

TREATMENT PROCESS

SECONDARY TREATMENT

TRICKLING FILTERS

BIOLOGICAL TREATMENT (FIXED-FILM PROCESS)

After wastewater is treated in the primary clarifiers, it flows to trickling filters. The word trickling “filter” is misleading because there is no straining or filtering action. Actually, a trickling filter is a process that brings wastewater into contact with slime (biological) growths (bacteria, protozoa, algae, fungi, worms, and insect larvae). The slime growths utilize the nonsettleable and dissolved solids in the wastewater for food, and in the process, converts those solids to settleable solids.

A trickling filter consists of three main parts; filter media, distributors, and the underdrain system. The media is stone in the wastewater treatment plant’s filters, however synthetic media is available. The stones are 1” or 4” in diameter and approximately 6’ deep in the trickling filters. The stone media provide surface area for the slime growths (gelatinous mass) to attach and provide voids for air to move through the filter supplying oxygen to the biological growths. The distributors provide a mechanism for “trickling” the wastewater over the rock media, and can be fixed nozzles or circular distributor arms. One fixed nozzle filter and four circular trickling filters are located at the wastewater treatment plant. The fixed nozzle filter consists of 1” diameter stone media and the circular filters utilize 4” media. In both types of filters the wastewater is discharged or dosed to the media. A large dosing tank fills with wastewater and is then discharged to the media. This provides periodic application of wastewater to the filter bed media. The dosing tank mechanism works by a siphon. The circular trickling filter distributor arms distribute wastewater over the entire filter and rotate by the propulsion of the water exiting the distributor arms, thus providing intermittent discharge to the filter bed media.

As the wastewater passes through the filter bed media surface, the slime growth thickens from the utilization of food in the wastewater. Eventually, some of the growth will “slough off” the media, become a settleable solid, and be washed through the media with the wastewater into the underdrain system. The underdrain system assists in providing ventilation (oxygen) to the gelatinous mass on the stone media. The underdrain system takes the wastewater/settleable solids mixture to an intermediate or final clarifier.

The intermediate or final clarifier tanks provide detention time for the “sloughings” (sludge) to settle to the bottom of the tank. Slow moving ploughs collect and direct the sludge to a center sump. This sludge, known as secondary sludge, is pumped back to the head of the plant where it settles in the primary clarifiers, and is then pumped with primary sludge to anaerobic digesters. Removal efficiencies of the trickling filters and intermediate/final clarifiers are BOD- 50-80%, NH₃-N (ammonia nitrogen as nitrogen) 60-80%, and TSS 40-60%.

