Case Study

Prefiltration (SDI reduction) for Reverse Osmosis Boiler Makeup Water System

Background

A major electrical utility in the Lake Charles Louisiana area required high quality water for boiler feed makeup water. A ground water pumping station provided 1,500-gpm water flow to a chemical treatment and solids clarification system. The decant water from the clarifier (SDI 6 to 8) collected in a lift tank where the water was pumped to two, parallel processing, carbon steel, pressure vessels filled with sand/anthracite media.

1,500 gpm of filtrate water at SDI <2 was required to feed a large Reverse Osmosis (RO) system, where the product water was to be used for boiler makeup water at the utility plant. Two problems were encountered with the multi-media filter system:

1) The design flux rate (gpm/ft2) could not be achieved without the DP increasing forcing frequent backwash cycles.

2) The filtrate SDI target for the RO feed water quality could not be achieved. Hence the RO equipment could not be operated at the design specifications to provide the 1,100 to 1,200 gpm of RO product water for the boiler.

Unable to operate the RO system due to the poor performance of the multimedia filter system, the utility plant engineer contacted a **ne**x**t** affiliate and arranged to conduct a pilot test of **ne**x**t-Sand.** After a 10 day pilot test, the utility opted to immediately replace their sand/anthracite filters with next-Sand.

The two pressure vessels were loaded with **ne**x**t-Sand** and went online in early 2002. The filters have been operating at the net 1,500 gpm design capacity for > 2 yrs, consistently producing a filtrate below the <2 SDI limit thus ensuring a reliable supply of water for the RO. Table I shows representative water quality data for the **ne**x**t-Sand** filter application.

> **What is SDI?**
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> SDI is Silt Density Index, a specialized test used to predict the fouling potential of feedwater for Reverse Osmosis systems. An SDI_{10} of 7 corresponds to a plugging factor of 70%. Low SDI values allow RO's to operate at higher efficiencies.

Table 1. Operating conditions and nex**t-S**and **performance**

System Flow	1500 gpm. (750 gpm/vessel)	
Surface Loading	~14 gpm/ft²	
Filter Performance	**Feed SDI$_{10}$**	**Filtrate SDI$_{10}$**
Initial	7	<1
Average over 24 months	7	<1

Conclusion

The **ne**x**t-Sand** media allowed economic operation of a high volume Reverse Osmosis system on a water supply that was unusable based on conventional filtration methods.