

CE 431

# Hazardous Waste Management

# What is Hazardous Waste ?

Hazardous waste is defined in the USA (Masters, 1997) as: *anything which, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, an increase in mortality; or cause an increase in serious irreversible, or incapacitating reversible, illness; or pose a substantial present or potential hazard to human health and the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.*

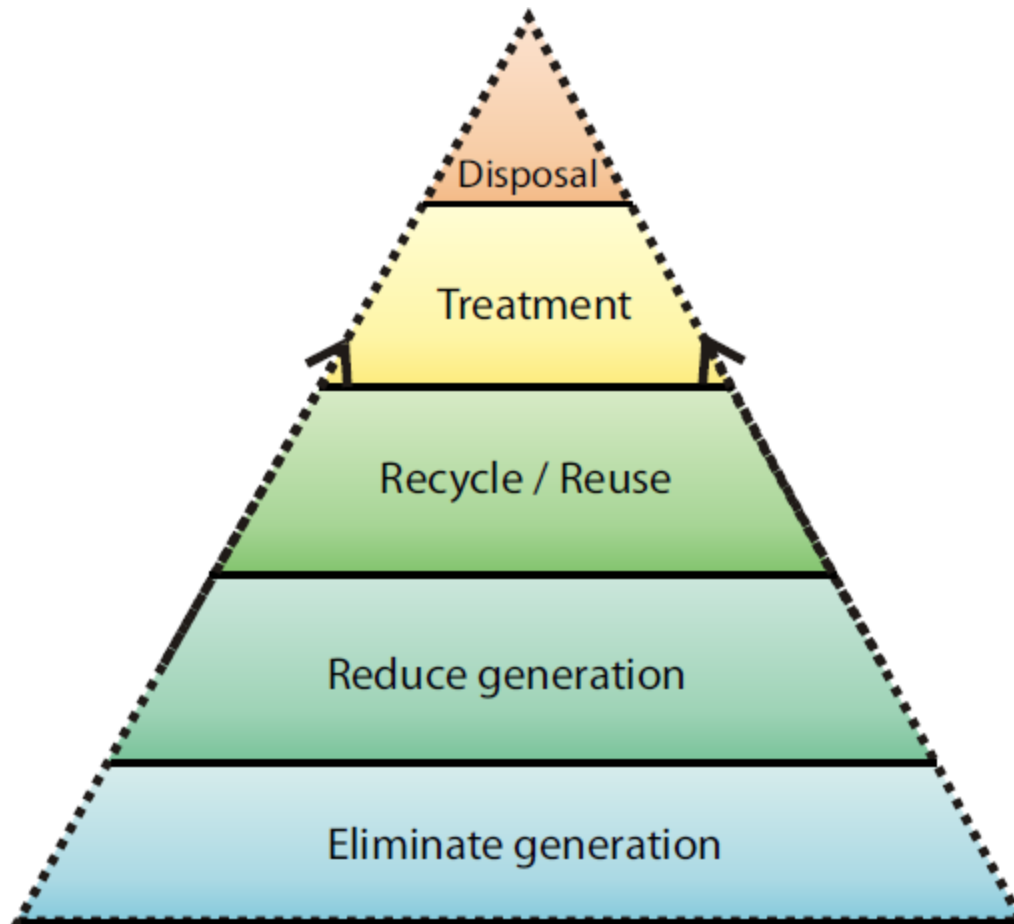
# What are Hazardous wastes ?

EPA listed wastes are organized into three categories:

- Source-specific wastes - *sludge and wastewater from treatment and production processes in specific industries, such as petroleum refining and wood preserving*
- Generic wastes - *wastes from common manufacturing and industrial processes, such as solvents used in degreasing operations*
- Commercial chemical products -*specific chemical products, such as benzene, creosote, mercury, and various pesticides*

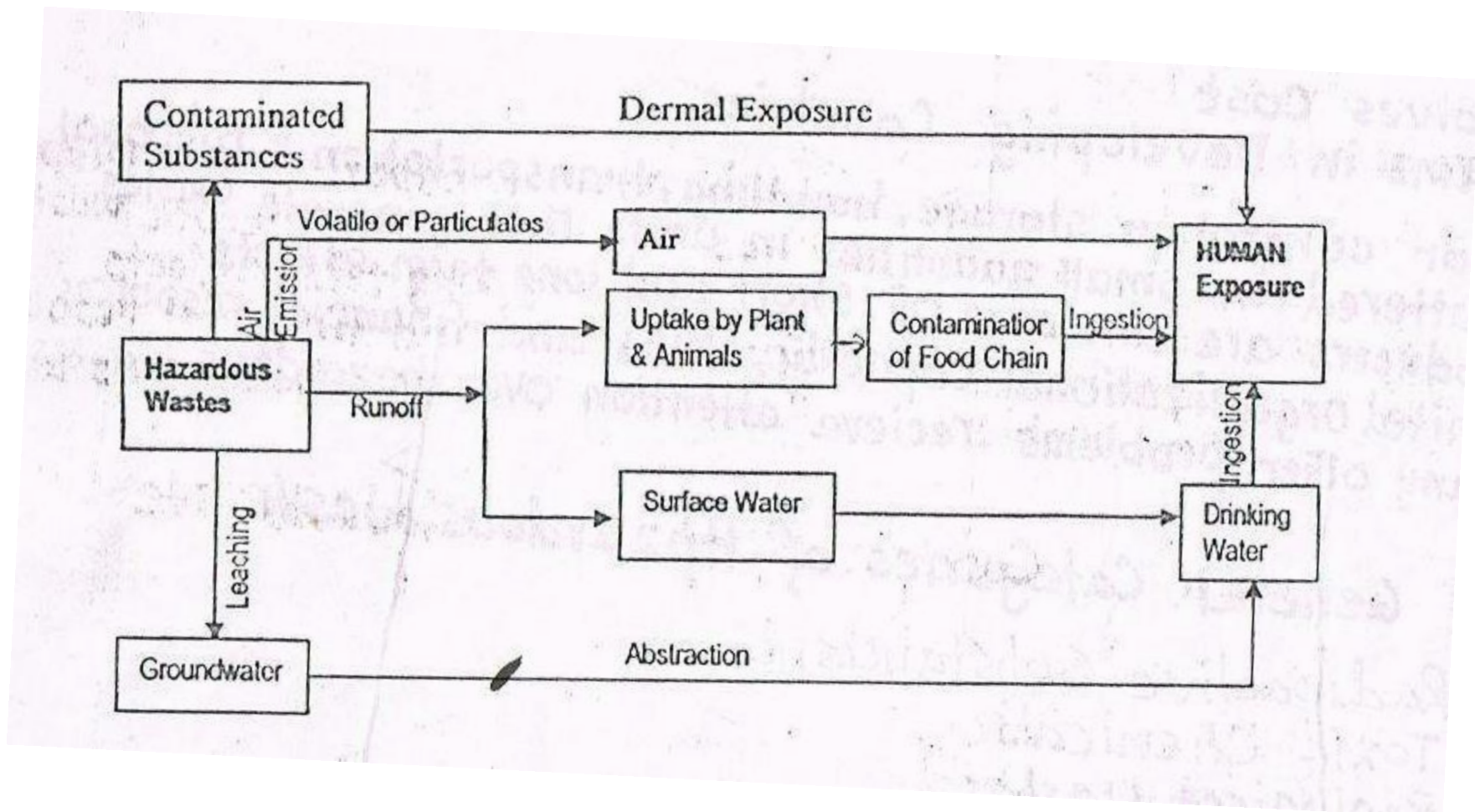
# Hierarchy of priorities in HWM

- The first priority is to find ways to eliminate uses of hazardous substances. Elimination might be achieved by changing manufacturing processes or by substituting products that can satisfy the same need without creating hazardous wastes.
- The next priority is to reduce the amounts generated. Again, manufacturing process changes can be important.
- The third strategy is to recycle hazardous substances such as solvents and acids to maximize their use before treatment and disposal becomes necessary.
- Finally, hazardous substances can be treated to reduce their volume and toxicity. Only after all of those options have been exhausted should disposal be considered.



**Figure 10.2: Hierarchy of priorities in HWM**

# Pathways of Human exposure to Hazardous Waste



# Problems in Hazardous Waste Treatment and Disposal

- Technological limitations
- Involves some degree of risks
- Involves cost

## **Problems in developing countries:**

- Poor control in storage, handling, transportation and disposal
- Scattered in small quantities in units that generate wastes
- Producers are unaware of short and long-term effects
- Limited organizational capacity, skills and financial resources
- Many other problems are received attention over hazardous wastes

# Categories of hazardous waste

Five generic categories:

- Radioactive Substances
- Toxic Chemicals
- Biological wastes
- Flammable wastes
- Explosives



# Options for Disposal of Hazardous waste

- On land, in sewer and inland waters
- Ocean dumping
- Engineering storage
- Deep well injection
- Deep mine storage and disposal
- Land burial or landfill

# Factors to be considered for Siting Landfills for hazardous wastes

- Groundwater
- Floodplain
- Surface water
- Air Quality
- Operational Safety
- Disease Transmission
- Impact of food chain crop land
- Endangered species