



# Green Labs Lunch & Learn

Hazardous Waste Minimization – October 1, 2015



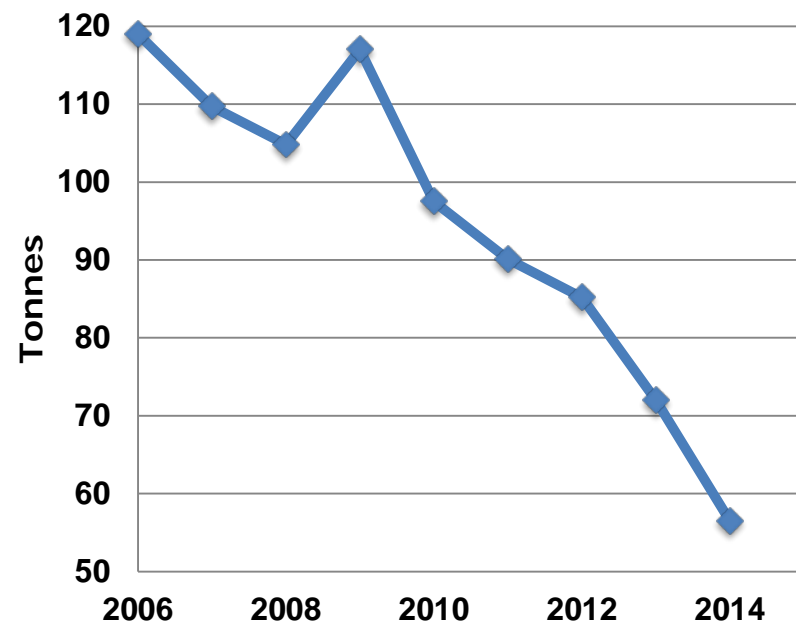
**Hazardous Waste Reduction at UBC:** Ligia Gheorghita, RMS



## UBC's Hazardous Waste Minimization Efforts

### Hazardous Waste Disposed 2006-2014

- Amount of disposed hazardous waste has seen steady and significant decrease
- ~55% waste reduction in 2014 compared to 2006
- Reduction largely achieved at the waste source (UBC labs)
- Main contributor: RG1 & RG2 delisted waste, reduced by 25+ tonnes

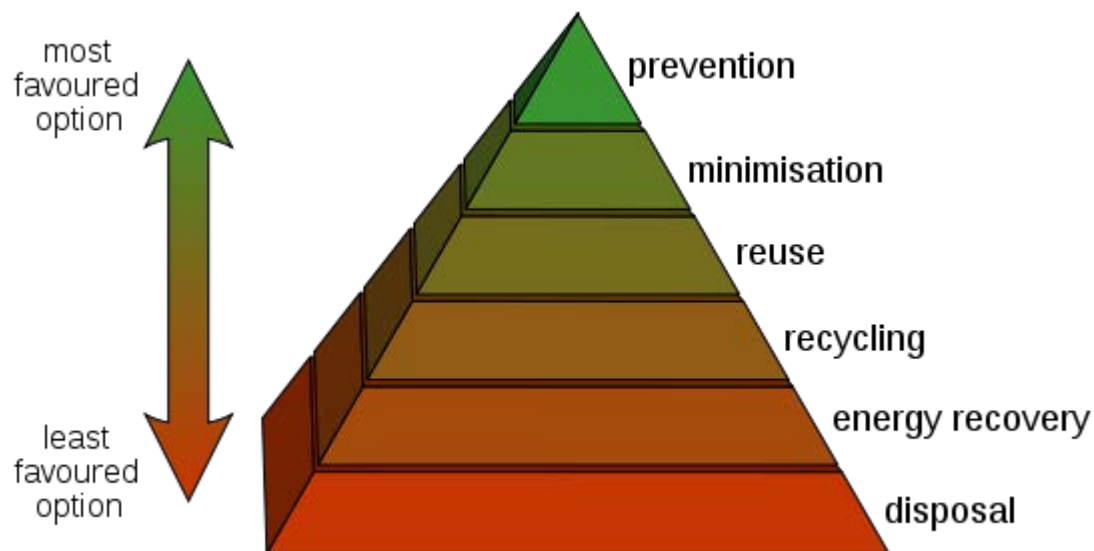




## Source Reduction Measures

120 tonnes (2006) - 95 tonnes (2014)  
= 25 tonnes (reduced at the source)

What else can labs do?



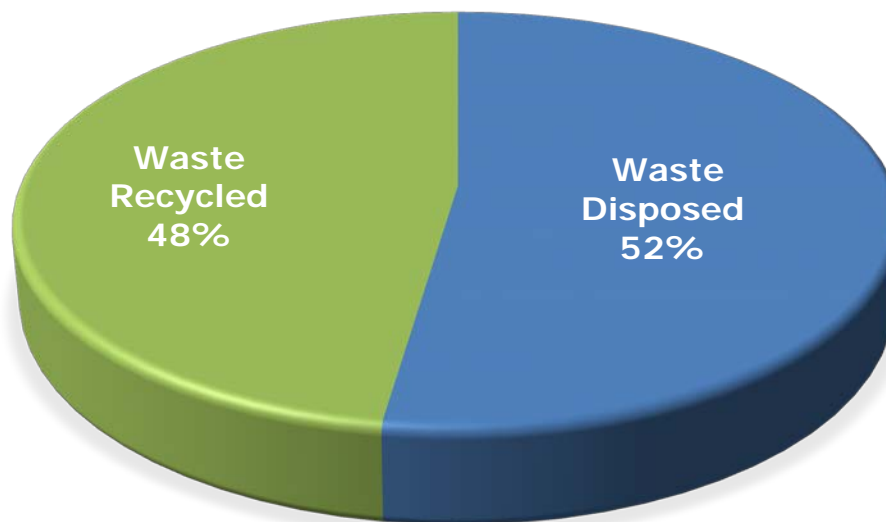
*Waste Hierarchy*



## UBC's Hazardous Waste Minimization Efforts

### Recycled vs. Disposed Waste 2014 (Point Grey Campus)

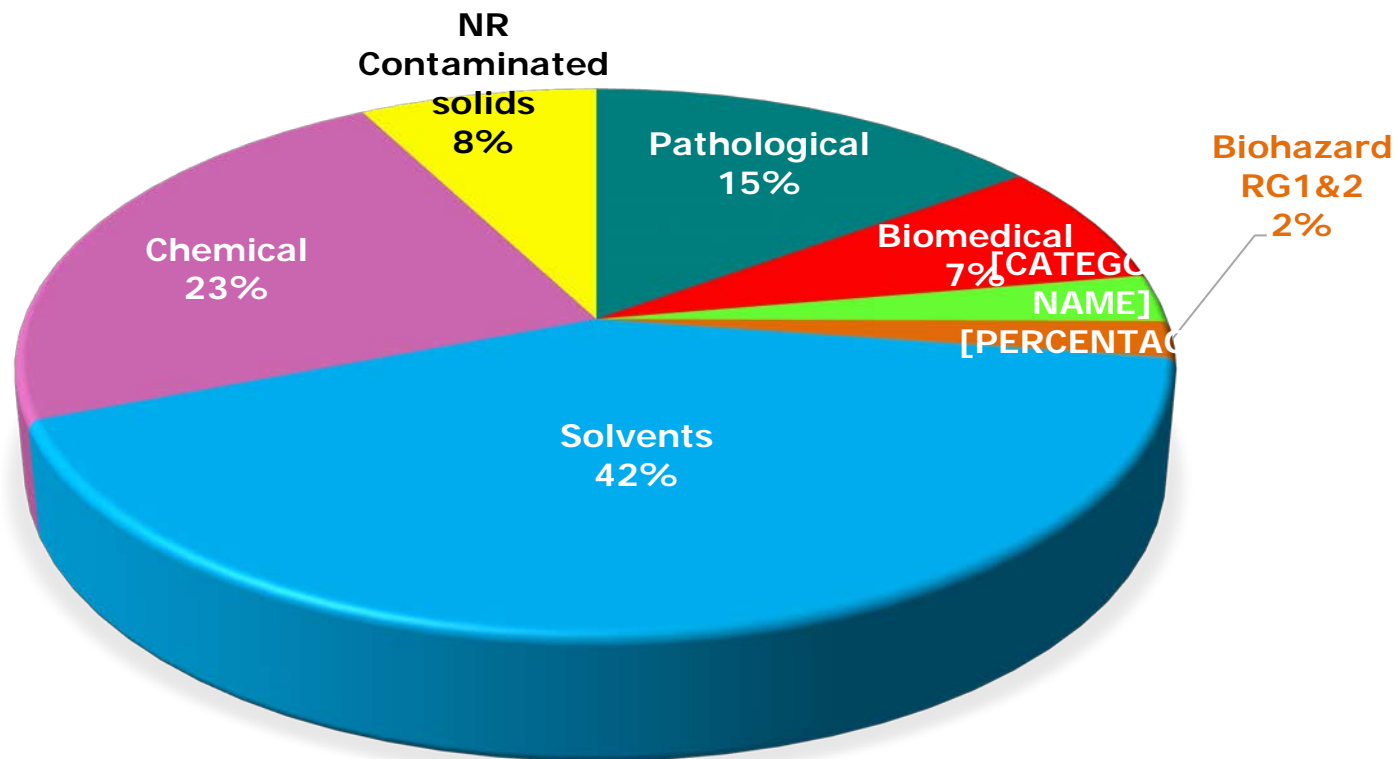
- Generated waste: 95 tonnes
- Disposed as hazardous waste: 50 tonnes





# UBC's Hazardous Waste Minimization Efforts

## Waste Disposed 2014 (Point Grey Campus)





## Key Waste Streams for Further Reduction

Largest volume for UBC and labs + lowest hanging fruit

### Solvents

Use less, improve segregation, use "other" solvents, substitute halo with non-halo

### Chemicals

Material substitution

### Pathological

Reduce contamination

### Non-Regulated Contaminated Solids

Reduce contamination

### Biomedical

Improve segregation



# Waste Minimization Techniques

## Material Substitution

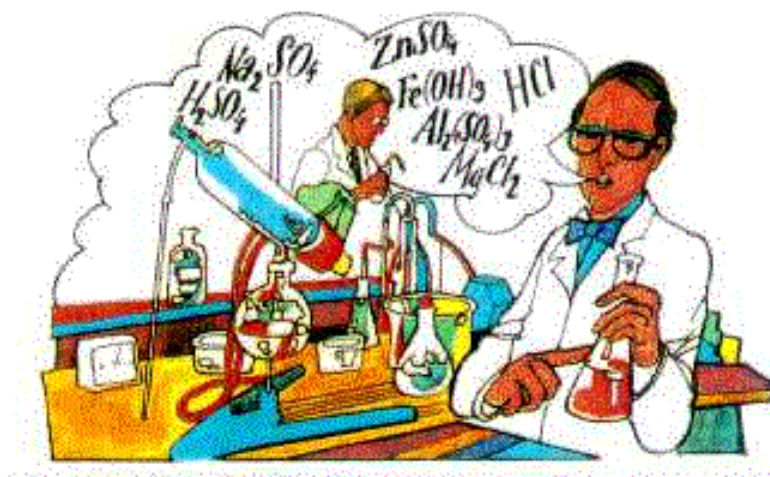
- Non halogenated solvents vs. halogenated
- Less toxic (e.g. toluene substituted for benzene)
- Non-mercury (e.g. alcohol, digital) thermometers vs. mercury thermometers
- Non-toxic dyes (e.g. GelRed) vs. ethidium bromide
- Phosphorus-33 vs. phosphorus-32
- Non-radioactive DNA labelling vs. radioactive DNA labelling
- “Greener” cleaners



# Waste Minimization Techniques

## Process Modification

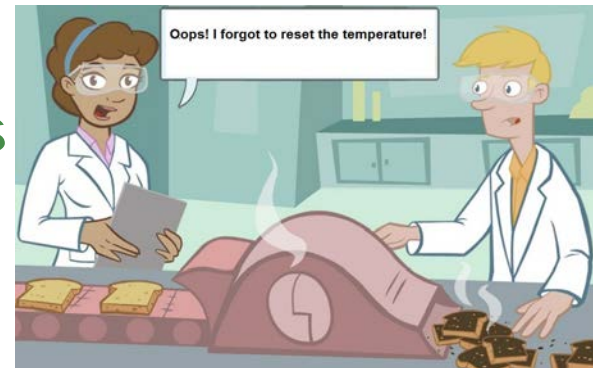
- Eliminate materials that would result in generation of hazardous wastes
- Reduce quantities of hazardous materials (e.g. use micro methods)





# Waste Minimization Techniques

## Good Laboratory Practice



- Review lab's annual waste report & identify waste streams that can be reduced
- Review [non-hazardous chemicals](#) list before requesting approval for chemical disposal
- Use [aqueous waste tool](#) to check if fit for drain disposal
- Avoid storing excess hazardous materials
- Track hazardous materials (to prevent extra waste and duplication)
- Segregate hazardous from non-hazardous waste product (to prevent waste streams contamination and added disposal cost)

# Waste Minimization Techniques

## Good Laboratory Practice



- Record "received" date on containers, so older ones will be used first (eliminates time sensitive materials being unnecessarily directed to disposal)
- Label samples & containers w/ scientific, not "coded", name (disposal of unknowns is illegal under WHMIS legislation and analysis of unidentified containers is costly)
- Dispose of all hazardous materials (containers) if no longer required or when research projects end (implement [Exit Lab Decommissioning Protocol](#))
- Take responsibility for hazardous materials stored in "shared facilities" such as cold/TC rooms, etc.

## Waste Minimization Techniques

### Purchasing & “FREE” chemicals

- Purchase hazardous materials in smallest quantities needed
  - Stockpiling hazardous materials rarely works; results in excessive costs to researchers + additional disposal costs to UBC
- Accept only hazardous materials that will be required by lab within a year
  - Donations in bulk (entire lab inventories) can result in receiving unwanted hazardous materials and costly disposal problems



- » Air Quality
- » Contaminated Sites
- » Environmental Management System
- » Green Labs Program

### [Hazardous Waste Management](#)

- » Hazardous Waste Reduction & Recycling
- » Non-Hazardous Chemical Disposal
- » Waste Disposal Guide
- » Chemical Waste Disposal
- [Hazardous Waste Management Manual](#)
- » Hazardous Waste Disposal Procedures
- » Oil Recycling
- » Silver Recovery Program
- » Solvent Recovery Program
- » Paint Recycling
- » Training Videos

- » Integrated Pest Management
- » Ozone Depleting Substances
- » PCB Containing Equipment

# Hazardous Waste Management Manual

## Section A: Pollution Prevention and Waste Minimization

- [1. Introduction](#)
- [2. Source Reduction of Laboratory Waste](#)
- [3. Reuse, Recycle, and In-Laboratory Treatment of Wastes](#)
- [4. Planning and Running Experiments](#)
- [5. Minimize Other Environmental Impacts](#)
- [6. Green Laboratory Checklist](#)

## Section B: Hazardous Waste Management

- [1. Introduction](#)
- [2. Environmental Services Facility \(ESF\)](#)
- [3. Sink and Normal Garbage Disposal](#)
- [4. Spill Reporting](#)
- [5. Frequently Asked Questions](#)
- [6. Hazardous Waste Disposal Procedures](#)
- [7. Appendices](#)

Download a complete [Hazardous Waste Management Manual](#)

- » Air Quality
- » Contaminated Sites
- » Environmental Management System
- » Green Labs Program
  - » Get Involved
  - » About Green Labs Program
    - » [Green Labs Toolkit](#)
    - » Aqueous Waste
    - » Energy Conservation
    - » Green Purchasing
      - » [Hazardous Waste](#)
    - » Water Conservation
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    - » Virtual Green Lab
  - » Sustainability Coordinators in Labs
  - » Green Labs Newsletter
  - » Green Labs Fund

- » Hazardous Waste Management
- » Integrated Pest Management
- » Ozone Depleting Substances
- » PCB Containing Equipment
- » Recycling Programs
- » Research Grant Environmental Assessment
- » Sanitary Sewers
- » Spills & Accidental Releases
- » Storm Water Pollution Prevention
- » Storage Tanks
- » Water Quality

## Hazardous Waste Minimization Toolkit

Hazardous waste is any product, substance or organism waste that poses a threat to public health or the environment. UBC's hazardous waste is composed of biological, chemical and radioactive waste. Given the variety, nature and quantity generated, environmental impact of hazardous waste generated by research laboratories is significant.

### Why Should Labs Minimize Hazardous Waste Generation?

- Hazardous waste is dangerous because of its quantity, concentration, physical, chemical, and infectious characteristics.
- UBC currently generates 60-70 tonnes of hazardous lab waste per year and pays over \$100,000 for disposal.
- The transportation of hazardous waste to appropriate disposal facilities can pose a significant risk to the environment.
- There is major risk of ecological damage if hazardous waste is incorrectly handled: emission of air contaminants, spills of hazardous materials into the environment and drain discharge of hazardous materials into sanitary or storm sewers.

### Best Practices for Hazardous Waste Minimization

Incorporate as many of the applicable Best Management Practices as possible into your lab routine.

- Familiarize yourself with the concept of [pollution prevention and waste minimization](#)
- Implement [environmental ethics](#) in the laboratory setting by taking responsibility for the by-products of research, and appropriately managing the waste generated.
- Adhere to the [waste hierarchy](#) as much as possible.
- Start with preventing pollution at the source, which is called [source reduction of lab waste](#).
- Minimize hazardous waste generated at the source, using the "[4 R's](#)" of [waste minimization](#)
- [Reuse, recycle, and implement in-laboratory chemical waste treatment](#)
- [Plan your experiments for waste minimization](#) (for new labs and new experiments).
- [Develop a generator specific waste minimization plan](#) (for established labs).
- [Minimize other environmental impacts](#) by: reducing air emissions, preventing sanitary and storm water contamination, conserving energy and water and purchasing greener products.

### Test Your Knowledge by Playing the Waste Sorting Game

Play the [hazardous waste-sorting game](#)! Encourage lab members and researchers to play this game for a fun chance to learn about how waste (hazardous and non-hazardous) gets sorted at UBC.

INSTRUCTIONS: Use your CWL to login. The game also requires the installation of [Unity Web Player](#) to run in your browser (download link available on game webpage); note that you may not be able to install it if you are using VDI.

Interested in Learning More?



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