

# SUCCESS STORIES

AQUA-AEROBIC SYSTEMS, INC.



FROM PRETREATMENT... TO REUSE

**PLANT NAME/LOCATION:** Fountain Hills Sanitary District WWTP/Fountain Hills, Arizona

**TYPE OF PLANT:** Municipal/Domestic

**DESIGN DAILY FLOW:** 3.2 MGD (12,113 m<sup>3</sup>/day) **PEAK FLOW:** 8.4 MGD (31,798 m<sup>3</sup>/day)

**AQUA-AEROBIC PRODUCTS:** (3) 6-disk AquaDisk<sup>®</sup> Filters, (1) MixAir<sup>®</sup> System, and (4) AquaDDM<sup>®</sup> Mixers

## FOUNTAIN HILLS COMBINES CLOTH MEDIA FILTRATION WITH MEMBRANE SYSTEM TO GET REUSE QUALITY EFFLUENT AT AN ECONOMICAL COST!

The Fountain Hills Sanitary District WWTP was first constructed in Fountain Hills, Arizona in 1974 and received an aggressive upgrade in November of 1999. The plant was in need of an upgrade because the original treatment equipment had reached the end of its life expectancy, and the tremendous growth and changing environmental regulations called for it. Fountain Hills' secondary and tertiary treatment processes all required expansion or retrofit. The upgrade included the replacement of 16 submersible mixers with 4 AquaDDM<sup>®</sup> direct-drive mixers in the plant's two anoxic basins and the use of a MixAir<sup>®</sup> system in the 2 aerobic digesters. The two aeration basins, which made up the plant's secondary treatment process, continue to be utilized. In order to produce reuse quality effluent for the growing community and meet more stringent environmental regulations at an economical cost, Fountain Hills opted to also upgrade the tertiary process by combining two state-of-the-art filtration systems. This filtration combination consists of 3 AquaDisk<sup>®</sup> cloth media filters and a Pall Microza<sup>®</sup> hollow-fiber microfiltration membrane system (see photo to the left).



Fountain Hills' new wastewater treatment facility was up and running in February 2001. The new system produces effluent quality far exceeding conventional methods, and with a low life cycle cost.

The reclaimed effluent produced by the AquaDisk cloth media filters is used for park and golf course irrigation, and to fill Fountain Lake, which exhibits the highest fountain in the USA. A portion of the filters' effluent is also distributed to the membrane system to produce microfiltered effluent for injection into deep wells for ground water recharge. This allows 2.0 MGD of water to be stored when the demand for water is low (i.e. winter) and have it available when the demand is high (i.e. summer).



Internal view of one of the AquaDisk Filter units.



PRODUCTS

**Aqua-Jet®**  
Surface Aerator

**Aqua-Jet II®**  
Contained Flow Aerator

**AquaABF®**  
Automatic Backwash Filter

**MixAir®**  
Aeration System

**AquaDDM®**  
Direct Drive Mixer-Blender

**AquaSBR®**  
Sequencing Batch Reactor

**AquaDisk®**  
Cloth-Media Filter

**AquaDiamond™**  
Cloth-Media Filter

**AquaDrum™**  
Cloth-Media Filter

**ThermoFlo®**  
Spray Cooler

**Aqua EnduraDisc®**  
Fine Bubble Diffuser

**Aqua EnduraTube™**  
Fine Bubble Diffuser

**Aqua CB-12™**  
Coarse Bubble Diffuser

**Aqua CB-24®**  
Coarse Bubble Diffuser

**AquaMB Process™**  
Multiple-Barrier Membrane System

**MSBR®**  
Modified Sequencing Batch Reactor

SERVICES

Process and Mechanical Engineering

Quality Manufacturing

Aftermarket Sales & Service

International Expertise

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FILTRATION PROCESS

Following biological treatment, including nitrogen removal, the wastewater travels to the secondary clarifiers before entering (3) 6-disk concrete AquaDisk® filters. The operation of the filters can be described as follows.

Clarified effluent flows by gravity through the cloth media of the stationary hollow disks and filtrate exits through the hollow center collection tube.



AquaDisk Filter Operation

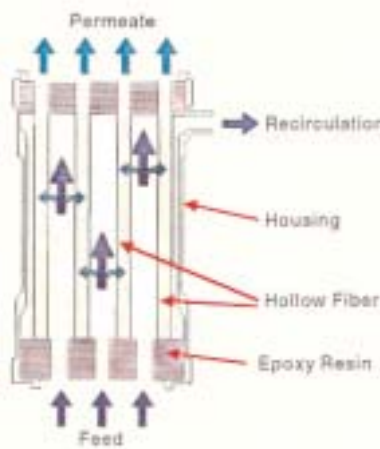
As solids accumulate on the surface of the media, the water level rises. Once a predetermined level is reached, a backwash cleaning mode is automatically initiated. Backwash waste and settled solids are pumped to a digester or plant headworks.

Chlorinated effluent intended for park and golf course irrigation is discharged directly to the end users. Effluent destined for groundwater injection is pumped to the hollow-fiber membrane system.

The membrane system reduces the potential clogging of underground injection equipment while providing a positive barrier for the removal of parasites from the reuse stream, thereby helping to insure public safety.

The microfiltration membrane system consists of free-standing racks of membrane modules, which are floor-mounted for easy access. Each module contains thousands of membrane fibers made of PVDF for strength and durability. Feed is pumped to the membranes, filtering from the outside to the inside of the fibers.

Filtered water, or permeate, is collected inside the fiber tube and discharged. Cleaning of the membrane surface is provided through agitation of the fibers and the rinsing action of the cross-flow, as well as brief periods of air scrubbing and flow reversal.



Periodically, a chemical solution is circulated through the membrane modules to remove solids built up over time.

DESIGN CHARACTERISTICS

Each of the AquaDisk filters has a capacity of 6 disks. However, only 4 disks were initially installed to meet current flow conditions. Simply installing the additional disks will increase capacity up to 3.0 MGD.

Generally, only a portion of the total plant flow requires advanced filtration with membranes. Because of the reuse quality effluent provided by the AquaDisk filters, capital and operating costs were reduced by downsizing the microfiltration system.

Land restrictions resulted in the installation of the membrane system 1 to 2 miles from the main plant. Because of the high chemical resistance of the PVDF membrane fibers, effluent from the AquaDisk filters is first chlorinated before being pumped to the advanced treatment facility.

AVERAGE PERFORMANCE DATA

AquaDisk Filter/Membrane System

	TSS mg/l	NTU mg/l
Plant Influent	300	N/A
AquaDisk Effluent	< 3.0	< 1.25
Membrane Effluent	BDL	≤ .05

Wastewater Treatment Plant Operations Supervisor, Clark Moskop says, "We are very satisfied with the AquaDisk filter. It is a fine piece of equipment and it's been all we wanted and more."

ADVANTAGES OF AQUADISK FILTRATION WITH MEMBRANE SYSTEM:

- Cloth media filtration increases membrane flux rates and provides flexibility of discharge
- Economics - less membrane area
  - Lower operating costs
  - Lower membrane replacement costs
  - Lower capital costs

Clearly, the Fountain Hills Sanitary District takes pride in the operation and maintenance of their wastewater treatment plant. The plant incorporates state-of-the-art technology to meet high quality standards and innovation to conserve a precious resource. We congratulate the administration and staff on their commitment to excellence.