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Waste Management Considerations

A High Level Look at Waste and Why Managing it Correctly is Necessary

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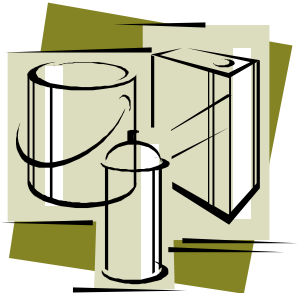
What is Waste?

Solid Waste - any solid, liquid, or containerized gas



Spent, can not be used again, or abandoned

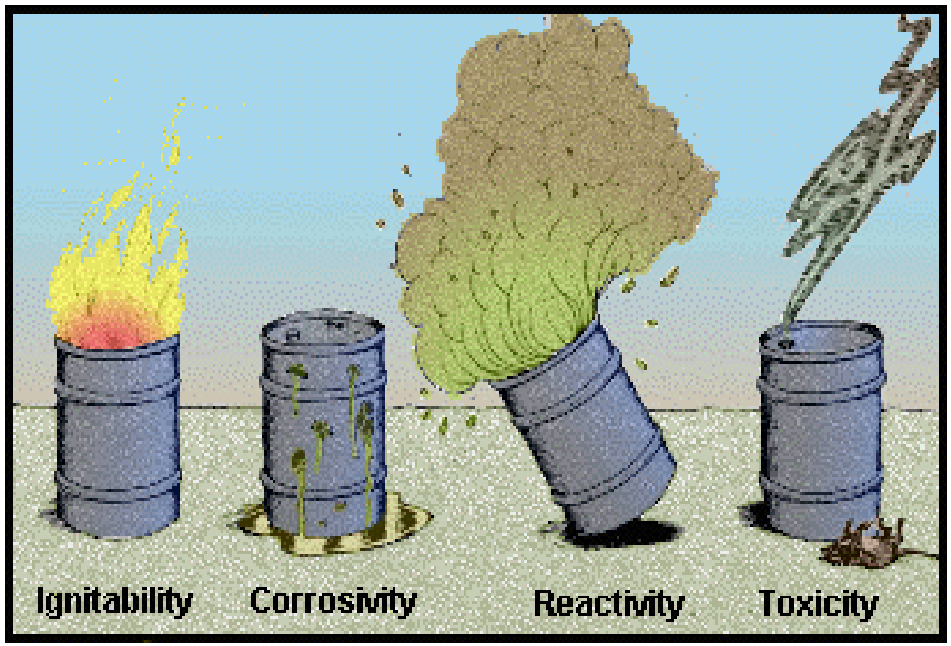
What is Hazardous Waste?

- A "solid waste" which, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:
  - pose a substantial hazard to human health or the environment if improperly treated, stored or disposed of, or otherwise mismanaged; or
  - cause an increase in mortality, or an increase in irreversible or incapacitating illness.

"***Solid Waste***" = any discarded material that is abandoned by being disposed of, burned or incinerated, recycled, or considered "waste-like." A solid waste can physically be a solid, liquid, semi-solid, or container of gaseous material.

What Makes Waste Hazardous?

- Hazardous Waste characteristics:
  - **Ignitability**
  - **Corrosivity**
  - **Reactivity**
  - **Toxicity**
  - Radioactivity



Why Do We Care?

- Human Health Impact
- Environmental Impact
- Misuse
  - Accidental
  - Terrorism

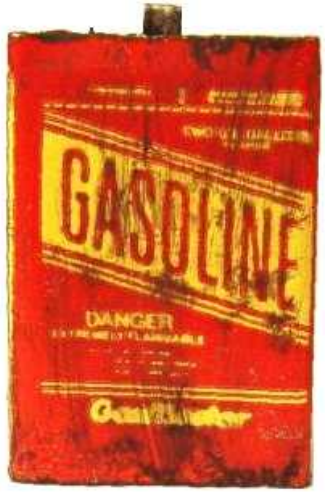
Lithium battery explosion at battery recycling facility

Ignitable Waste

- Liquid waste with a “Flash Point” ≤ 140° F (≤ 60° C)
  - Flash Point: lowest temperature at which a liquid will generate sufficient vapor to flash (or “ignite”) when exposed to a source of ignition
- Non-liquid waste capable of igniting through friction, absorption of moisture, or a spontaneous chemical change
- Ignitable compressed gases and oxidizers

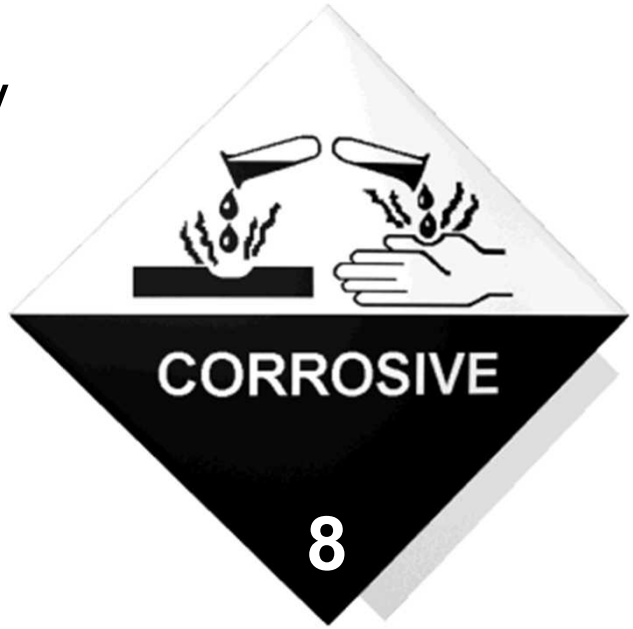
Ignitable Waste
- Potential Military Examples -

- Fuels
- Solvents (e.g., degreasers and weapons cleaners)
- Alcohols
- Activated Carbon from Gas Masks



Corrosive Waste

- Aqueous waste with very low or very high pH level
  - Example: pH < 2.0 or >12.5 in the U.S.
- A liquid waste that corrodes steel at a minimum rate of 0.25 inch/year
- Corrosive materials can wear away (corrode) or destroy a substance
  - Example: most acids are corrosives that can eat through metal, burn skin on contact, and give off vapors that burn the eyes.



Corrosive Waste
- Potential Military Examples -

- ***Acidic*** Cleaners/Strippers
- ***Basic*** Cleaners/Strippers
- Certain water treatment chemicals
- Car batteries

Reactive Waste

- A solid waste that is normally:
  - Unstable
  - Explosive
  - Reacts violently with water
- Reactive material can explode or create poisonous gas when combined with other chemicals
  - Example: chlorine bleach and ammonia are reactive and create a poisonous gas when mixed

Reactive Waste
- Potential Military Examples -

- Munitions
  - Out of date
  - Misfires
  - Damaged
- Lithium Batteries
- Phosphorus
- Flares

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Toxic Waste

- A waste that contains certain substances determined to be harmful at, or in excess of, the applicable maximum concentration.
- Harmful to human health if swallowed or absorbed through the skin
  - Acute effects
  - Chronic effects
- Harmful to the environment

Toxic Waste
- Potential Military Examples -

- Chemical Agents
- Solvents (e.g., degreasers and weapons cleaners)
- Many Chemical Products
  - Insecticides / Herbicides
  - Rat Poison
- Mercury Switches
- PCB Oils
- Biological/Medical Waste

Radioactive Waste

- Unusable, radioactive liquid, solid, or gaseous byproducts (waste) from mining of radioactive ore, nuclear reactor operations (including fuel production), and from use of radioactive materials in research, industry, medicine, and nuclear weapons production
- Low-level vs. high-level

Radioactive Waste
- Potential Military Examples -

- Radioactive Sources
- Medical Isotopes
- Depleted Uranium munitions

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How Should Waste Be Managed?

- Generation
- Accumulation
- Storage
- Transportation
- Disposal

Waste Generation

- Eliminate Use of Hazardous Materials
  - Use non-toxic products
  - Use non-ignitable products
- Minimize Waste Production
  - Usage Efficiency
  - Track Expiration Dates

Waste Accumulation

- Smaller Volumes
- Access Control
- Compatibility
- Closed Containers
- Labeling
- Tracking

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Waste Storage

- Larger Volumes
- Access Control
- Segregation
- Labeling
- Containment
- Emergency Procedures

HAZARDOUS WASTE TAG

AFFIX THIS END TO CONTAINER

Date 12-7-01 Room # 112D Tel. # 5-5564 Box #

Name Joe Wastemaker Dept. Materials-LLE

Procedures Used For Cleaning glassware

Special Precautions Corrosive

CALL 52056 FOR PICKUP; ALL TAGS MUST BE LEGIBLE.

LIST EACH CHEMICAL (FULL NAME OF EACH CHEMICAL, NO SYMBOLS)	TOTAL AMOUNT 500 ml / AMOUNT OR % OF EACH CHEMICAL
Hydrochloric Acid	50 ml (or 10%)
Water	450 ml (or 90%)

EACH CONTAINER MUST HAVE ITS OWN TAG(S). TOTAL % MUST = 100

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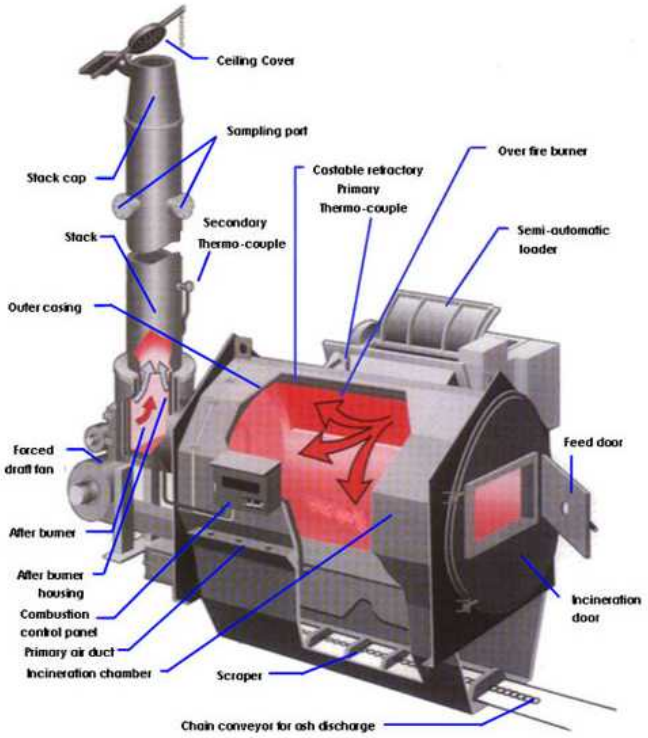
Waste Transportation

- Security
- Packaging
- Marking
- Separation
- Segregation

Waste Disposal

- Eliminate Hazardous Characteristic(s)
  - Treatment is technology and characteristic driven
- Render safe for environmental disposal
- Dispose in appropriate locations
  - Typically not the local landfill



Potable incinerator

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QUESTIONS?