4: The Management of Biomedical Waste in Ontario. https://www.ontario.ca/page/c-4-management-biomedical-waste-ontario

Ontario Ministry of the Environment. Guideline C-17: Non-Incineration Technologies for Treatment of Biomedical Waste (Procedures for Microbiological Testing).