

## **CHAPTER 19 WASTE – Section 3**

***E.Q.: What are the characteristics that make up hazardous wastes and what are some ways to treat hazardous waste safely?***

**E.S. STANDARD: SEV5. Students will recognize that human beings are part of the global ecosystem and will evaluate the effects of human activities and technology on ecosystems.**

- a.) Describe factors affecting population growth of all organisms, including humans. Relate these to factors affecting growth rates and carrying capacity of the environment.**
- b.) Describe the effects of population growth, demographic transitions, cultural differences, emergent diseases, etc. on societal stability.**
- c.) Explain how human activities affect global and local sustainability.**
- d.) Describe the actual and potential effects of habitat destruction, erosion, and depletion of soil fertility associated with human activities.**

### **Section 3 – Hazardous Waste**

#### **Preview**

- **Bellringer**
- **Objectives**
- **Types of Hazardous Waste**
- **Resource Conservation and Recovery Act**
- **The Superfund Act**
- **Preventing Hazardous Waste**
- **Conversion into Nonhazardous Substances**
- **Land Disposal**
- **Biologically Treating Hazardous Waste**
- **Incinerating Hazardous Waste**
- **Exporting Hazardous Waste**
- **Hazardous Wastes at Home**
- **Disposing of Household Hazardous Waste**
- **Motor Oil**

#### **Objectives**

- **Name two characteristics of hazardous waste.**
- **Describe how one law that governs hazardous waste.**
- **Describe two ways in which hazardous waste is disposed.**

#### **Types of Hazardous Waste**

- **Hazardous wastes are wastes that are a risk to the health of humans or other living organisms.**

- They may be solids, liquids, or gases. They often contain toxic, corrosive, or explosive materials.
- Some examples are
  - dyes,
  - cleansers,
  - solvents,
  - plastics,
  - and pesticides.

### **Types of Hazardous Waste**

- dyes, cleansers, and solvents
- PCBs (polychlorinated biphenyls) from older electrical equipment, such as heating systems and television sets
- plastics, solvents, lubricants, and sealants
- toxic heavy metals, such as lead, mercury, cadmium, and zinc
- pesticides
- radioactive wastes from spent fuel that was used to generate electricity

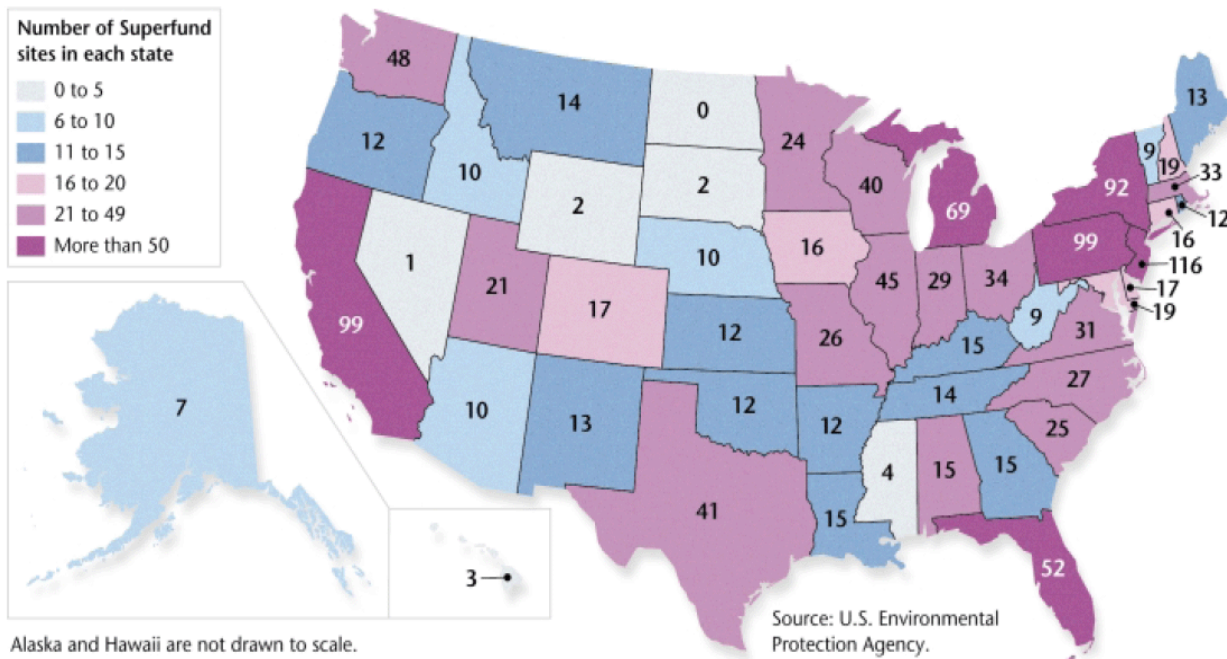
- The methods used to dispose of hazardous wastes often are not as carefully planned as the manufacturing processes that produce them.
- An improperly maintained hazardous waste disposal site can leak toxic waste into the air, soil, and ground water.
- Federal laws were passed to clean up old waste sites and regulate future waste disposal.

### **Resource Conservation and Recovery Act**

- requires producers of hazardous waste to keep records of how their wastes are handled.
- The RCRA also requires all hazardous waste treatment and disposal facilities to be built and operated according to standards that are designed to prevent the facilities from polluting the environment.

### **The Superfund Act**

- **In 1980, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act, more commonly known as the Superfund Act.**
- **This act gives the EPA the right to sue the owners of hazardous waste sites who had illegally dumped waste.**
- **It also allows the EPA to force the owners to pay for the cleanup.**
- **Cleaning up improperly discard waste is difficult and extremely expensive.**
- **The act also created a fund of money to pay for cleaning up abandoned hazardous waste sites.**
- **Cleanup has been completed at only 75 of the roughly 1,200 approved or proposed Superfund sites.**



## **Preventing Hazardous Waste**

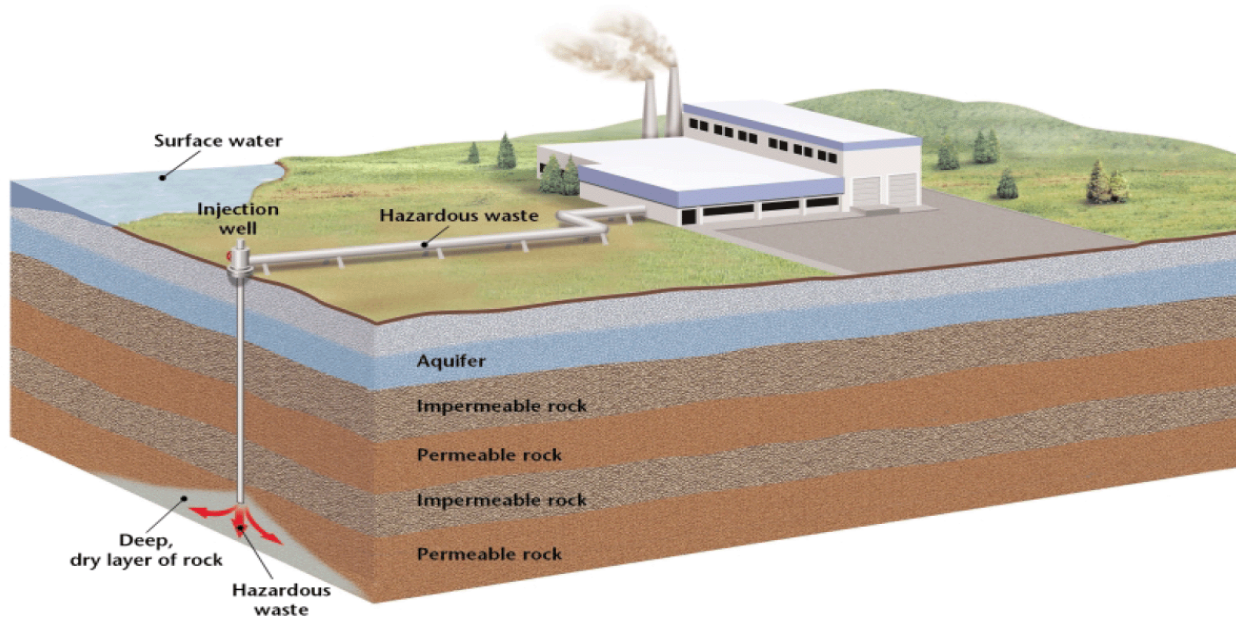
- **One way to prevent hazardous waste is to produce less of it.**
- **For example, manufacturers discovered they can redesign manufacturing methods to produce less or no hazardous waste.**
- **Such techniques save the manufacturers money by cutting the cost of materials as well as in cutting the cost of waste disposal.**
- **Another way to prevent hazardous waste is to find a way to reuse it.**
- **For example, a company that would usually throw away a cleaning solvent after one use can instead sell it to another company that produces a product that is not harmed by small amounts of contamination in the solvent.**
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## Conversion into Nonhazardous Substances

- Some types of wastes can be treated with chemicals to make them less hazardous.
- For example, cyanides, which are extremely poisonous compounds, can be combined with oxygen to form carbon dioxide and nitrogen.
- Wastes can also be treated biologically.
- Sludge from petroleum refineries, for example, may be converted by soil bacteria into less harmful substances

## Land Disposal

- Most of the hazardous waste produced in the United States is disposed of on land.
- Hazardous wastes in concentrated or solid forms are often put in barrels and buried in special landfills.
- These landfills have extra safety precautions to prevent leakage.
- One type of land disposal facility uses deep-well injection.
- Deep-well injection involves deep-well disposal of hazardous waste.
- Deep-well injections pump hazardous wastes deep into the ground, where they are absorbed into a dry layer of rock below the level of groundwater.
- The wastes are then covered with cement to prevent contamination of the groundwater.



- A surface impoundment is a natural depression or a human-made excavation that serves as a disposal facility that holds an accumulation of wastes.
- Surface impoundments are basically ponds with sealed bottoms.

- **Wastes accumulate and settle to the bottom of the pond, while water evaporates from the pond and leaves room to add more wastes.**

### **Biologically Treating Hazardous Waste**

- **Some hazardous wastes can be absorbed, broken down, or their toxicity can be reduced when they are treated with biological and chemical agents.**
- **Certain bacteria and chemicals can be used to help clean up an area in the environment that has been contaminated with hazardous substances.**
- **Flowering plants and trees that absorb heavy metals can also be planted in contaminated areas.**

### **Incinerating Hazardous Waste**

- **Some hazardous wastes are disposed of by burning in specially designed incinerators.**
- **Incineration can be a safe way, but it is generally the most expensive form of disposing waste.**
- **Incinerators need pollution-control devices and they need to be monitored for hazardous gases and particles.**
- **Incinerators produce ash that needs to be buried in a hazardous waste landfill.**

### **Exporting Hazardous Waste**

- **Until recently, only local laws regulated waste disposal in the United States.**
- **Until the 1980s, companies would often send hazardous waste to landfills in other, less populated states.**
- **Hazardous wastes are now exported through international trade agreements to facilities in another countries that specialize in treating, disposing of, or recycling a particular hazardous waste.**

### **Hazardous Wastes at Home**

- **Household produces can also create hazardous waste.**
- **Some household products should be disposed of in specially designed hazardous waste landfills, and not down the drain or put in the trash for a solid-waste landfill.**

## Common Hazardous Household Products

- motor oil
- pesticides
- paints
- fertilizers
- batteries
- cleaners
- computers
- antifreeze
- mobile phones

### Disposing of Household Hazardous Waste

- **More cities around the country have begun to provide collection for household hazardous waste to make sure they are disposed of properly.**
- **Trained workers sort the hazardous materials and send some for recycling and pack others into barrels for disposal.**
- **Used batteries and motor oil, for example, can be recycled.**

### Motor Oil

- **It is illegal to pour motor oil on the ground or throw it in the trash.**
- **However, people in the United States throw away over 700 million liters (185 million gallons) of used motor oil every year. This does not include the oil disposed of by service stations and automobile repair shops.**
- **Motor oil can be recycled by taking it to an automobile service station. Some cities have designated oil-collection receptors. These cities recycle the used oil turned in by citizens.**