

UF/ NF

Municipal Drinking Plant:
Lake Michigan water treated through FiberFlex™
system then sent for distribution

APPLICATION: Municipal Drinking Water

CAPACITY: 6.75 MGD (UF), 5.17 MDG (NF)

LOCATION: Delaware, Ohio, USA

COMMISSIONED: 2014

CHALLENGE

The City of Delaware, Ohio, required a combined ultrafiltration and nanofiltration membrane treatment system to treat their combined groundwater and surface water sources. The City pumps water from multiple sources including the Olentangy River and multiple groundwater wells. The treatment process proposed by H₂O Innovation had to be flexible to accommodate a range of feed water quality.

Prior to facility design, H₂O Innovation teamed with Toray was pre-selected to supply the UF membrane treatment equipment.

The master plan for the overall treatment facility included a design that incorporates room for additional trains to meet the projected future demand of the City.

SOLUTION

H₂O Innovation delivered its flagship plant consisting of three ultrafiltration (UF) membrane trains and five nanofiltration (NF) trains.

The Olentangy River surface water source is characterized by having moderately high TOC with total suspended solids reaching upto 50 mg/L. To treat the surface water, feed to the three new UF trains is pretreated using coagulation, two-stage flocculation and sedimentation. After the UF, the surface water is then treated using the three new NF trains.

Backwash water that is generated from the UF membranes is collected and sent to backwash holding tanks. Equalized flow is then pumped to a backwash sludge lagoon where the concentrate is then sent to sewer.

Treated filtrate turbidity from the UF system is required to be less than 0.1 NTU, 95% of the time and a maximum of 0.15 NTU. The design recovery rate of the ultrafiltration system is 95%. Daily membrane integrity tests are also performed on the UF trains to meet the requirements of the US EPA Membrane Filtration Guidance Manual with LRV results greater than 4.0 log.



NF System in Delaware, OH



SOLUTION (continued)

The groundwater source which exhibited iron, manganese and hardness, required a different treatment process compared to the surface water supply. As such, greensand filtration precedes two NF trains. Treated permeate from the groundwater NF trains is then sent to degasifiers.

The treated surface water and groundwater streams are ultimately blended, followed by final disinfection with chlorination. The treated water is also injected with orthophosphate for corrosion control, fluoridation and pH adjustment using caustic. Water is stored in a 1 MGD treated water clearwell and from there it is then pumped using vertical turbine pumps to the City's distribution system.

RESULTS

By providing custom designed treatment processes for each raw water source, membrane fouling is kept to a minimal resulting in optimized plant operations. Water produced by the City of Delaware WTP is of superior quality that meets and exceeds the most stringent regulatory requirements. All sequences are fully automatic for easy operation.



UF System in Delaware, OH



City of Delaware, Ohio | UF System