IV. SOLID WASTE MANAGEMENT

What is SOLID WASTE?

- The materials generated as waste by residential areas, hospitals, industries, etc are known as SOLID WASTE.
- These include trash and garbage (MSW), paper, fabric, plastics, vegetable matter, hazardous substances, etc.
- Solid waste creates an unhealthy environment.

SOLID WASTE MANAGEMENT

- Waste management is the collection, transport, processing, recycling or disposal of waste materials.
- It can involve solid, liquid, gaseous or radioactive wastes which will have separate treatment methods.

CLASSIFICATION OF SOLID WASTES

GARBAGE	Produced during the preparation or storage of meat, fruits, vegetables, etc
RUBBISH	Paper, wood, scrap material, rubber, leather, metals, glass, ceramics, etc
PATHOLOGICAL WASTE	Dead animals, human wastes, etc
INDUSTRIAL WASTE	Chemicals, paints, sand, fly ash, sludge, metal bits, etc
AGRICULTURAL WASTE	Farm animal manure, crop residue, etc

OBJECTIVES OF WASTE MANAGEMENT

- To minimize the adverse effects caused by solid wastes
- Once the problem intensifies, it becomes too difficult to rectify
- To reduce wastes at the source point
- To REDUCE, REUSE and RECYCLE

STAGES IN TREATMENT METHODS

- The various stages involved in solid waste management are
  - Collection
  - Transportation
  - Sorting
  - Disposal

COLLECTION

- Waste is collected from storage bins (capacity 100 – 500 litres) which are placed at intervals of 50 – 200m.
- Usually waste is collected daily as organic wastes tend to decompose.
- Vehicles are used to collect the solid waste and transport them to the required location.

TRANSPORTATION

- Various types of vehicles are used for transport of waste materials.
- There will be collection centers for receiving the waste from the individual vehicles.
- The waste will then be sorted out and sent to the disposal site.

SORTING

- The waste before being taken to the disposal site must be sorted.
- All those which can be recycled will be sent for recycling.
- Depending on the type of waste present, they will be sorted out and sent to the respective centres for processing or disposal.

DISPOSAL METHODS

- There are many types of disposal methods
  - Open dumping
  - Landfill
  - Composting
  - Incineration

OPEN DUMPING

- Wastes are usually taken to a spot in the outskirts and dumped in an open area.

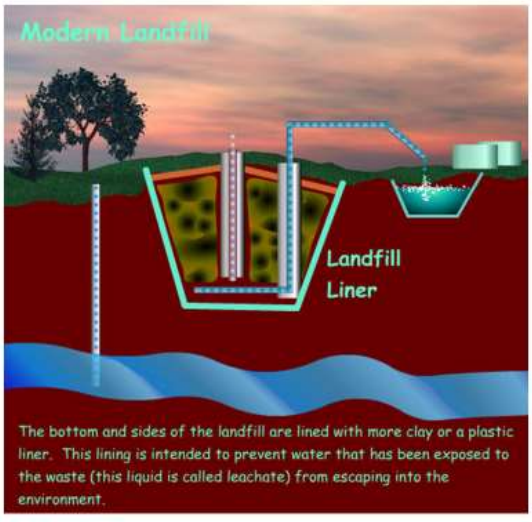
- This causes many environmental problems and health issues.
- Indiscriminate open dumping leads to bad odour due to the decay of organic matter, air and water pollution, spreading of infectious diseases, etc.

LANDFILLS

- Management of Solid Waste is disposed of by dumping or burying the waste in low lying areas or in structures built on the ground.
- The waste is usually sorted and pulverized before being buried.
- The waste is spread and compacted in thin layers called a cell.
- Each layer of waste is interspersed with a layer of soil 20 cm thick.
- When buried, decomposition of the waste occurs by aerobic and anaerobic bacteria converting the wastes into CO_2, H_2O, CH_4, NH_3, H_2S, energy, etc.
- These gases escape through a vent provided in the landfill.
- Decomposition also produces liquid wastes which can leak into the underground water table and contaminate it. This is called LEACHING.
- To prevent this, water tight linings are used.

ADVANTAGES AND DISADVANTAGES

- ✓ No air pollution
- ✓ No public health problems
- ✓ The area above can be used for other purposes
- x Leaching
- x Sites need to be found to be made into landfills



COMPOSTING

- This involves aerobic decomposition of organic constituents of wastes under controlled conditions.
- The organic matter is converted into a solid compound called compost.
- For successful completion, the water content in the waste should be around 40 – 60%.
- The waste is placed in a trench or in a mound called the windrows.
- It is stirred regularly to ensure air circulation.
- Bacteria decompose organic matter and liberate CO2 which raises the temperature of the mixture to about 45 – 60˚C
- When decomposition is over, the temperature comes down.

COMPOSTING TECHNIQUES

- Buhler Process: The non-composting materials are separated from the organic matter which is ground and decomposed in windrows. Two months
- Dano Process: The waste is partially decomposed in rotating drums called bio-stabilizers. Then windrows are used. One month.
- Tollemache Process: The waste is pulverized and decomposed in windrows for 3 weeks.
- Nu-soil Method: Waste is digested in a vertical digestor which consists of 7 sections. In each section, the waste is kept for a day. Process is complete in 7 days.

INCINERATION

- It is a process of burning the most combustible wastes to yield mineralized products.
- Organic and biological materials are combusted to get CO_2 and H_2O.
- It causes air pollution because of the generation of fly ash and other pollutants.
- Air discharge must be controlled to offset the pollution.