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High Performance Multicellular Aerated Treatment System

(HP-MATS)

AquaTec's High Performance Multicellular Aerated Treatment System (HP-MATS) is less costly to build, operate and maintain than traditional activated sludge treatment systems which are plagued by the need for skilled operators, periodic odors, and the production of vast amounts of sludge, in addition to being subject to costly upgrades. Our HP-MATS will not only save you money but the main aeration equipment in the system requires no maintenance and is completely warranted for three years. If desired, the valuable, bacteriologically-cleaned, nutrient rich, odor-free liquid from the system can be 100% recycled for irrigation.

For secondary treatment of domestic wastewater several functions are required to accomplish treatment which are:

1. Bioconversion of the influent biodegradable carbon to biomass
2. Flocculation of the biomass
3. Solids separation
4. Solids stabilization
5. Sludge Storage

These functions are much easier to optimize when the system consists of at least two (2) or more aerated basins – a reactor basin to accommodate bioconversion and flocculation, followed by a settling basin(s) dedicated to sedimentation, solids stabilization and sludge storage. The solids in the reactor basin (cell 1) are kept in complete suspension, whereas in the settling basin(s) the aeration intensity applied is under the threshold value for the suspension of settable solids. To minimize algal growth, the settling basin(s) have a limited hydraulic retention time and are divided into several cells in series. This secondary treatment system is generally proceeded by a screen to remove gross solids and is usually followed by a disinfection system.

The combination of an aerated reactor basin and an aerated, multicellular settling basins as described above is referred to as a High-Performance Multicellular Aerated Treatment System. The name derives from the system's high performance with respect to effluent $CBOD_5$ and TSS which are usually in the expected range of 20 to 30 mg/l. Because of its multi-cellular configuration and the fact that aeration is applied both in the reactor basin (cell 1) and settling basin(s), this system has also been identified in the literature as a Dual-Power, Multicellular (DPMC) system.

In a small system, all basins will be combined in a single basin with polyester, floating curtain walls separating the reactor portion from the settling portion as well as the individual cells of the latter. Window cutouts in the curtains allow flow from one cell to the next. Separation of the basins makes the system easily modifiable for upgrading to include nitrification and nutrient removable as effluent objectives may change in the future.

High-Performance Multicellular Aerated Systems have been installed for over a decade. Many such systems are operating successfully in the southeastern United States and the west coast. The system incorporates benthalic stabilization of settle sludges in the settling basins. During benthalic stabilization much of the carbon in the biodegradable fraction of the sludge solids is discharged to the atmosphere as odorless methane gas. Benthal stabilization, therefore, is much more economical than aerobic digestion.

The settling basins are designed for solids sedimentation, solids stabilization and sludge storage. Since the requirements for solids stabilization and sludge storage result in air-water surface areas that greatly exceed any minimum value for adequate sedimentation, sedimentation requirements are generally ignored in the design. It is very important that the settling basins be aerated. First, aeration maintains an aerobic water column and an aerobic layer at the top of the sludge deposit, which, intern, minimizes feedback of reduced compounds from the sludge to the water column, eliminates odors, and reduces the resuspension of bottom solids. Secondly, aeration provides mixing, thus reducing the dead spaces within the upper areas of the cells where algae can become established and flourish. Thirdly, aeration exhausts to the atmosphere large quantities of respiratory carbon dioxide that accumulates in the basin during the night hours so that it is not available for algal growth during the daylight hours. Aeration, however, must be at intensities low enough to allow the settable solids to settle.

Solids stabilization and sludge storage requirements compete against hydraulic retention time limits and these conflicts are relieved by incorporating features that provide for retention time flexibility into the design.

As sludge accumulates at the bottom of the settling basins, a point in time will be reached when the volume of water above the sludge will reach the critical value where the aeration power intensity will exceed its design limit. When this occurs, there will be some settable suspended solids appearing in the effluent from the basin. Therefore, by monitoring the performance of the last settling basin this will provide a practical clue as to when the basin is operating at its maximum sludge depth and should have its sludge removed. We estimate and experience has shown that sludge removal should occur in the twelfth year of operation based on kinetic calculations for domestic wastewater systems. This infrequent sludge removal occurs because the settled sludge is being stabilized in the existing settling basins which is of great value in reducing the overall total operating and maintenance cost of this highly efficient and low maintenance biological treatment system.

ADVANTAGES OF THE HP-MATS

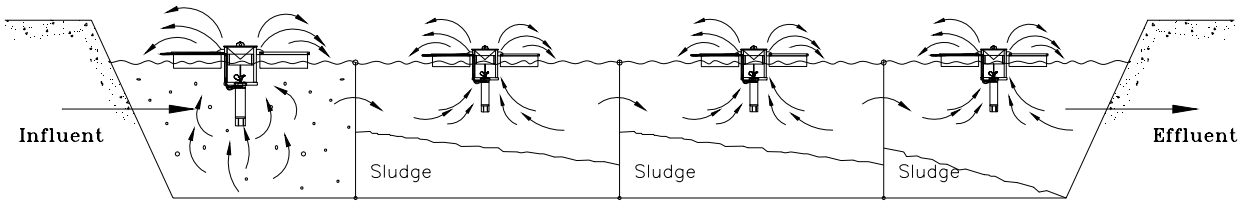
Less Capital Cost to Build

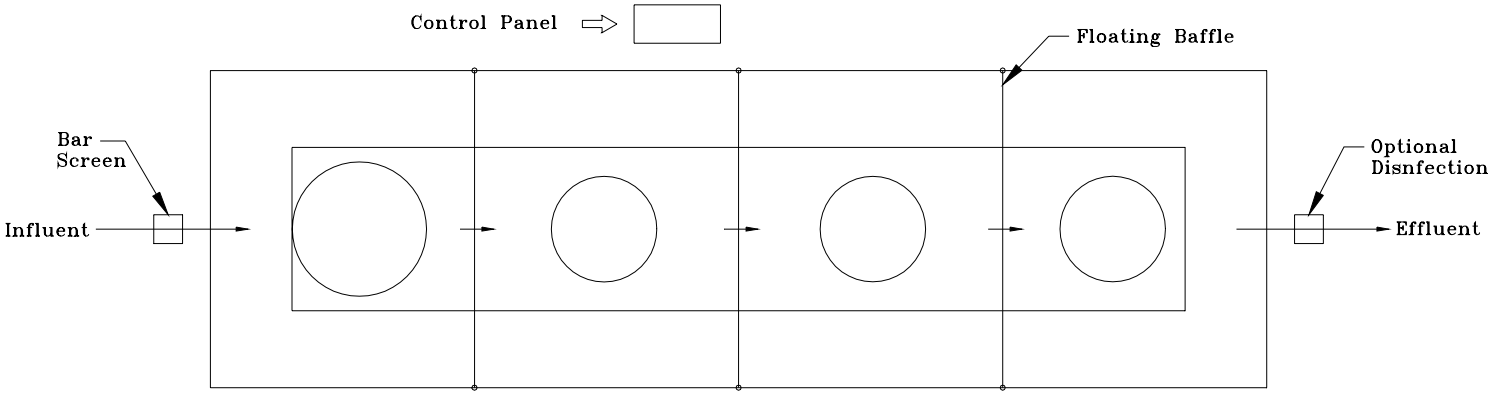
Far Less Costly to Operate and Maintain

No Frequent Sludge Disposal Required

No Odors to Offend the Neighbors

Opportunity for No-cost, nutrient rich irrigation water





PLAN VIEW