A city skyline with several skyscrapers under a blue sky with light clouds. In the foreground, there is a large green pyramid logo with a white outline and a reflection below it. The pyramid is positioned on the left side of the slide, partially overlapping the title area.

# Managing Hazardous and Biohazardous Materials/Waste in the Laboratory Setting

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## Topics

- Types of Waste
- Resource Conservation and Recovery Act (RCRA)
- Hazardous Waste definitions
- Hazardous Waste Disposal Methods
- CAA vs SAA
- Recycling
- Environmental Sustainability

## What is Trash?






➤ Trash –  
**Unregulated** materials used  
 in day-to-day operations  
 or personal consumption  
 items for disposal

- **Regular Plant Trash** - Food waste, face masks, booties, lab coats (uncontaminated), nitrile/latex gloves
- **Recyclable Trash** – flattened ("broken down") boxes, glass, etc.









RECYCLE RIGHT


✓ ALWAYS RECYCLE / RECICLE SIEMPRE

 Plastic Bottles & Containers Botellas y envases de plástico	 Food & Beverage Cans Latas de alimentos y bebidas	 Paper Papeles
 Flattened Cardboard & Paperboard Cartón y cartulina aplastados	 Glass Bottles & Containers Botellas y envases de vidrio	

✗ DO NOT INCLUDE IN YOUR MIXED RECYCLING CONTAINER / NO INCLUIR EN SU CONTENEDOR DE RECICLAJE MIXTO

 NO Food or Liquids NO comida o líquidos	 NO Foam Cups & Containers NO vasos y recipientes de poliestireno	 NO Loose Plastic Bags, Bagged Recyclables or Film Empty recyclables directly into your bin. NO bolsa suelta de plástico, bolsas, o materiales reciclables embolsados. No los arrojes directamente los materiales reciclables en nuestro contenedor.
 NO Batteries – check local drop-off programs for proper disposal. NO baterías. Verifica los programas locales de entrega para su correcta disposición.	 NO Green Waste NO desechos verdes.	 NO Clothing, Furniture & Carpet NO ropa, muebles y alfombras.

To learn more, visit: [wm.com/recyclerright](http://wm.com/recyclerright)



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## Waste Processes: EPA Definition

- EPA Definition of a Solid Waste:
  - “any garbage or refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities. Nearly everything we do leaves behind some kind of waste.”
  - **Waste** is the FINAL process in an industrial setting
  - Many processes yield waste:
    - ViCell Machine
    - GCMS → HPLC Fluid
    - Empty Bottles (Chemicals, Biological)



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## RCRA Summary

- The Environmental Protection Agency (EPA) has been given authority to regulate Hazardous Waste under the **Resource Conservation and Recovery Act of 1976 (RCRA)**
- Includes regulation of of:
  - Generation
  - Transportation
  - Treatment/Storage/Disposal
- The **Generator** is ultimately responsible for the waste being disposed



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## RCRA: Cradle-To-Grave

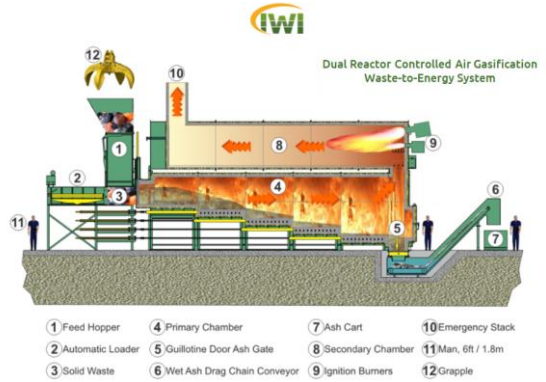
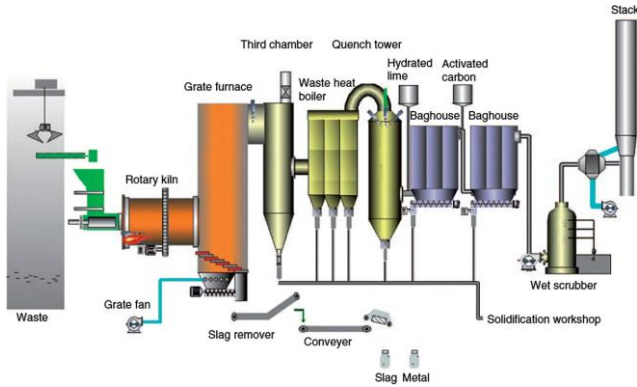
### Hazardous Waste Management Cradle-to-Grave System



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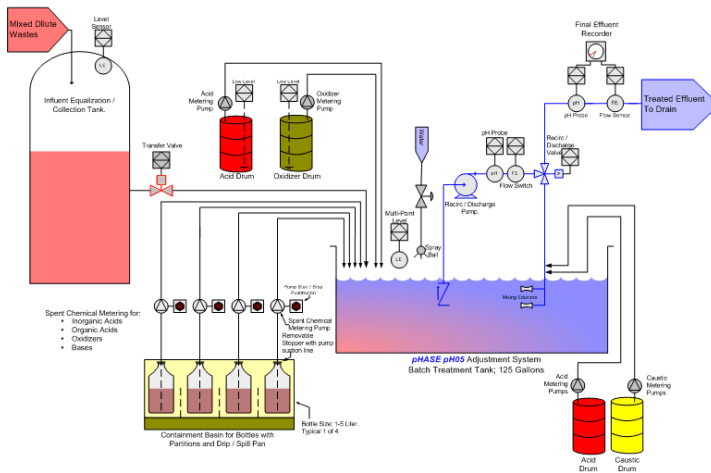
# Chemical Incinerator vs Biowaste Incinerator



**Putting hazardous chemicals in your biowaste can cause issues, disruptions, or even damage to biowaste incinerators and harm both the operators and the environment!**



# pH Neutralization System (Bioskid)



pH Neutralization systems do not treat or remove hazardous chemicals except for *adjusting the pH to a safe level for sewer discharge.*

If you put chemicals into a pH neutralization system, *it ends up in the municipal water system and therefore, your drinking water.*

**YOU MUST DISPOSE OF CHEMICALS THROUGH THE PROPER DISPOSAL METHODS FOR EACH CHEMICAL!**



# Chemical and Biological Waste

- **Medical waste is:**
  - contaminated by blood, body fluids or other potentially infectious materials and is often referred to as **regulated medical waste**;
    - Pathological
    - Chemotherapeutic
    - Sharps
  - regulated at the state level, not Federal.
- **Hazardous waste is defined under RCRA**
  - may cause injury, illness, or disease to humans;
  - may cause damage or create toxicity in the environment;
    - **Listed** wastes are wastes from common manufacturing and industrial processes, specific industries, or can be generated from discarded commercial products.
    - **Characteristic** wastes are wastes that exhibit any one or more of the following characteristic properties: ignitability, corrosivity, reactivity or toxicity.

# Chemical and Biological Waste cont.

- **Non-Hazardous Waste**
  - What does it mean to be Non-Hazardous?
    - Not listed under RCRA
    - Does not meet a characteristic definition
    - Still could cause harm to humans and the environment!
    - Different than solid waste (Trash)
  - The most disposal options
    - Treatment for reuse or recycle
    - WTE
    - WWT

## Maryland Special Medical Waste

- State of Maryland, Code of Maryland Regulations (COMAR) 10.06.06.02 explains the definition of Special Medical Waste:
  - (a) Liquid or semiliquid blood or another potentially infectious material;
  - (b) A contaminated article that releases liquid or semiliquid blood or another potentially infectious material if compressed;
  - (c) An article that contains dried blood or another potentially infectious material and is capable of releasing the blood or material during handling;
  - (d) Pathological and microbiological waste containing blood or another potentially infectious material;
  - (e) Contaminated sharps; and
  - (f) Anatomical material.

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## Common Misconceptions



### Diluted Bleach Solutions

- Corrosive
- Can't drain dump if contains cells/media/other chemicals



### 70% IPA Spray

- Flammable
- Can't throw in trash unless completely empty and defaced
- Can't "off-gas" in chemical fume hoods



### Sharps in Biobags

- "Sharps" are anything that could compromise the integrity of a biobag, not cut human skin
- Plastic syringes and pipettes count as sharps

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## Treatment Technologies

- Chemical Waste
  - Treatment and Landfill
  - Incineration
  - Waste to Energy
  - Fuel Blending
  - Wastewater Treatment
- Medical Waste
  - Autoclave and landfill
  - Waste to Energy
  - Incineration
  - Recycling



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## SAA vs CAA

### Satellite Accumulation Area (SAA)

- Waste accumulated AT or NEAR point of generation
- No greater than (55) Gallons
- Waste can stay (72) hours
- Moved to CAA
- (EPA 40 CFR 262.16(a)(6)(ii))

### Centralized Accumulation Area (CAA)

- All Waste from SAA transported to CAA
- Hazardous Materials need to be stored, packed, etc. in a certain manner
- Only Trained/Authorized employees in CAA
- Weekly inspection of CAA
- (EPA 40 CFR 262.17(a)(1)(v))

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## CAA vs SAA



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## Sustainability in the Lab

- What can we do to increase our lab's sustainability?
- How do we move waste up the hierarchy?
- What resources are there to audit our sustainability practices in the lab?



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## Sustainability in the Lab

- Chemical Waste
  - Segregate high BTU for Fuel
  - Segregate good solvent for recycling
  - Green Chemistry Alternatives
- Regulated Medical Waste
  - Recycle
  - Waste to Energy
- Water
  - Identify largest use points
    - Lab sinks
    - Autoclaves
    - Equipment
- Energy
  - Lab Equipment Power Usage
    - Fume Hoods
    - BSCs
    - Equipment

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## Recycling – Red 2 Green



### Sustainable Program

Triumvirate's Red2Green program is a proprietary process for recycling regulated medical waste (RMW) into plastic lumber. The program helps divert waste from expensive incinerators and other treatment technologies to a sanitization and manufacturing process. The finished product is a quality plastic lumber – resulting in a complete cradle-to-cradle system.



Let us help you reduce costs and reach your recycling goals by going Red2Green.



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**THANK YOU!**

**CONTACT US!**  
1-888-834-9697  
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