



|              |                        |
|--------------|------------------------|
| Name         | Sajid Shahzad          |
| ID           | 7685                   |
| Section      | C                      |
| Department   | BE(Civil)              |
| Subject      | Wastewater engineering |
| Exam         | Final paper            |
| Semester     | 8th                    |
| Submitted to | Engr. Nadeem ullah     |



Q = No = 01

Ans

Wastewater treatment: Wastewater treatment consist of applying known technology to improve or upgrade the quality of a wastewater.

→ Wastewater treatment involves collecting the wastewater in a centralized or decentralized location (wastewater treatment plant) and subjecting the wastewater to various treatment process.

Importance The major aim of wastewater treatment is to remove as much of the suspended solid as possible before the remaining water, called effluent, is discharged back to the environment. As solid material decays, it uses up oxygen, which is needed by the plants and animals living in the water.

⇒ The shape of the rectangular clarifiers provides a longer path for the wastewater flow and the suspended solid to travel, and subsequently longer detention time which warrants less short circuiting and more sludge settling compared to the centre-feed / peripheral

overflow Circular Clarifiers. In addition, flow distribution among several clarifiers is usually more even and often requires less head loss for rectangular clarifiers.



$$Q = N_0 = 0.2$$

### AEROBIC WASTEWATER TREATMENT:

- \* Aerobic processes use bacteria that require oxygen, so air is circulated throughout the treatment tank
- \* These aerobic bacteria then break down the waste within the wastewater.
- \* Some systems utilize a pretreatment stage prior to the main treatment to reduce the chance of clogging the system
- \* Electricity is required for system operation.

### ANAEROBIC WASTEWATER TREATMENT:

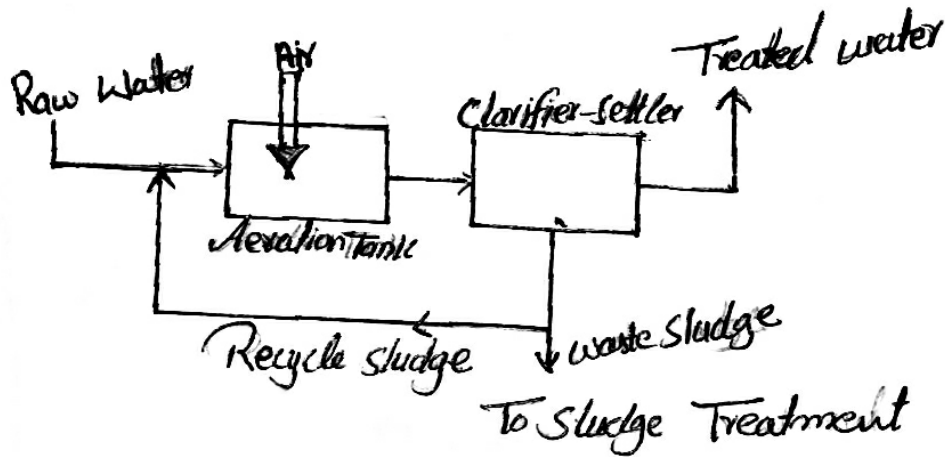
- \* Anaerobic bacteria transform organic matter in the wastewater into biogas that contains large amounts of methane gas and carbon dioxide.
- \* Energy-efficient process
- \* Often used to treat industrial wastewater that contains high levels of organic matter in warm temperature
- \* It can be used as a pretreatment prior to aerobic municipal wastewater treatment.

## Activated Sludge Process:

- \* The Sludge blanket is measured from the bottom of the clarifier.
- \* The Sludge volume index is the volume of settled sludge in mm occupied by 1 gram of dry sludge solids after 30 mins of settling in a 1000ml graduated cylinder.
- \* The Mean Cell Residence Time is the total mass (kg) of mixed liquor suspended solid in the aerator and clarifier by the mass flow rate (kg/day) of MLSS effluent.
- \* The F/M is amount of BOD fed to the aerator (kg/day) by the amount of MLSS (kg) under aeration.
- \* Some use ~~the~~ Mixed Liquor Suspended Solid for expedience, but Mixed liquor volatile suspended solid is considered more accurate for the measure of microorganisms.
- \* process for treating sewage or industrial wastewater using aeration and a biological floc composed of bacteria and protozoa.
- \* is a biological process that can ~~be~~ used for oxidizing carbonaceous biological matter, oxidizing ~~an~~ nitrogenous matter (NH<sub>3</sub> and N<sub>2</sub>)

121 853  
⇒ Aeration methods - diffused aeration, surface aerators (cones) and pure oxygen aeration.

## Activated Sludge Process diagram:



x=====x

## Assimilative Capacity of Receiving Bodies:

→ Assimilative Capacity of receiving water bodies refers to the ability of a body of water to cleanse itself, its capacity to receive wastewater without deleterious effect and without causing damage to aquatic life or humans who consume the water. It is level to which water body or nature control the toxicity without affecting the aquatic life.

How does it help in wastewater treatment?

When wastewater or contaminated water meets fresh water or natural water bodies, then because of the assimilative capacity of natural water bodies two processes are done on the contaminated water, one dilution and second dispersion, in dilution when contaminated water meets greater amount of fresh water than the concentration of contaminated water decreases, while in dispersion the contaminated water disperses on a greater area and its concentration gets low. And because of these 2 processes assimilative capacity treats wastewater.

Q = No = 04

Ans Sludge management:

- 1: Primary operation
- 2: Thickening
- 3: Stabilization
- 4: Dewatering
- 5: Heat drying

1 Primary operation:

This process includes:

- i) Grinding: It includes particles size reduction
- ii) Screening: It includes removal of fibrous material
- iii) Degritting: It includes removal of sand or other inorganic material
- iv) Blending: It includes removal of sand or other inorganic mat<sup>n</sup>
- iv) Storage: It ensures flow equalization in the system.
- v) Blending: It include making the sludge homogenous.



2 Sludge Thickening:

⇒ Sludge thickening is undertaken to increase percentage of solid content in sludge by removing a portion of liquid fraction.

⇒ Volume reduction of approximately 30-80% can be reached with sludge thickening.

⇒ Various methods of sludge thickening are

- \* Gravity thickening
- \* Flotation thickening
- \* Rotatory drum thickening

3 Sludge Stabilization:

⇒ Sludge stabilization to reduce pathogens, eliminate offensive odors, minimize production of usable gas (methane)

⇒ Methods of stabilization are:

- (i) Alkaline Stabilization
- (ii) Anaerobic Digestion

5 Heat Drying:

→ It involves the application of heat to evaporate water and to reduce the moisture content of biosolids.

→ Advantage of this method is to reduce product transportation costs, improve storage capability, and marketability.

→ Direct drying involves the wastewater solid come into contact with hot gases, which cause evaporation of moisture. Dryers such as rotary dryers and fluidized bed dryers are used.

⇒ Advantages:

→ High treatment efficiencies possible for BOD, COD, TSS, and P.

→ High flexibility in operating conditions

→ Possibility of producing electric energy from biogas

→ Low land requirement of CAS, somewhat higher land requirement for EA.

→ High effluent quality.

## Q=No=05

### Environmental Impact Assessment:

→ Environmental Impact Assessment is defined as an activity designed to identify the impact on the biogeophysical environment, on man and well-being of legislative proposals, projects, policies, operational procedures and to interpret and communicate information.

EIA is a systematic process of identifying future consequences of a current or proposed action.

OR

In simple words EIA may be defined as "A formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or ~~and~~ reduce adverse effects and to enhance positive effects."

EIA thus has three main functions:

- To predict problem
- To find ways to avoid/mitigate them, and
- To enhance positive effects.

The following parameters to be considered while conducting EIA for newly proposed wastewater treatment plant.

Although legislation and practice vary around the world, the fundamental components of an EIA would necessarily of the following stages:

- 1) Screening to determine which project or developments require a full or partial impact assessment study
- 2) Scoping to identify which potential impact are relevant to assess (based on legislative requirements, International Convention) to identify alternative solutions that avoid, mitigate or compensate adverse impact on biodiversity (including the option of not proceeding with development, finding alternative designs or sites which avoid the impact incorporating safeguards in the design of the project, or providing compensation for adverse impacts) and finally to derive terms of reference for the impact assessment.
- 3) Assessment and evaluation of impact and development of alternatives to predict and identify the likely environment impacts of a proposed project or developments including the detailed elaboration of alternatives.

4 Reporting the environment Impact statement (EIS report or EIA report, including an environmental management Plan (EMP), and a non-technical Summary for the general audience.

5 Review of the environmental Impact Statement (EIS), based on the team of reference (scoping)

### Environment Impacts Assessment and Mitigation Measures

The first attempt to assess the environmental impacts was done within the "Initial Environmental Examination IEE level study". Using the basic from this study, following the general recommendation for elaboration of the environmental impact using updated information and large amount of new data and taking into consideration all media and their interaction, detailed Environmental Impact Study was prepared.

## Construction Phase:

- Construction of the access roads and main collectors (left and right river bank)
- Construction of the Siphon Structure across the River bed/day
- Preparatory works at the location of the WWTP (tree cutting, hummus removal and flattening of the location) and excavation works
- Transport and disposal of Surplus excavated material.
- Construction of the structure of the WWTP (civil work, use of heavy machinery and vehicles.
- Disposal of Construction waste
- Installation of the equipment.

End