

River Water Pilot

Project Background

A textile plant located in Huzhou City of China has been operating a 440 GPM (100 m³/hr) process water treatment plant with water drawn from a nearby river. The treatment process consists of coagulation, flocculation, clarification, sand filtration and carbon filtration followed by reverse osmosis as shown in the flow diagram below. Since its inception, the treatment plant has experienced a number of operating issues:

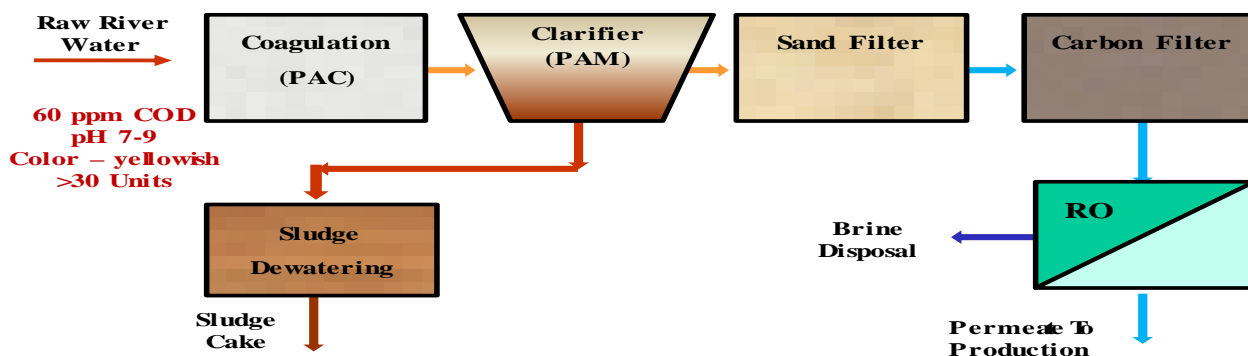
- High turbidity of pre-treated water fouling the RO membranes – SDI >10
- Frequent replacement of activated carbon upstream of the RO - Once per week
- Frequent chemical cleaning of RO membrane - Once every 10-15 days
- Frequent replacement of RO membranes - Once every 3-6 months

In an effort to overcome the operating problems as identified, Duraflow was contracted to perform a field pilot study in September 2010 to evaluate the feasibility of replacing the existing conventional RO pre-treatment process with tubular microfiltration which has a proven track record in reducing RO membrane fouling, providing stable RO performance and yielding high-quality water on a consistent basis.



Duraflow Microfilters

Existing Water Treatment Process



River Water Pilot

Pilot Test Description

The Duraflow pilot test unit consists of a polypropylene tank, a centrifugal re-circulation pump, and two (2) 3-foot membrane tubes with 0.14 M² (1.5 ft²) membrane area as the major components. Flow meter and pressure gauges are provided for measurement of key operating parameters. All the components are assembled on a portable stainless steel frame as shown in Figure 1 below. The chemically pre-treated river water sample is pumped at a high velocity through the membrane tubes. The turbulent flow, parallel to the membrane surface, produces a high-shear scrubbing action which minimizes deposition of solids on the membrane surface. During operation, clear filtrate (Figure 2) permeates through the membrane, while the suspended solids retained in the re-circulation loop are periodically purged to maintain a TSS concentration of 2% – 3% (wt).



Figure 1 - Duraflow Pilot Test Unit

Filtrate Sample Analysis (Selected Parameters)	
Color	<12 Units
COD	<19 ppm
Hardness	<31 ppm CaCO ₃
SiO ₂	<13 ppm
TSS	<3 ppm
NTU	<1.0
SDI	<3.0
pH	8.5 – 9.0

Figure 2 – Filtrate Sample



Throughout the test, the membrane flux stabilized at around 550 GFD (935 LMH) and the unit produced a filtrate quality meeting the RO feed specifications. The performance data suggested that the membrane based design, as illustrated in the following MF/RO treatment process diagram, could eliminate the carbon columns, extend RO membrane cleaning to once every 3 to 5 months and reduce membrane replacement frequency to >4 years.

MF / RO Water Treatment Process

