

APES Chapter 16 – Waste Generation and Waste Disposal

Intro: Paper or Plastic

- a) What is polystyrene, and what is it used for?
- b) Environmental Considerations in Switching from Styrofoam cups to Paper cups:
Pluses:

Minuses:

I. Humans generate waste that other organisms cannot use (Fig. 16.1 and 16.2)

Defining waste – outputs...can these serve as inputs for other systems?

- A. The Throw Away Society (Fig. 16.3)
- B. Content of the Solid Waste Stream – (flow of solid waste that is recycled, incinerated, placed in sanitary landfills, or other disposal).
 1. Composition of MSW and its main sources: (Fig. 16.5)
 2. E-waste (Electronic waste) Components =
Environmental Effects are large!
Exported to China and other developing countries

II. The 3 R's

- A. Reduce
- B. Reuse
- C. Recycle (Fig. 16.9)
 1. Closed-loop recycling: (Fig. 16.8)
 2. Open-loop recycling:
- D. Compost/Composting (Fig. 16.11 and 16.12)

III. Solid Waste Landfills and Incineration (Fig. 16.13)

- A. Basics of the Modern Sanitary Landfill (Fig. 16.14)
 1. Anatomy of a Sanitary Landfill
 2. Siting is controversial (economics YIMBY, and limited good sites NIMBY)
 3. Problems of landfills

B. Incineration – usually to produce electricity or steam heat

Pollution Issues: Greenhouse Gases (CO₂ and H₂O vapor)

Ash – Bottom Ash from furnace

- Fly Ash from the furnace flue gases

- concentrated toxins (heavy metals such as Cadmium, Mercury)

- leachate from landfilled ash

Other problems: NIMBY

IV. Hazardous Waste

Defined:

A. Handling and Treatment

B. Legislation

1976 – Comprehensive Environmental Response, Compensation and Liability Act

CERCLA...also known as Superfund

Established a National Priorities List (NPL)...See Fig. 16.18 NPL Map

Love Canal, NY (near Niagara Falls) on site of Hooker Chemical waste dump.

1995 – Brownfields Program...rehabilitate contaminated industrial sites for new use.

C. International Consequences of Hazardous Waste

1986 – The Garbage Barge Odyssey (13,000 metric tons of hazardous waste/ash)

From Philadelphia...Caribbean...Haiti (some buried)...ocean dumping....

Later removed from Haiti...Florida...back to PA (2002...re-classified as non Haz.)

V. New Ways of Thinking about Solid Waste

A. Life Cycle Analysis

B. Alternative Methods – Integrated Waste Management (Fig. 16.20)

Cradle to Cradle Handling (William McDonough) – holistic waste mgmt..

Working Towards Sustainability...Recycling E-waste in Chile