



AQUA-AEROBIC SYSTEMS, INC.

SUCCESS STORIES

PLANT NAME AND LOCATION

SILVER SPRING TOWNSHIP AUTHORITY WWTP - MECHANICSBURG, PA

DESIGN DAILY FLOW / PEAK FLOW

1.2 MGD (4543 m³/day) / 2.7 MGD (10,221 m³/day)

AQUA-AEROBIC SOLUTION

3-basin AquaSBR[®] System, 2 AquaDisk[®] Filters (6-disk)

SILVER SPRING CHOSE AQUA-AEROBIC TECHNOLOGIES FOR NITROGEN REMOVAL CAPABILITIES AND REDUCED CAPITAL COSTS

Silver Spring Township Authority's wastewater treatment facility, located in Mechanicsburg, Pennsylvania, has been in operation since August 1990. The plant initially utilized an intermittent cycle extended aeration system but was in need of an upgrade after 18 years because the existing system could not provide sufficient Total Nitrogen removal.

Silver Spring, along with their engineer, Pennoni Associates researched other technologies for the upgrade including a membrane bioreactor, and an aerobic/anoxic reactor with clarification. Ultimately, they chose a 3-basin AquaSBR[®] sequencing batch reactor system and (2) AquaDisk[®] cloth media filters. Preference for the AquaSBR system was due to its ample Total Nitrogen removal capabilities, derived from its anoxic mixing method. Also, overall cost of the

system was lower due to the type and depth of tankage required for the new plant layout.



The two AquaDisk[®] filters are housed inside a building.



Rick Billman, Superintendent, stands beside one of the three AquaSBR[®] basins.

Start-up of the AquaSBR system with AquaDisk cloth media filters began in April 2009. Silver Spring Township Authority currently serves a population of 1500 residential connections and 135 commercial customers. The Aqua-Aerobic treatment technologies have thus far exceeded the plant's performance expectations, especially in regard to Total Nitrogen Removal.

The facility has plans to install a fourth AquaSBR basin when necessary, which will increase the average design daily flow to 1.6 MGD.

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

Silver Spring Township Authority’s AquaSBR system with AquaDisk filters were designed with treatment objectives of: nitrification, denitrification, and phosphorus removal. Although the plant doesn’t require chemical addition to improve its effluent quality, it adds Aluminum Sulphate to the batch reactors to aid in additional PO₄ removal.

Jim Stevens, Authority Manager says, “The AquaSBR system has exceeded our expectations with regard to Total Nitrogen removal, and the components are robust and easily maintained. Aqua-Aerobic has provided customer support for us since start-up”.

AVERAGE OPERATING DATA

LOADING	DESIGN INFLUENT	AVG INFLUENT	DESIGN EFFLUENT	AVG EFFLUENT
AVG Flow mgd	1.2	0.54	----	----
Peak Flow mgd	2.7	0.65	----	----
BOD mg/l	400	388	10	2.0
TSS mg/l	240	389	10	1.4
Total N mg/l	62	----	6	3.4
NH ₃ -N mg/l	----	43	2	0.3
Total P mg/l	10	8.3	1	0.5

Total Nitrogen effluent levels have decreased to approximately 3 mg/l. Effluent Total Suspended Solids are typically 1 mg/l.

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® CLOTH MEDIA 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