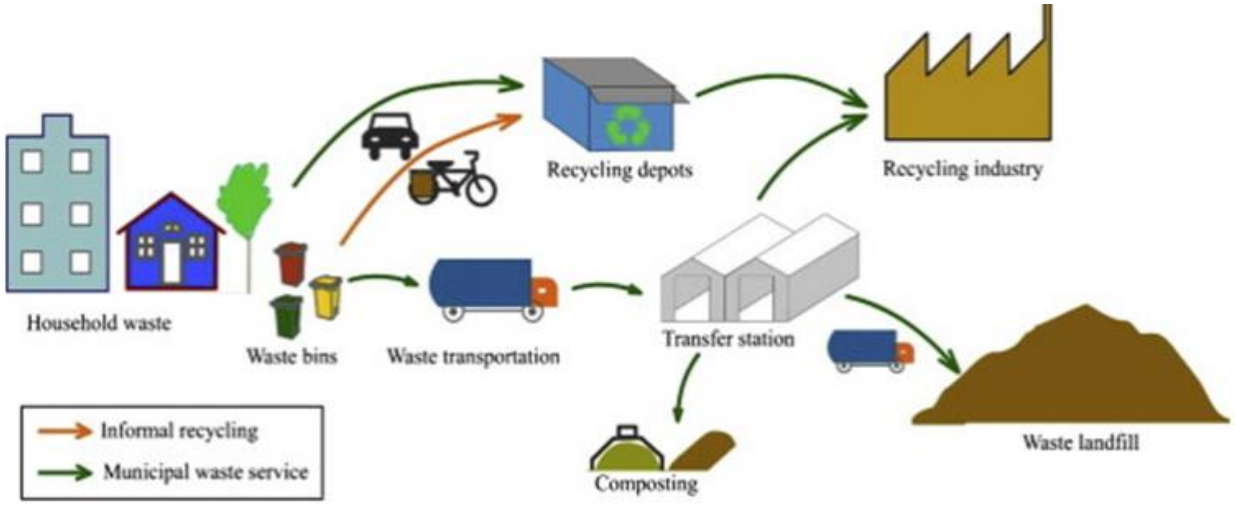
AI 3010 WASTE AND BY PRODUCT UTILIZATION

UNIT I NOTES

Waste management

Waste management as a process by which wastes are gathered, transported and processed before disposal of any remaining residues. solid waste management as the effective supervision and handling, keeping, collection, conveying, treatment and disposal of waste in a manner that safeguard the environment and the public. solid waste management utilizes skills and knowledge from various discipline such as legal, financial, administration among others in the day to day running of waste management issues. The main reason for managing waste is to ensure a safe environment.

Some waste management methods are often preferred than others. For instance, reuse, recycling, composting and energy generation from incineration are often preferred to landfills. Landfilling is the final destination of most waste produced from waste treatment and processing facilities. Other technologies merely serve the purpose of volume reduction or treatment before final disposal. Wastes streams with different characteristics may require different management approach. For instance, industrial waste might contain more hazardous materials than municipal waste streams. Hence, the management of these two waste streams might differ. Vergara & Tchobanoglous, (2012) found that, although waste management might differ between countries, there are some basic processes or paths that waste management needs to follows.



These paths are illustrated in Figure above shows that, wastes generated must be gathered and stored by the generator in a place. The municipal authorities or their agents collect the waste from the point of storage, for transportation to processing or disposal sites. The study added that, in some instances, the waste generators separate the waste into various materials from where they are collected for recycling by the recycling industries.

Waste management involves a process whereby wastes are collected, transported and disposed of in the best possible way of limiting or eliminating the harmful effect of wastes. This aspect of environmental management is as important as other public amenities or infrastructures without which the life of contemporary man would be extremely difficult. This is because studies have shown a direct link between air, water and land pollution and diseases such as lung cancer, heart disease, cholera and hepatitis. In addition, climate change and eutrophication are a direct result of water and air pollution. Little wonder why there is a huge disparity in the life expectancy of people in developed and developing countries.

Since factors such as population increase and the coming together of people to form communities lead to increase waste generation. Efforts should be directed towards making projections far ahead in order to ensure that new and existing settlements are adequately planned so as to accommodate possible increase in the volume of waste generation in future. Effectively planning ahead will prevent indiscriminate disposal and other harmful practices so as to prevent the build-up of open dumps and breeding ground for rats and other vermin which poses health risk.

Solid waste management

Solid waste management (SWM) is a decentralized process based mostly on the economic status of individual countries. Monitoring of waste production is a primary step in any waste management strategy, regardless of region or country. Several high-end waste monitoring technologies such as geographic information systems (GISs), radio-frequency identification (RFID), ultrasonic sensors, and international system for mobile/general radio packet service (GSM/GPRS) have been developed recently to enhance waste collection from bins and trucks. These state-of-the-art techniques are mostly inapplicable in poor countries due to their high cost. As a matter of fact, untrained rag-picking is the sole method used for waste collection/segregation in about 63% of countries.

Land filling is the most common waste disposal route adopted globally because of its convenience of execution. Because of the high management costs involved, many landfills stay unattended with severe pollution .In developed countries, an improved type of landfilling, referred to as “sanitary landfilling”, is practiced.

sanitary landfill typically comprises of four layers (USEPA, 1972): (1) the bottom layer consists of dense clay lining along with a cover of HDPE (high density polyethene) sheets which restrict the seepage of toxic effluents; (2) the second layer incorporates proper drainage channels which direct the flow of the

inbound toxic fluids out of the dump into a treatment facility; (3) the third layer as collection layer to trap the landfill gases and transport them for further cleaning and use; and (4) the fourth or top-most layer is the largest reservoir to accommodate the solid waste. Finally, the mouth of a sanitary landfill is covered with soil for checking the odor and discharge of pathogenic micro-organisms outside (USEPA, 1972). On the contrary, a common landfill is a deep cavity which accumulates solid waste with its top covered by soil. It has been observed over the years that common landfills extrude considerable amount of CH_4, N_2O, and toxic heavy metals.

The major limitation of implementing such a practice in underdeveloped countries is the lack of skilled labor which restricts the usability of sanitary landfills on a large scale. Other waste management procedures including pyrolysis, incineration, and gasification are also strongly limited, even in highly industrialized countries, because of strict environmental regulations. Conversely, in underdeveloped or low income countries, incineration is deemed an effective solid waste treatment strategy regardless of its pollution aspect. Deterioration in solid waste treatment infrastructure generally results from stagnation of the national economy and low environmental awareness.

Maintenance of waste Management

1. Identify Wastes

The University provides safe, effective, and efficient waste management services for managing nonhazardous solid waste, recyclable waste, and hazardous waste. The University community is responsible for identifying the type of waste produced and using the appropriate University management system.

2. Evaluate Waste

The University community must evaluate their waste for its physical, chemical, and biological characteristics to determine how it is to be properly managed.

A waste may be:

1. Recyclable material (e.g., paper, soda cans)
2. Compostable organic waste (e.g. food, animal bedding, biodegradable plastics)
3. Non-hazardous solid waste

4. Hazardous radioactive waste: containing or contaminated with a radioactive isotope
5. Hazardous biological waste: containing or contaminated with an infectious or potentially infectious agent, a biological toxin, animal carcasses, genetically modified organisms, recombinant DNA, etc.
6. Hazardous chemical waste: waste chemicals, products which are chemical in nature (cleaning agents, paint, motor oil, and pharmaceutics), products that contain chemicals (fluorescent lamps, thermometers), or materials contaminated with chemicals (contaminated soil or rags)
7. Otherwise Regulated Material: asbestos, car batteries, contaminated soil, and construction debris

3. Manage Wastes

Once wastes have been identified and evaluated, the University community must manage it according to applicable University of Minnesota waste management instructions. These waste management instructions have been developed to keep the University in compliance with all applicable laws and regulations and to promote a safe and healthy workplace.