Wastewater Treatment System General Description

Wastewater treatment systems are available with appropriate treatment technologies designed to meet any water quality standards. To gain a better understanding of how a typical activated sludge treatment process operates, please refer to Figure 1.   The following glossary of terms is provided :

- Activated sludge – A treatment process consisting of a holding tank and air supply piping designed to promote the growth of micro-organisms that breakdown raw wastewater biologically. Settled biomass in the clarifier is returned to the aeration basin and re-aerated where ongoing utilization of raw sewage provides a food source for these organisms. The result is a stabilized discharge of clear water, separated from biomass.
- Biomass – A mixture of bacteria, higher life forms and organics. The biomass stabilizes raw sewage biologically
- BOD – Biochemical Oxygen Demand – The level of oxygen demand exerted on a wastewater stream indicating the level of biodegradable organics present. The BOD test is used to indicated degree of wastewater strength.
- Clarifier – A settling tank designed to provide time for biomass to settle and separate from free water. Settled biomass is returned to the aeration basin and the clear water is discharged.
- Effluent – The flow leaving a process, typically referred to as the treated wastewater
- Infiltration basin – An excavation designed to accept and percolate treated wastewater into the ground. Infiltration of treated water allows further treatment and dispersion.
- Influent – the incoming flow from an up-stream process to a receiving process, typically referred to incoming raw wastewater
- Moving Bed Bio-reactor (MBBR) – An activated sludge treatment system containing additional treatment capability by the use of synthetic media (plastic cylinders or other shapes) designed to provide additional surface area on which biomass can attach and grow. Media is suspended in the aeration tank by aeration.
- Secondary Treatment – Wastewater treatment utilizing on biological processes
- Tertiary Treatment – Wastewater treatment utilizing additional processes following biological treatment, such as filtration or chemical addition to enhance treatment
- Waste Sludge – Excess biomass and stabilized solids removed from the treatment system and trucked to an approved disposal site.

Raw wastewater contains carbon-based organics, nitrogen, and phosphorus in several forms. If these constituents are not reduced or removed by treatment they will impose significant deleterious impact on the environment. Treatment using activated sludge processes is by far the most accepted and reliable method for removing organics and

nutrients. The activated process was developed approximately one hundred years ago and because of the reliability as a treatment process it is still in use today. Enhancements, such as adding synthetic media (MBBR) have improved the process performance and further improved water quality being discharged. The typical activated sludge process (refer to Figure1) consists of a plant headworks where debris and grit are removed from the waste stream prior to treatment. Incoming flow (influent) is contained in a flow equalization tank, allowing a consistent rate of flow to down stream processes. Flow from the equalization tank enters the aeration basin(s) in which the biomass breaks down organics and converts nitrogen compounds. The biomass then flows into the settling tank or clarifier where the biomass and clear water are separated. The clarified water flows to additional treatment process or can be discharged directly into an infiltration basin where it percolates into the ground. The biomass population continues to expand, and at some point, a portion of the biomass is removed or wasted from the process. This waste sludge is contained in a holding tank and periodically removed by a pump and haul service to be disposed of at a permitted facility. Process control testing by a qualified wastewater operator ensures that the treatment process performs reliably and produces acceptable water quality.

Figure 1

TYPICAL WASTEWATER TREATMENT SYSTEM LAYOUT