



## 12. Introduction to Secondary Treatment

- While preliminary and primary treatment processes are designed primarily to remove solids from wastewater, secondary treatment is for the removal of organics.
- Secondary treatment involves:
  - biological conversion of the dissolved and suspended organics in wastewater into biomass, and
  - physical settling (separation) process where the solids including the biomass formed during secondary treatment is separated and removed from the treated wastewater.
- With the removal of gross solids in the preliminary treatment followed by removal of settleable solids in the primary clarifiers and the removal of dissolved and suspended organics in the secondary treatment processes, the wastewater is considered treated.
- Secondary treated wastewater is typically disposed or treated further for reuse or disposal (depending upon the end use/application and the NPDES permit stipulations).
- The solids (biomass) removed from the secondary treatment is typically mixed with the solids from primary treatment and stabilized using a solids treatment process like sludge digestion prior to its disposal.

Secondary treatment process incorporates one of the following three approaches:

### 12.1 Fixed film system

- Here the microorganisms responsible for the treatment, grow on substrates such as rocks, sand or plastic.
- When the wastewater is spread over the substrate, the microorganisms up-take the organics present in the wastewater
- Example of this secondary treatment process include trickling filters and rotating biological contactors

### 12.2 Suspended Growth System

- In this type of secondary treatment, the microbes are suspended in the wastewater flow being treated.

- Air or oxygen is supplied to maintain an aerobic environment and to keep the microorganisms in suspension.
- Example of this secondary treatment approach include the activated sludge treatment process

### **12.3 Pond System**

Similar to the suspended growth, stabilization ponds are large man made bodies of water which treat wastewater using mainly natural processes including sunlight, algae and microorganisms.