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Unit III

Municipal Solid Waste Management

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OPEN DUMPS AND SANITARY LAND FILLS

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Open Dumping

- Open dumping occurs when large quantities or piles of waste accumulate in areas not designed to handle such materials.
- Open dumps are commonly found in forests, backyards, abandoned buildings and swimming pools.
- Open dumps are usually removed shortly after they are created.
- They usually breed pests and vectors which cause diseases to those living near an open dump.
- Open dumps are usually formed when making a foundation for a building.
- The waste of an open dump would decay and form part of the soil as organic manure.

Effects of open dumping

- Physical hazards – Open dumping often presents physical hazards with broken glass, sharp metal on discarded items, and appliances in which children or animals can be trapped.

- Chemical hazards – Disposed chemicals may be toxic to a child who goes onto the site. Household hazardous waste (HHW) such as paint, pesticides and other toxic chemicals, can be found in open dumps.

- Biological hazards – Items such as syringes or other discarded medical items. Household garbage, which may include food scraps and dirty diapers, attracts pathogens.

  In the environment, chemicals and other contaminants found in solid waste can seep into our groundwater and can also be carried by rainwater to rivers and lakes that provide essential wildlife habitat.

  These contaminates can also end up in our ground water, rivers and lakes that are our sources for drinking water.

- How does open dumping affect the environment?

  In the environment, chemicals and other contaminants found in solid waste can seep into our groundwater and can also be carried by rainwater to rivers and lakes that provide essential wildlife habitat. These contaminates can also end up in our ground water, rivers and lakes that are our sources for drinking water. Further the chemicals due to open dumping of waste were reported to have resulted in deterioration of soils and was found that the soil no longer support large number of plants.

- **Adverse Effect of open dump**

  An open dumping is defined as a land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, are susceptible to open burning, and are exposed to the elements, vectors, and scavengers.
  Open dumping can include solid waste disposal facilities or practices that pose a reasonable probability of adverse effects on health or the environment.

- **Health Effect**
- The health risks associated with illegal dumping are significant. Areas used for open dumping may be easily accessible to people, especially children, who are vulnerable to the physical (protruding nails or sharp edges) and chemical (harmful fluids or dust) hazards posed by wastes.

- Rodents, insects, and other vermin attracted to open dump sites may also pose health risks. Dump sites with scrap tires provide an ideal breeding ground for mosquitoes, which can multiply 100 times faster than normal in the warm stagnant water standing in scrap tire causing several illnesses.

- Poisoning and chemical burns resulting from contact with small amounts of hazardous, chemical waste mixed with general waste during collection & transportation.

- Burns and other injuries can occur resulting from occupational accidents and methane gas exposure at waste disposal sites.
- **Environment pollution**
  Air pollution
  Dust generated from on-site vehicle movements, and placement of waste and materials

  Water pollution
  Runoff from open dump sites containing chemicals may contaminate wells and surface water used as sources of drinking water open dumping can also impact proper drainage of runoff, making areas more susceptible to flooding when wastes block ravines, creeks, culverts, and drainage basins & also contamination of groundwater resources and surface water from leachate emissions.

- **Soil Contamination**
  Permanent or temporary loss of productive land
- **Global Warming and Climate Change**
  In most of the cities & towns the municipal solid waste is being dumped & burnt in open spaces without understanding the adverse impacts on the environment. The waste in the dumping ground undergoes various anaerobic reactions produces offensive Green House gases such as CO2, CH4 etc. These gases are contributing potentially to Global Warming & Climate Change phenomenon.

What could be done?

- Recycle as much as you can (i.e., glass, aluminium, plastics, furniture, electronics and appliances),
- Materials good for composting include uncontaminated and untreated natural growth solid wastes, such as tree limbs, stumps, leaves, grass clippings and sawdust derived from processing untreated, natural wood.
- the remainder of the solid waste can be dumped at a permitted landfill

Consequences of Open Dumping

- Violators are responsible to pay for the remediation and proper disposal of the waste at an open dump site.
- The environmental damage to the soil and water can be significant and irreversible.
- Piles of waste take away from naturally beautiful landscape. Open dumping can also lower property values of surrounding homes.

Open dumps of solid wastes

Sanitary Landfills

- Sanitary Landfills are designed to greatly reduce or eliminate the risks that waste disposal may pose to the public health and environmental quality.

- They are usually placed in areas where land features act as natural buffers between the landfill and the environment.

- For example the area may be comprised of clay soil which is fairly impermeable due to its tightly packed particles, or the area may be characterised by a low water table and an absence of surface water bodies thus preventing the threat of water contamination.

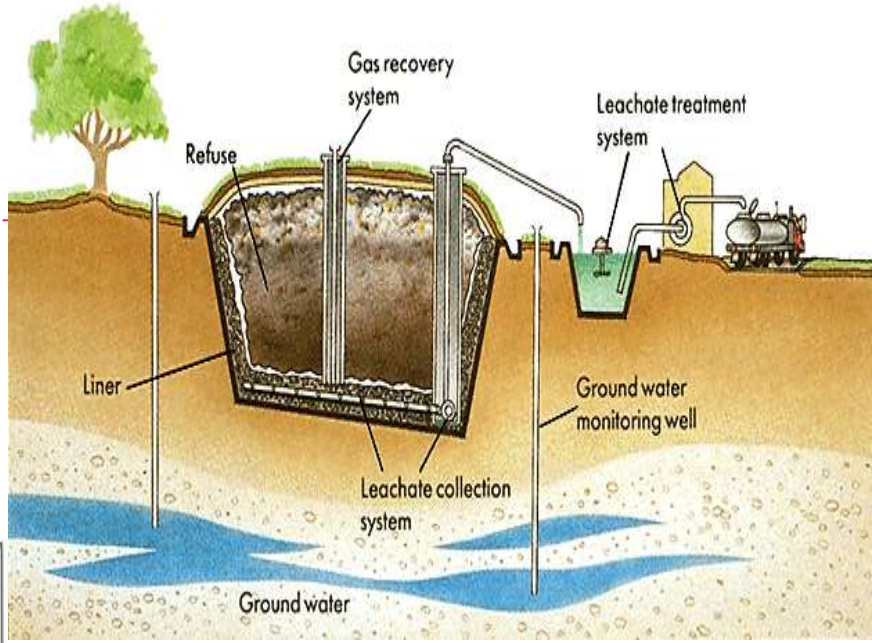
- In addition to the strategic placement of the landfill other protective measures are incorporated into its design.
- The bottom and sides of landfills are lined with layers of clay or plastic to keep the liquid waste, known as leachate, from escaping into the soil.
- The leachate is collected and pumped to the surface for treatment.
- Boreholes or monitoring wells are dug in the vicinity of the landfill to monitor groundwater quality.

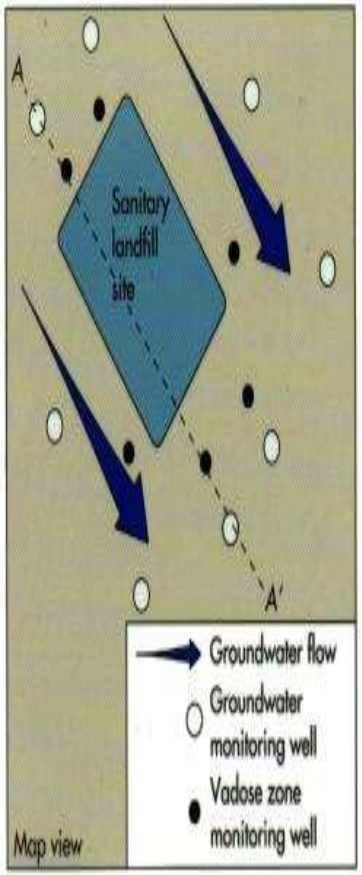
- A landfill is divided into a series of individual cells and only a few cells of the site are filled with trash at any one time. This minimizes exposure to wind and rain.
- The daily waste is spread and compacted to reduce the volume, a cover is then applied to reduce odours and keep out pests.
- When the landfill has reached its capacity it is capped with an impermeable seal which is typically composed of clay soil.
- Some sanitary landfills are used to recover energy.
- The natural anaerobic decomposition of the waste in the landfill produces landfill gases which include Carbon Dioxide, methane and traces of other gases.

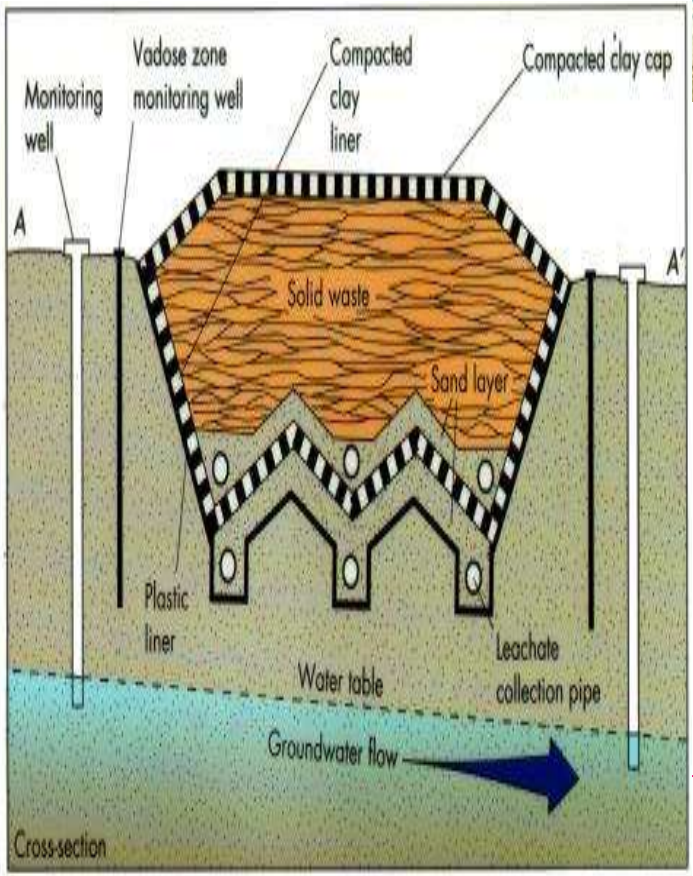
- Methane can be used as an energy source to produce heat or electricity. Thus some landfills are fitted with landfill gas collection (LFG) systems to capitalise on the methane being produced.

- The process of generating gas is very slow, for the energy recovery system to be successful there needs to be large volumes of wastes.

- These landfills present the least environmental and health risk and the records kept can be a good source of information for future use in waste management, however, the cost of establishing these sanitary landfills are high when compared to the other land disposal methods.


Gas recovery system
Leachate treatment system
Refuse
Liner
Ground water monitoring well
Leachate collection system
Ground water


A
Sanitary landfill site
A'
Groundwater flow
Groundwater monitoring well
Vadose zone monitoring well
Map view


Monitoring well
Vadose zone monitoring well
Compacted clay liner
Compacted clay cap
A
A'
Solid waste
Sand layer
Plastic liner
Leachate collection pipe
Water table
Groundwater flow
Cross-section

- Gases escaping from landfills contain toxic pollutants that can cause cancer, asthma, and other serious health effects. These gases were reported to carry toxic chemicals such as paint thinner, solvents, pesticides, and other hazardous volatile organic compounds. All dumps also leak toxic leachate; even "state-of-the-art" landfills will eventually leak and pollute nearby groundwater.
- Landfills are also a significant contributor to climate change. They are the largest global source of human-created methane emissions, a toxic climate-changing gas that is 25 to 72 times more potent than carbon dioxide.

QUESTIONS

- 2 MARKS
- **What do you mean by Open dumps?**
- **Are open dumps hygienic?**
- **Why recycling of waste is important?**
- **What are Sanitary landfills ?**

5 MARKS

- **Elaborate on the effects of Open dumping.**
- **How does open dumping affect the environment?**
- **What are the consequences of open dumping? Explain.**

10 MARKS

- **Explain the process of landfilling with a neat sketch.**
- **Discuss the method of opendumping and list out the effects of the same on the ennvironment .**