

HAZARDOUS MATERIALS DISPOSAL GUIDE



Emergency Response Procedure for Chemical Spill

In case of a spill involving either hazardous waste or chemicals, 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.

All spills of hazardous materials must be cleaned up immediately.

University of Windsor Campus Police
Emergency Line: ext. 4444

Quick Reference Steps:

- 1. Treat Injured People First:** Providing first aid to injured people takes priority over cleaning a hazardous materials spill. Inform emergency personnel that THE spill involves hazardous materials.
- 2. Alert Everyone in the Area:** Inform everyone within the vicinity of the spill that an accident involving hazardous materials has occurred. Mark the spill zone and post appropriate signage (if needed) to reduce the potential for further contamination.
- 3. Control Contamination:** Take action to prevent the spread of hazardous materials.
- 4. Clear Area:** Remove all unnecessary individuals from the area of the spill. Attempt to reduce the movement of people within the spill zone.
- 5. Summon Aid:** If you are unsure of how to clean the spill, contact the Chemical Control Centre (ext. 3523).
- 6. Report Incident:** Once area has been cleaned and no further hazard exists, complete a chemical spill report and forward to Office of Occupational Safety.

Critical Dispatch Information:

Provide dispatcher with the following:

- your full name,
- phone number (extension or cellular),
- exact location (building and room #),
- incident involves hazardous materials,
- and if anyone is injured.

Emergency Procedures

The U of W has a universal emergency procedure found on Occupational Health & Safety website (www.uwindsor.ca/safety) under "Emergency Procedures" along with a "Chemical Spill Response Plan and Fire Procedure".



Policies and Procedures Reference

HAZARDOUS MATERIALS DISPOSAL GUIDE

Questions and comments related to this guide can be directed to:

Chemical Control Centre
Hazardous Materials Technician
401 Sunset Avenue
Windsor, Ontario N9B 3P4
e-mail: ccc@uwindsor.ca
Phone: 519.253.3000 ext. 3523, option #3

Date Revised: July 2007

Authors:

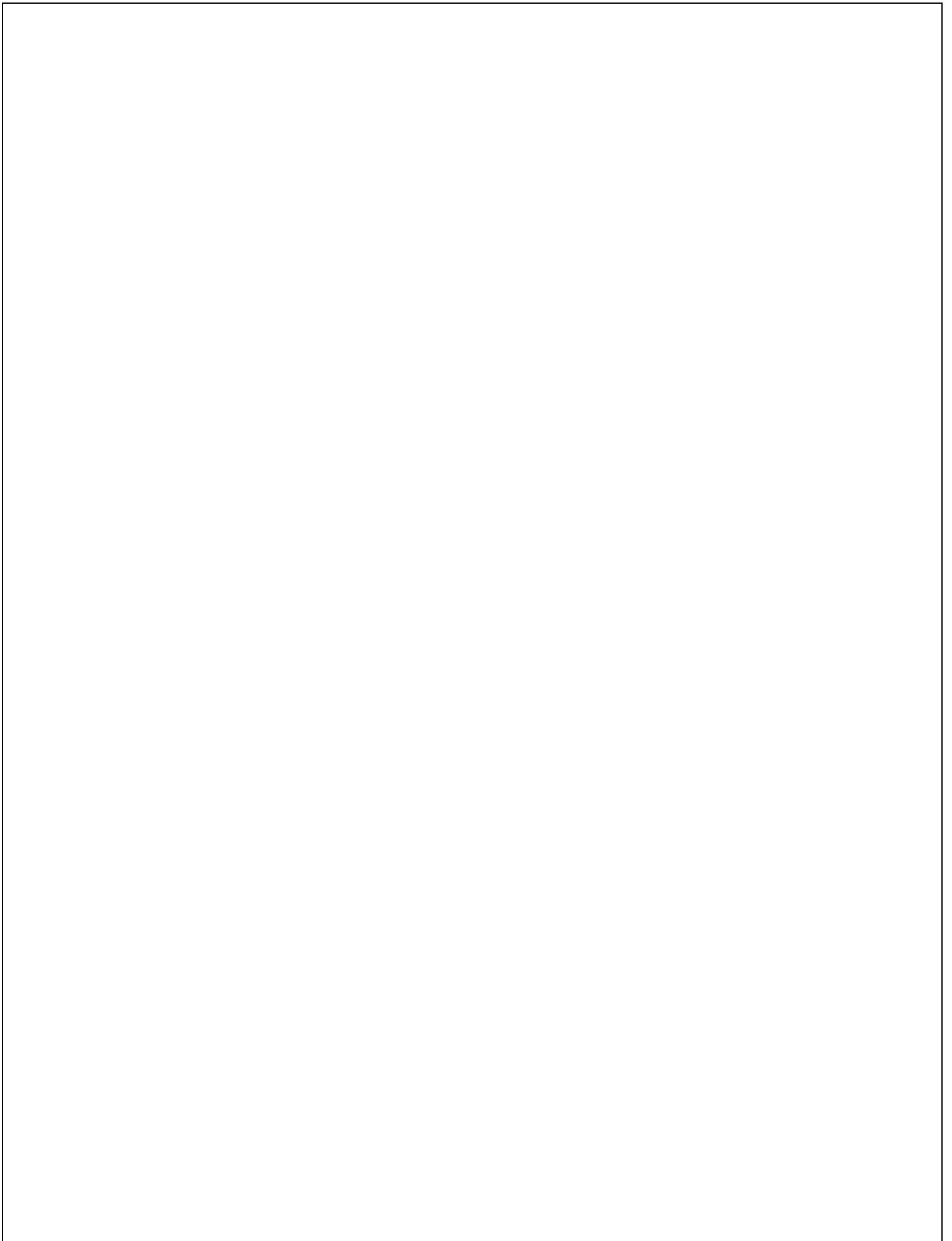
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No part of this document may be reproduced in any form without permission. This manual has been developed to provide guidance to the University of Windsor community regarding the disposal of hazardous materials. Only individuals who have received training through formal education or site-specific training should handle chemical, biological, and/or radioactive materials. Failure to use, handle, store, or disposal of materials safely can increase the possibility of injury to both the user and campus community. For more information, please contact the Chemical Control Centre, your supervisor, or the Office of Occupational Health and Safety.

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1. Overview

Hazardous wastes include a broad range of materials such as manufacturing residues from researchers (e.g. waste acids, contaminated oils and complex chemicals), biomedical wastes, photo-finishing chemicals, waste pesticides, PCBs, motor oil, unused cleaning products and discarded batteries. These wastes require special handling to reduce adverse effects to human health and the environment.

This guide addresses the most common types of hazardous waste generated on the University of Windsor's campus. This manual was developed to ensure that the disposal of these materials is completed safely, effectively, and within the applicable regulations. Please remember that Materials Safety Data Sheets (MSDS) are the best reference for the storage, handling and hazards associated with your chemicals. We do recognize that there will be unique situations that will require the assistance of the specialists here at the Chemical Control Centre.



M.S.D.S' can be accessed at www.uwindsor.ca/cc

2. Introduction

Institutional Commitment

The University of Windsor is committed to providing a safe and healthy work and educational environment for all of its employees, students, and visitors. Proper materials and waste management is an important part of this responsibility.

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* (EPA) and accompanying regulations, the Ministry of the Environment (MOE) has established a cradle to grave management system, which includes the systematic control of 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 authority of the Transportation of Dangerous

Goods Act. The TDGA regulations applicable to transport of laboratory chemicals include those governing packaging, labeling, marking, placarding, and reporting of discharges.

3. Chemical Control Centre's Role and Responsibilities

The Centre is a client-focused administrative department responsible for assisting our partners acquire, utilize, store, and dispose of hazardous materials in a cost-effective, safe, and responsible manner. Effective chemical management begins with the decision to purchase laboratory chemicals. All chemicals required in research, teaching or support services, must be acquired through "The Centre". We place all orders to ensure regulation compliance related to acquisition, storage, use and disposal. Our chemical technicians can provide assistance in ordering and can provide safer and less toxic alternatives if available.

Mission Statement:

The Mission of the Chemical Control Centre is to facilitate a safe environment in the university community through the informative acquisition, distribution, proper handling and disposal of hazardous materials.

Our Values & Guiding Principles:

***Approachable:** We are committed to being accessible and to ensure effective communication and understanding.*

***Collaboration:** We believe that working collaborative with our partners is key to a safe university environment*

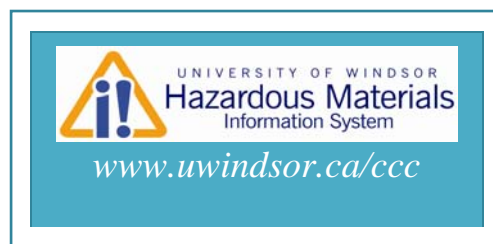
***Expertise:** We are dedicated to providing relevant technical knowledge and support.*

***Safety:** We promote and develop safe laboratory practices to support the university community.*

***Service:** We utilize innovative methods to provide effective, timely client focused services*

4. Hazardous Materials Information System (HMIS)

The University of Windsor's Hazardous Materials Information System (HMIS) is an online system that provides up-to-date inventory and safety management information. HMIS tracks the storage location of all chemical, biological, radioactive, and other hazardous materials on campus. Along with tracking and



maintaining the entire hazardous materials inventory for the university, the system is also able to generate detailed reports on controlled substances, radioisotopes and designated substances.

5. General Requirements Related to Packaging Waste

The Chemical Control Centre requires that its clients follow specific guidelines related to the packaging of hazardous waste, including:

1. All materials must be collected in an appropriate waste storage container. The Centre can provide a wide variety of approved containers for the collection, storage, and transportation of hazardous waste (see Table 1 below).
2. Each container must be labeled appropriately to reduce the possibility of the downstream mixture of incompatible materials. *Please see “Section 6 – Labeling Requirements” for more information.*
3. Secondary containment must be used during the transportation of materials to prevent leakage should breakage occur, examples include a cart with a lip, rubber bucket, or fiber box.
4. Incompatible and highly reactive chemicals must always be packaged separately to minimize fire and explosion hazards in case of accidental breakage.
5. Each waste container should have only one type of waste material inside. Chemical, biohazardous and radioactive wastes are handled differently and cannot be stored together.

Table 1: List of available waste management supplies from the Chemical Control Centre for the disposal of hazardous materials at the University of Windsor.

Part No.	Application	Description	Size
LAB0076	Liquid Waste	Plastic coated glass safety bottles	2.5L
		Plastic waste drums	20L
		Plastic waste drums	200L
USG0003	Solid Waste	Plastic waste drums	1 gallon
USG0004		Plastic waste drums	2.5 gallons
LAB0971		Plastic waste drums	5 gallons

6. Labeling Requirements

Hazardous Waste Labels

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 Centre and are typically attached to the waste container.

The following procedure ensures proper labeling, safe handling and collection of hazardous waste:

1. Immediately attach a “Hazardous Waste Label” to the container as soon as it is used for the collection of hazardous waste. Record the starting date on the label.
2. As ingredients are added to the container, record the chemical name and amounts added under the “List of Contents”.
3. Containers in the process of being filled must be kept closed and stored in a safe location; storage location should be selected based on the characteristics of the contents.
4. Collect inorganic substances separately and do not mix solids with liquids (*see “Section 10 – Hazardous Materials Waste Streams” for more information*)

UNIVERSITY OF WINDSOR
Chemical Control Centre

Name: _____
Building: _____ Room: _____
Date: _____ Ext: _____

WASTE INFORMATION

Halogens Organics
 Oil Cyanides
 Photographic Ferrnanganates

List of Contents:

HAZARDOUS WASTE

UNIVERSITY OF WINDSOR
Chemical Control Centre
4800 St. Clair Ave. E.
Windsor, ON N9A 6K1
Phone: 519-253-1234
Campus Emergency: call ext. 5555

Acceptable Alternatives

In addition to pre-printed “Hazardous Waste Labels” (see above), the Chemical Control Centre accepts hazardous waste materials, which have an alternative notification label. Acceptable labels include WHIMS labels, University of Windsor workplace labels, and/or the original supplier label.

7. Transportation of Chemicals and Hazardous Waste

Chemicals transported outside the laboratory or between stockrooms and laboratories should be in break-resistant secondary containers. Secondary containers are commercially available and are made of rubber, metal, or plastic, with carrying handle(s), and are large enough to hold the contents of the chemical containers in the event of breakage. Materials transported must be held within appropriate and clearly labeled containers.

8. Cylinders

When transporting cylinders of compressed gases, the cylinder should always be strapped in a cylinder cart and the valve protected with a cover cap. Cylinders should be transported between floors using a freight elevator (if available). Empty cylinders ready for disposal should be left with valve in closed position. Please ensure that the cylinder status tag reflects the current state of the cylinder: (1) full; (2) in-service; or (3) empty. The Centre coordinates the movement of cylinders outside of Essex Hall with Facilities Services. If you require the pick-up of an empty cylinder for disposal, please contact The Centre directly at ext. 3523.



9. Characteristics of Hazardous Waste

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) flammability; (2) oxidizing ability; (3) corrosivity; and (4) toxicity.

1. **Flammable** materials have one of the following characteristics:
 - Liquids that have a flash point less than 100°F.
 - Solids that can cause fire through friction or adsorption of moisture will burn vigorously and persistently causing a hazard.
 - Flammable compressed gases.
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. **Corrosive** liquids have a pH of 2 or less or 12.5 and greater. Most common acids or bases are corrosive.

Please never mix acids and bases!
4. **Toxicity** is measured through the Toxicity Characteristic Leaching Procedure (TCLP) to determine the tendency for waste materials to be extracted under circumstances assumed to reproduce landfill conditions.

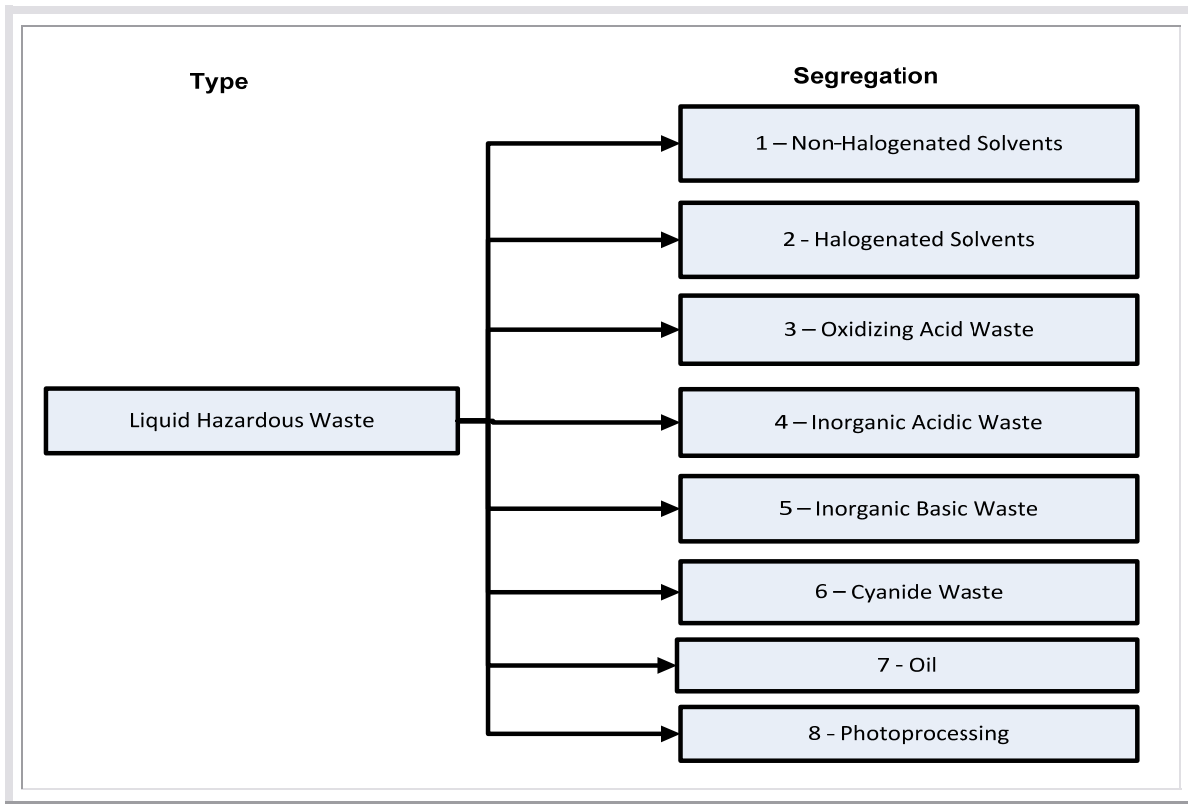
10. Hazardous Materials Waste Streams

The Centre has developed the following waste streams. This guide will focus on the packaging, labeling and transportation of each of our waste streams as well as explain the service that we offer to assist you in this.

Liquid Wastes

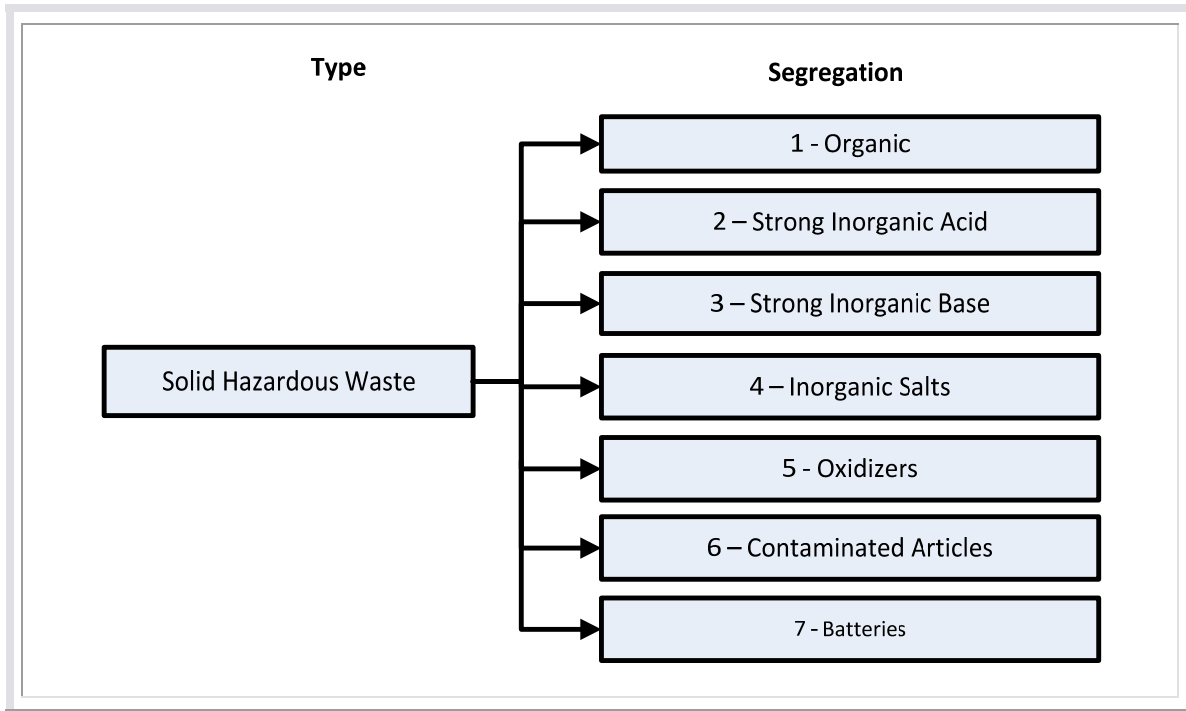
Liquid chemical wastes are comprised of both flammable and toxic chemical liquids. Purely organic solvents, such as acetone and ethanol, are more flammable than halogenated and aqueous solvents. Liquid chemical wastes are separated into eight classes: (1) Non-Halogenated Organic; (2) Halogenated Organic; (3) Oxidizing Acid; (4) Inorganic Acid; (5) Inorganic Bases; (6) Cyanides; (7) Oils; and (8) Photographic Waste.

Halogenated and non-halogenated wastes should be kept separate, if possible. Halogenated wastes contain chlorine, bromine, iodine, or fluorine atoms. *For more information, please refer to the “Guide to Hazardous Waste Management – Chemicals” located on the back cover of this guide.*



Hazardous Solid Chemical Waste

Solid hazardous wastes are separated into the following seven waste classes: (1) Organic; (2) Strong Inorganic Acids; (3) Strong Inorganic Bases; (4) Inorganic Salts; (5) Oxidizers; (6) Contaminated Articles; and (7) Batteries. Contaminated articles are any towels, filters or gloves that have been exposed to hazardous chemicals should be placed in a container and labeled to identify the primary contaminant.



11. 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. As these materials are regulated, they require specialized treatment and documentation prior to disposal; therefore, it is requested that individuals who have been issued an exemption permit contact The Centre to make disposal arrangements.

Disposal Instructions: Controlled Substances

The disposal of controlled substances requires an “Authorization to Return” or “Authorization for the Destruction” of controlled or narcotic substances from Health Canada. Please return all controlled items directly to the Chemical Control Centre.

12. Designated Substances

In Ontario, the Occupational Health and Safety Act (R.S.O. 1990) (OHS Act) requires the University of Windsor to take reasonable precautions to ensure that the health and safety of individuals is adequately protected, including the utilization of hazardous materials. The OHS Act does outline special treatment for substances or combination of substances, whether biological, chemical, or physical in nature poses an increase risk to cause harm. In Ontario, eleven substances have specific regulations associated with their utilization, including acrylonitrile, arsenic, asbestos, benzene, coke oven emissions (not applicable at the University of Windsor), ethylene oxide, isocyanates, lead, mercury, silica, and vinyl chloride.

12.1 Acrylonitrile

Acrylonitrile (2-propenenitrile / CAS# 107-13-1) is a colorless, volatile, liquid with a slightly pungent odor similar to garlic or onion. It very rapidly forms high vapor concentrations at normal temperatures and is very toxic by inhalation. It therefore poses a serious inhalation hazard.

Disposal Instructions: Acrylonitrile

Place material in suitable, covered, labeled containers and arrange for transport or deliver directly to the Chemical Control Centre.

12.2 Arsenic

Arsenic is a poisonous metalloid commonly found as arsenide and arsenate compounds. It is an odorless, silver-gray, brittle, crystalline solid.

Disposal Instructions: Arsenic and Arsenic Compounds

Solids: Place material in suitable, covered, labeled containers and arrange for transport or deliver directly to Chemical Control Centre. "The Centre" provides pre-labeled lined pails specifically for arsenic.

Liquids: Place in either a 2.5L plastic coated bottle or a 20L plastic carboy and indicate contents on approved hazardous waste label.

12.3 Benzene

Benzene (benzol or 1,3,5-cyclohexatriene / CAS# 71-43-2) is a clear, colorless liquid with a characteristic, aromatic hydrocarbon odor. It is a known carcinogen and is typically

used as an industrial solvent and a precursor in the production of drugs, plastics, rubber, and dyes.

Disposal Instructions: Benzene

Place in either a 2.5L plastic coated bottle or a 20L plastic carboy and indicate contents on approved hazardous waste label. Benzene can be combined with other non-halogenated organics; however, the hazardous waste label must indicate the presence of benzene as a constituent.

12.4 Ethylene Oxide

Ethylene oxide (epoxyethane, dimethylene oxide, or oxirane / CAS# 75-21-8) is a colorless flammable gas or refrigerated liquid with a sweet, ether-like odor and is typically used as an intermediate in the production of ethylene glycol and other chemicals.

Disposal Instructions: Ethylene Oxide

Please return cylinder to The Centre with the valve in the closed position. On the gas cylinder label, indicate if the tank has been depleted or still contains material.

Refer to Section 8 – Cylinders for more information

12.5 Isocyanates

Isocyanates are organic compounds which contain a functional isocyanate group (-N=C=O) and maybe flammable, toxic to living tissues, and water reactive. People working with these chemicals should be properly trained regarding its hazards and its safe use.

Disposal Instructions: Isocyanates

Store waste material in an open or loosely covered plastic containers within a chemical fume hood for a minimum of 24 hours before sending to The Centre. Prior to pick-up, place material within an approved, covered, and labeled container.

Avoid with water, oxidizing agents, alcohols, acids, bases, and amines.

12.6 Lead

Lead is a bluish-white, silvery, gray, heavy, ductile, soft metal and tarnishes on exposure to air. When heated in air, lead and lead compounds form highly toxic lead oxide fumes.

As with mercury, lead is a potent neurotoxin that can accumulate in soft tissues and bones.

Disposal Instructions: Lead

Please keep lead waste separate from other waste, if possible. Place material in an approved, covered, and labeled container. Please contact The Centre to arrange for transport (exclusive of Essex Hall).

Always avoid mixing lead waste with strong acids and/or hydrogen peroxide.

12.7 Mercury

Mercury is widely used in thermometers, barometers, and other scientific instruments across campus. It is a silvery transition metal, which is a liquid at or near room temperature and pressure. As with lead, also a potent neurotoxin, mercury can accumulate in soft tissues and bones.

Disposal Instructions: Mercury

The Centre collects all mercury and its compounds. Please place in appropriate labeled container. Please contact The Centre to arrange for transportation (exclusive of Essex Hall).

12.8 Silica

Silicon dioxide is the oxide of silicone, is the principle component in most types of glass, concretes, and is commonly referred to as silica or silox. The inhalation of silica dust in significant quantities poses a health hazard including both silicosis and cancer.

Disposal Instructions: Silica

Place material in suitable, covered, labeled containers and arrange for transport or deliver directly to Chemical Control Centre. If the silica cannot be kept separate, please list all constituents on the hazardous waste label.

12.9 Vinyl Chloride

Vinyl chloride is a colorless gas with a pleasant, sweet, ethereal odor. Only authorized personnel should have access to this material. They should be properly trained regarding its hazards and its safe use.

Disposal Instructions: Vinyl Chloride

Please return cylinder to The Centre with the valve in the closed position. On the gas cylinder label, indicate if the tank has been depleted or still contains material.

Refer to "Section 8 – Cylinders" for more information

13. Explosive Substances

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.

Packaging Instructions: Explosive Substances

Package each container of potentially explosive substances separately from other chemicals. Please note on the Hazardous Chemical Waste Tag the waste's characteristics and any special handling precautions. If you do not feel comfortable handling the chemical, or are unsure of its shock sensitivity, call the Chemical Control Centre for assistance.

14. Radioactive Substances

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/radiation>

15. 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 waste, including incineration and steam sterilization requirements.

Please refer to the University of Windsor's Radiation Safety Program for more information regarding radioactive waste.

<http://www.uwindsor.ca/biosafety>

16. Unknown Chemical Waste

As a service to you, The Centre will take all of your wastes, even unknown ones. For everyone's safety please make every effort to identify all waste before submitting for disposal. This information may greatly reduce the hazards involved in handling and testing the material, including name of 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).

17. Disposal Procedures & Pick Ups

The Centre collaborates with Facilities Services to pick-up and delivery of materials to our clients, including hazardous waste. Please call the Chemical Control Centre directly to arrange for the pick-up of all your waste material. Pick-up requests can be made during business hours by contacting customer service (ext. 3523) or by e-mail at ccc@uwindsor.ca. Please note that it may take up-to three (3) business days between submission of a transportation request and fulfillment by Facilities Services. If you require immediate service, please provide a valid account number during the submission of your request for expedited service.

Departmental Procedures:

Essex Hall: Please bring waste material directly to the Chemical Control Centre (Essex Hall B-37).

Biological Sciences: Please deliver material to Biological Stockroom (Biological Sciences 316). These materials will be picked up directly from the stockroom's chemical vault.

Visual Arts: Please contact The Centre directly to arrange the pick-up of photographic wastes.

GLIER: Properly labeled waste materials can be temporarily stored pending pick-up in GLIER-127. Hazardous waste supplies, including labels and approved containers are also stocked by the Chemical Control Centre within GLIER-127.

Memorial Hall: Please call The Centre to make arrangements for pick-up of hazardous waste.

Pick Up Schedule:

Individual research clients who reside in the below mentioned buildings do not need to arrange for the pick-up of hazardous waste; however, if additional services are required please contact The Centre directly.

Building	Schedule
Essex Hall	Daily - Waste delivered by end-user directly to Chemical Control Centre
Biological Sciences	Monthly - First Wednesday of the Month
GLIER	Twice a month - Second & Last Wednesday of the Month
Memorial Hall	Monthly - Third Wednesday of the Month
Student Health Services	Weekly - Every Friday Afternoon
All other buildings should contact Chemical Control Centre directly to arrange pick-up	

18. References

“Regulations to amend regulation of 347 of the revised regulations of Ontario made under the Environmental Protection Act”. Ontario Regulation 558/00. Ontario Ministry of the Environment, 2000.

“Transportation of Dangerous Goods Regulations written in Clear Language”. Transport Canada, Government of Canada, 2002.

“Laboratory Biosafety Guidelines”. Health & Welfare Canada and Medical Research Council of Canada, 1990.

“Prudent Practices for Handling Hazardous Chemicals in Laboratories”. National Research Council, National Academy Press: Washington, D.C., 1981.

“Prudent Practices in the Laboratory, Handling & Disposal of Chemicals”. National Academy Press: Washington, D.C. 1995.

Insert - Poster - Solid Waste Segregation

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Insert - Poster - Labeling

Inside back cover - black and white

Insert Poster - Guide to Hazardous Waste Management - Chemical Disposal

Outside Back cover - colour