Introduction to Waste Management

Need for Management

- Growth in volume and concentration
- Population and consumerism
- Industrial growth and increasing complexity of wastes
- The nuclear problem
- Historic lack of management options
  - Impact at storage sites and surrounding areas
  - Improper reuse
  - Midnight dumping
  - Open dumps

Lack of Management Options: Drum Storage
Lack of Management Options: Midnight Dumping

Lack of Management Options: Open Dumps

• Collateral Pollution
  • Water
    • Direct impact
    • Leachate
  • Air
    • Particulates
    • Odor
    • Smoke
  • Vermin
  • Explosive gases
  • Property values

Open Dumps: Habitat Loss
Resource Use and Resource Recovery

- Mining and other extraction technologies
  - energy intensive
  - waste producing
- Considerable resources remain in waste
  - were being ignored yet waste disposal was becoming an increasing complicated and expensive problem

The Solid Waste Problem?

Benefits?
- Employment
- Application of high technology
- Source of income for third world countries?

Movement to Environmentally Sound Management and Disposal

Motivations
- Public outcry
- States unable to accomplish, even with federal support
- Federal standards a way to harmonize state efforts

Results
- Protect human health
- Protect public welfare
- Protect ecological health
- Protect economic health
- Legal wrangling
The Solid Waste Problem?

EPA Waste Management Hierarchy

• Pollution prevention/source reduction
• Recycling
• Waste to energy (alternatively treatment)
• Landfilling

Solid Waste

• Defined by statute
  • Solids, liquids, gases, semisolids
  • Anything that is discarded unless specifically regulated by another statute
  • Not air emissions, radioactives, wastewaters, certain recyclable materials

Examples

• Construction and demolition wastes
• Agricultural and mining wastes
• Municipal solid waste
• Yard wastes
• Household hazardous waste
• Non-hazardous industrial and business waste
• Small quantities of hazardous waste
Management Standards

- Collection, storage, transfer, and disposal
- Landfill
- Incinerator
  - Waste to energy

In a sanitary landfill, trash and garbage are crushed and covered each day to prevent accumulation of vermin and spread of disease.
Old vs. New Landfill Technology

C & D Landfill – Before and After
Reduce, Reuse, Recycle Initiatives

- Municipal sorting to increase recyclable materials and decrease solid waste volume
- What can be recycled?
  - Marketability - recyclability does not mean resale-ability
  - There must be a market for recyclable wastes or there will be a cost associated with recycling
- Innovative approaches to reuse
Number of Landfill Locations Shrinking

Reducing the Number of Landfills

Hazardous Waste

Subset of solid wastes requiring special management due to hazards they pose
Management Standards

- Identification
- Appropriate packaging
- Proper storage
- Accountability: "cradle to grave" responsibility
- Labeling
- Safe transport
- Treatment, destruction, disposal
- Clean up of past mismanagement

Hazardous Waste

- Federally Regulated With Program Management At The State Level
- Generators Have “Cradle To Grave” Responsibility
Landfilling Hazardous Waste

- Most common method early in the program
- ‘Land Ban’ changes to law in ‘84 made landfilling expensive

A secure landfill for toxic waste.

Incineration of Hazardous Waste

- Increasingly used for certain types of hazardous wastes
- Resulting ash must be managed as hazardous
Alternatives

- Recycling and recovery
- Treatment methods - numerous

Summary of Treatment Strategies

- Reducing the volume of hazardous waste or removal of hazardous components
- Chemically treating to eliminate the hazardous characteristic(s)
- Converting liquids to solids prior to landfilling
- Incinerator technology capable of extremely efficient combustion of waste