



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

SUCCESS STORIES

PLANT NAME AND LOCATION

CASEYVILLE TOWNSHIP EAST WWTP - O'FALLON, IL

DESIGN DAILY FLOW / PEAK FLOW

2.2 MGD (8316 M³/DAY) / 6.33 MGD (23927 M³/DAY)

AQUA-AEROBIC SOLUTION

4-BASIN AquaSBR® SYSTEM, (3) AquaDisk® FILTERS (12-DISK)

CASEYVILLE WWTP EXPANDED WITH AN AquaSBR® SYSTEM AND AquaDisk® FILTERS TO ACCOMODATE RAPID COMMUNITY GROWTH

The Caseyville wastewater plant started its service in 1968 with a traditional flow through activated sludge system (extended aeration). Since that time several expansions and upgrades have been completed to accommodate the community's rapid growth. The latest expansion took place in 2008 and adopted the AquaSBR® sequencing batch reactor (SBR) and AquaDisk® cloth media filter technology to handle an average design flow of 2.2 MGD. The SBR process is operated in parallel with the existing extended aeration process. The primary treatment focus of the whole plant is on the removal of ammonia nitrogen, and total suspended solids (TSS).

The AquaSBR system was originally selected for its relatively small footprint in comparison to the other competing technologies (oxidation ditch, extended aeration, etc.), but other valuable features were soon realized by the plant operators from both process and mechanical perspectives. The AquaSBR system processed 120% of the maximum design flow within two months of start-up while still meeting permit. Although not required in the current effluent discharging permit, the AquaSBR system also provides better phosphorus removal in comparison to the parallel extended aeration system. The SBR system is achieving less than 1 mg/L Total Phosphorus without chemical addition, while the extended aeration plant uses alum addition to achieve 2-3 mg/L Total Phosphorus.



One of the four AquaSBR® basins in operation.

The AquaDisk cloth media filters allow higher hydraulic and solids loading rates than conventional granular media, resulting in a smaller footprint. For Caseyville, the advantage of land space savings from Aqua-Aerobic technologies was fully exploited. Together with its consistent operational performance, the plant superintendent Joe Hogg stated "*We are very satisfied with the AquaSBR and AquaDisk filter operations and results. The systems are doing an excellent job. If I had to do it all over again I would*".

AquaSBR® SYSTEM PROCESS

The AquaSBR system operates on a simple concept of introducing a quantity of waste to a reactor, treating the waste in an adequate time period, and subsequently discharging a volume of effluent plus waste sludge that is equal to the original volume of waste introduced to the reactor. This "Fill and Draw" principle of operation involves the basic steps of Fill, React, Settle, Decant, and Sludge Waste. The system may be designed to include seven individual phases of operation but the inclusion or duration of any individual phase is based upon specific waste characteristics and effluent objectives.

Where nutrient removal is required, a simple adjustment to the SBR's operating strategies permits nitrification, denitrification, and biological phosphorus removal. Optimum performance is attained when two or more reactors are utilized in a predetermined sequence of operation.

AquaDisk® FILTER PROCESS

Clarified effluent from the AquaSBR system enters the filter and flows by gravity through the cloth media of the stationary hollow disks. The filtrate exits through the hollow shaft which supports the individual disks and flows to the effluent channel. As solids accumulate on the surface of the media, the water level surrounding the disks rises. Once a predetermined level is reached, the disks rotate and the media surface is automatically vacuum backwashed clean. Heavier solids settle to the bottom of the tank and are then pumped to a digester or to the plant headworks.

DESIGN CHARACTERISTICS

The upgraded AquaSBR system allows the plant to meet its effluent requirements for ammonia, and produces low total nitrogen and total phosphorus, although it is not a permit requirement. The 4-basin cycle structure facilitates direct decant

to the AquaDisk filters without the need for a post equalization basin.

The AquaDisk filters provide low effluent TSS levels with the benefit of a small footprint.



Two of the three AquaDisk® filters are shown.

AVERAGE OPERATING DATA (Jan-June 2011)

LOADING	DESIGN INFLUENT	AVG INFLUENT	PERMIT EFFLUENT	AVG EFFLUENT*
Avg Flow mgd	2.20	2.32	----	----
Peak Flow mgd	6.33	6.10	----	----
BOD ₅ mg/l	264	162.5	10	2.56
TSS mg/l	300	163.4	12	2.71
TN mg/l	----	----	----	8.73
NH ₃ -N mg/l	35	----	1	0.06
Total P mg/l	8	----	1	< 1

*Represents AquaSBR system effluent only.

The AquaSBR system is designed for future total nitrogen and total phosphorus. It is currently achieving less than 10 mg/l and less than 1mg/l, but is not a permit requirement.

AquaSBR® SYSTEM ADVANTAGES

- Tolerates variable hydraulic loads
- Tolerates variable organic loads
- Controls filamentous growth
- Provides quiescent settling
- Separation of aeration and mixing
- Lower installation costs
- Return activated sludge pumping eliminated
- Small footprint
- Simple to expand or upgrade
- One company accountability

AquaDisk® FILTER ADVANTAGES

- Consistent, high quality effluent
- Lower backwash rates
- Tolerates extreme variations in loads
- Reuse quality effluent
- Continuous filtration during backwash
- Minimal operator attention
- Minimal maintenance
- Small footprint
- Eliminates sand media and underdrains