

DEFINITIONS – WASTEWATER TREATMENT PLANT

Activated Sludge Process- A biological wastewater treatment process which speeds up the decomposition of wastes in the wastewater being treated. Activated sludge is added to the wastewater and the mixture (mixed liquor) is aerated and agitated. After some time in the aeration tank, the activated sludge is allowed to settle out by sedimentation and is disposed or (wasted) or reused (returned to the aeration tank) as needed. The remaining wastewater then undergoes more treatment.

Algae- Microscopic plants which contain chlorophyll and live, floating or suspended in water. They also may be attached to rocks or other submerged surfaces. Algae produce oxygen during sunlight hours and use oxygen during night hours. Their biological activity appreciably affect the pH, alkalinity, and dissolved oxygen in the water.

Ammonia-Nitrogen as Nitrogen (NH₃-N)- Ammonia-nitrogen is an inorganic, dissolved form of nitrogen that can be found in water and is the preferred form for algae and plant growth. Ammonia is the most reduced form of nitrogen and is found in water where dissolved oxygen is lacking. When dissolved oxygen is readily available, bacteria quickly oxidize ammonia to nitrate through a process known as nitrification.

Anaerobic- A condition in which atmospheric (free) or dissolved oxygen is not present in the water environment.

Anaerobic Bacteria- Bacteria that live and reproduce in an environment containing no free or dissolved oxygen. Anaerobic bacteria obtain their oxygen supply by breaking down chemical compounds which contain oxygen, such as sulfate (SO₄).

Anaerobic Digestion- Wastewater solids and water (about 5% solids, 95% water) are placed in a large tank where bacteria decompose the solids in the absence of dissolved oxygen. At least two general groups of bacteria act in balance: 1. Saprophytic bacteria (acid fermenters) break down complex solids to volatile solids, the most common of which are acetic and propionic acids: 2. Methane fermenters break down the acids to methane, carbon dioxide, and water.

Bacteria- Microscopic living organisms, which usually consist of a single cell, use organic matter for their food and produce waste products as the result of their life processes.

Biochemical Oxygen Demand (BOD)- The rate at which organisms use the oxygen in water or wastewater while stabilizing decomposable organic matter under aerobic conditions. In decomposition, organic matter serves as food for the bacteria and energy results from its oxidation. BOD measurements are used as a measure of the organic strength of wastes in water.

Biochemical Oxygen Demand Test (BOD Test)- A procedure that measures the rate of oxygen use under controlled conditions of time and temperature. Standard test conditions include dark incubation at 20 degrees Centigrade for a specified time, usually five days.

Biosolids- A primarily organic solid product, produced by wastewater treatment processes, that can be beneficially recycled. The word biosolids is replacing the word sludge.

Clarifier- Settling tank. Sedimentation basin. A tank or basin in which wastewater is held for a period of time during which the heavier solids settle to the bottom and the lighter materials float to the water surface.

Combined Sewer Overflow (CSO)- Combined sewers carry both sanitary waste and stormwater drainage. CSO's are outlets that dump excess water (usually during rain/storm events) from sewers into streams and rivers, keeping the sewers from backing up into homes and businesses.

Design Average Flow (DAF)- Design average flow is the average of the daily flow volumes anticipated to be received at the wastewater treatment plant over a continuous twelve (12) month period. The design average flow is generally used for mass loading of treatment units.

Detention Time- The time required to fill a tank at a given flow or the theoretical time for a given flow of wastewater to pass through a tank.

Dewater- 1. To remove or separate a portion of the water present in a sludge or slurry. To dry sludge so it can be handled and disposed of. 2. To remove or drain the water from a tank.

Digester- A tank in which sludge is placed to allow decomposition by microorganisms. Digestion may occur under anaerobic or aerobic conditions.

Dissolved Oxygen (DO)- Molecular (atmospheric) oxygen dissolved in water or wastewater.

Distributor- The rotating mechanism that distributes the wastewater evenly over the surface of a trickling filter or other process unit.

Effluent- Wastewater or other liquid, untreated, partially or completely treated, flowing from a reservoir, basin, treatment process, or treatment plant.

Fixed-Film Process- The biological treatment process in which the microorganisms responsible for the conversion of organic matter in wastewater to gases and cell tissue are attached to some inert media, such as rocks, slag, or synthetic media. Fixed-film process includes trickling filters and rotating biological contactors but excludes sand filters.

Fixed (Spray) Nozzle- Cone-shaped spray nozzle used to distribute wastewater over the filter media. A deflector is mounted within the cone to spread the flow of wastewater through the cone, thus causing a spraying action.

Fungi- Small non-chlorophyll-bearing plants which lack roots, stems, or leaves, and which occur in wastewater growing best in the absence of light. In some wastewater treatment processes fungi are helpful and in others they are detrimental.

Grit- The heavy material in wastewater, such as sand, eggshells, gravel, and cinders.

IEPA- Illinois Environmental Protection Agency

Influent- Wastewater (or other liquid), raw or partially treated, flowing into a reservoir, basin, treatment process, or treatment plant.

Milligrams Per Liter (mg/L)- A measure of the concentration by weight of a substance per unit volume. One mg/L of a substance in water is equal to one part per million parts (ppm). A liter of water with a specific gravity of 1.0 weighs one million milligrams. If it contains 5 milligrams of dissolved oxygen, the concentration is 5 milligrams per 1,000,000 milligrams, or 5 milligrams per liter (5 mg/L or 5 ppm).

MGD- Million gallons per day

NPDES Permit- National Pollutant Discharge Elimination System permit is the regulatory agency document issued by either a federal or state agency which is designed to control all discharges of potential pollutants from point sources and storm water runoff into U.S. waterways. NPDES permits regulate discharges into navigable waters from all point sources of pollution, including industries, municipal wastewater treatment plants, sanitary landfills, large agricultural feedlots and return irrigation flows.

pH- (pronounced as separate letters)- pH is an expression of the intensity of the basic or acidic condition of a liquid. Mathematically, pH is the logarithm (base 10) of the reciprocal of the hydrogen ion activity.
$$\text{pH} = \text{Log} \frac{1}{[\text{H}^+]}$$

Primary Treatment- A wastewater treatment process that takes place in a rectangular or circular tank and allows those substances in wastewater that readily settle or float to be separated from the water being treated, a physical process.

Protozoa- A group of motile microscopic organisms (usually single-celled and aerobic) that sometimes cluster into colonies and generally consume bacteria as an energy source.

Recirculation- The return of part of the effluent from a treatment process to the incoming flow.

Screen- A device used to retain or remove suspended or floating objects in the wastewater. The screen has uniform openings in size and retains or removes objects larger than the openings. A screen may consist of bars, rods, wires, gratings, wire mesh, or perforated plates.

Secondary Treatment- A wastewater treatment process used to convert dissolved or suspended materials into a form more readily separated from the water being treated. This process usually follows primary treatment. Secondary treatment is a biological treatment process followed by secondary clarifiers that allow the solids to settle out from the water being treated.

Settleable Solids- Suspended solids which will subside in quiescent wastewater, or other liquid in a reasonable period of time.

Slime Growths- A complex population of organisms that form on the trickling filter media and break down the organic matter in wastewater. These slimes consist of living organisms feeding on the wastes in the wastewater, dead organisms, silt, and other debris.

Sloughings- Trickling filter slimes that have been washed off the filter media.

Sludge- The settleable solids separated from liquids during processing.

Sludge Digestion- The process of changing organic matter in sludge into a gas or a liquid or a more stable solid form. These changes take place as microorganisms feed on sludge in anaerobic or aerobic digesters.

Total Solids- All solids in wastewater or sludge, includes suspended, settleable, and nonsettleable solids

Total Suspended Solids (TSS)- Solids that either float on the surface or are suspended in water, wastewater, or other liquids, and which are largely removable by laboratory filtering. The quantity of material removed from wastewater in a laboratory test.

Trickling Filter- A treatment process in which wastewater trickles over media that provide the opportunity for the formation of slimes or biomass which contain organisms that feed upon and remove wastes from the water being treated.

USEPA- United States Environmental Protection Agency

Volatile Solids- Solids in water, wastewater, or other liquids, that are lost on ignition of the dry solids at 550 degrees Centigrade.

Wastewater- A community's used water and water-carried solids that flow to a treatment plant. Stormwater, surface water, and groundwater infiltration also may be included in the wastewater that enters a wastewater treatment plant. Normal wastewater is 99.9% water and 0.1% solids.

Wet Well- A compartment or tank in which wastewater is collected. The suction pipe of a pump may be connected to the wet well or a submersible pump may be located in the wet well.