In the early 1990s, the consulting firm of Buchart-Horn, Inc. was hired by the Washington County Sanitary District to provide design bidding and construction phase services for the town of Smithsburg. The Smithsburg Wastewater Treatment Plant (WWTP) was in need of upgrading and expansion because it was out of compliance.

Originally, the County wanted to expand the existing 0.2 mgd extended air treatment system but Buchart-Horn felt an AquaSBR® sequencing batch reactor (SBR) followed by AquaDisk® cloth media filters would be more cost-effective. Buchart-Horn’s new plant design consisted of a new control building, a submersible influent pumping station utilizing chopper pumps for raw sewage grinding, two (2) AquaSBR basins, an effluent equalization basin, two (2) AquaDisk filter units, and an effluent channel with UV disinfection.

The new plant was designed to facilitate future expansion. The SBR system can be expanded from 0.33 MGD to 0.5 MGD by the addition of a third SBR reactor. Also, the capacity of the AquaDisk filters can be increased to a peak flow of 1.5 MGD by adding a third filter unit.

The original extended air treatment tanks were converted to effluent equalization and biosolids holding tanks. A new operations facility was constructed over these tanks to house the AquaDisk filters and rotary thickener. Control of the odors from the influent pumping station and biosolids processing area is provided by means of a biofilter.

Construction of the new plant began in October 1993 and Smithsburg’s new wastewater treatment system went into operation in the spring of 1995.
**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 plant’s average design daily flow is 0.33 mgd with a design peak flow of 1.0 mgd. The two (2-disk) AquaDisk filters can handle a flow capacity up to 1.0 mgd.

The filter units reduce TSS and NTU to required levels and pre-filter the effluent prior to UV treatment.

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**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

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**CURRENT PROCESS FLOW**