

Beyond the Average

By Craig Granlund

Filmtec BW30-8040 elements have been used for the past 21 years at the Antelope Valley Station, a lignite coal-based power plant in North Dakota operated by Basin Electric Power Cooperative. In 1992, the plant sought a cost-effective solution to treat feedwater from its Lake Sakakawea source—a reservoir of Missouri River water.

Because the Missouri River feedwater contains concentrations of dissolved solids and matter such as silt, it is important that the water is specially treated and conditioned on an ongoing basis to remove pollutants and contaminants that will cause issues with the boiler. This treated water is used to supply the boiler to generate steam, ultimately helping Antelope Valley Station provide electricity to member electric distribution systems throughout the state of Nebraska and upper Midwest.

Treating Feedwater With RO

For this conditioning, the Antelope Valley Station turned to a reverse

osmosis (RO) system containing 168 Filmtec BW30-8040 elements from Dow Water & Process Solutions.

Typical membrane life ranges from three to five years, with seven years seen as excellent performance. Today, the Dow membrane elements show nearly the same performance in providing clean boiler feedwater as when they were installed 21 years ago, surpassing typical membrane life by more than 15 years. Although RO elements typically have a higher upfront cost, they offered the best overall economics for RO system operators over the lifetime of the product for the Antelope Valley Station.

The Filmtec product was selected for its high performance and maximum element life attributes when treating difficult feedwaters. It is designed for high rejection, robustness and durability across a wide range of feed conditions, and features a thick feed spacer (34 mm) to lessen the impact of fouling or a buildup of contaminants on the filter. This

buildup can require frequent cleaning to restore productivity, so the elements help prevent costs associated with cleaning, downtime and lost system performance. The elements originally used at Antelope Valley Station were a predecessor to today's Filmtec BW30-365 element.

The durability and cleaning attributes of Filmtec BW30-8040 elements, combined with proper pretreatment and plant maintenance, boosted the lifespan of the elements significantly beyond the typical industry average.

Pretreatment & Maintenance

At the Antelope Valley Station, the feedwater arrives from Lake Sakakawea via a 9-mile-long pipeline, where it goes through a pre-chlorination step before the clarifiers. After the clarifiers purify the water, it is cold-lime softened to reduce hardness and enhance clarification before the filtration process. Liquid ferric sulfate and a polymer also are added as coagulation aids. The water is pumped to a 1-million-gal clear well, and then transported to the main plant, where it goes through a sand/anthracite filter, followed by a separate carbon filtration step.

Because chlorine can damage the membrane elements, it is necessary to remove it with carbon filtration. Additional pretreatment steps include 5- μ m cartridge filters and a temperature increase to about 75°F before the water finally is pumped to the RO system. A heat exchanger that uses waste heat from the plant increases the temperature of the feedwater. The RO elements receive a chemical cleaning once per quarter, and O-rings and adaptors are changed out as needed.

RO membranes provide power plant with cost-effective, environmentally friendly treatment



The Antelope Valley Station needed a cost-effective way to treat feedwater from its source, which is a reservoir of Missouri River water that contains concentrations of dissolved solids and silt.

Performance Results

After 21 years of operation, the RO elements are still operating and helping the plant produce boiler feedwater. Because the product has continued to work effectively and has not had to be replaced multiple times, the plant has saved time, money and resources. This RO system, combined with the Filmtec elements, has enabled the Antelope Valley Station to operate continuously and efficiently, unaffected by contaminants and pollutants in the river water used by the facility.

Since it began commercial operations in 1984, the plant has made investments such as these to maintain operations that not only are cost-effective, but also are environmentally sound. In fact, water is used so efficiently at the Antelope Valley Station

that it is considered a "zero-discharge" facility. The only time water leaves the plant is during evaporation.

The RO system installation is just one of many initiatives the plant implemented to maintain and improve overall efficiencies. While long life is a hallmark of Filmtec membranes, the exceptionally long membrane life of 21 years achieved here also is to the credit of the operators and maintenance personnel at the Antelope Valley Station. *wqp*

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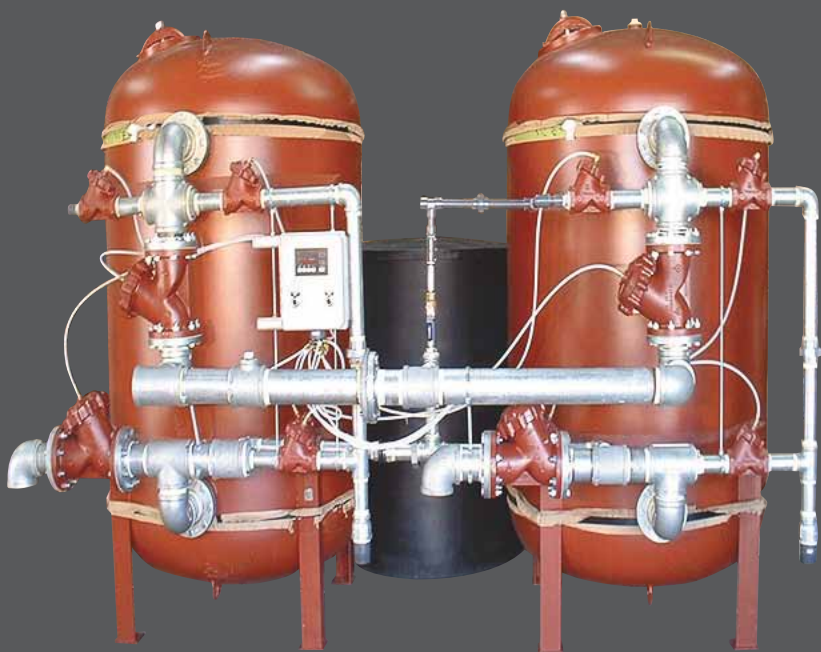


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