Enabling Increased Uptime - Less Cleaning, Less Downtime

Because water is such a critical component to power generation, power plants are often built near a surface water source such as rivers, lakes, or oceans. Maintaining adequate water volumes and quality in a power plant is vital for effective operation.

Surface waters typically contain higher concentrations of impurities including suspended solids, organic constituents, and dissolved salts (e.g., calcium, magnesium, silica, etc.), all of which must be removed prior to sending the make-up water to boilers for heating. For this reason, make-up water is first treated to remove floating and suspended materials and is then treated by reverse osmosis (RO) membrane elements to remove dissolved salts.

THE CHALLENGE

System Downtime Due to Membrane Cleaning

Due to the high organic and biological content found in surface waters, many existing RO systems treating boiler make-up water deal with organic fouling or biofouling challenges, resulting in a decline in RO system performance. To restore performance, the system is shut down to perform chemical cleanings. And the more fouling the feed stream, the more frequently cleaning is performed, which results in excessive system downtime. Excessive downtime places a significant strain on boiler make-up water production and thereby, power generation. Not to mention, the consequential costs associated with system downtime to perform those chemical cleanings can be substantial.

A power plant in the Pacific Northwest of the United States treating river water for boiler make-up is confronting ongoing issues with frequent maintenance and downtime. Despite installing conventional fouling-resistant reverse osmosis elements, this plant averages chemical cleanings at least once a month due to persistent organic fouling challenges. Additionally, the RO elements undergo replacement every 12 to 18 months when they fail to meet the plant's performance standards. This cycle of high cleaning frequency and element replacement has led the plant to explore alternative solutions.

THE SOLUTION

ZwitterCo RO Reduces Downtime & Cleaning

The RO system at this plant is comprised of two trains, each a three-stage array with six elements per vessel. One train houses a new set of conventional fouling-resistant RO elements, while the other houses ZwitterCo Low Energy RO elements. The plant wanted to determine whether the ZwitterCo RO elements would allow them to benefit from less frequent element cleaning and downtime.

Over the first four months of operation, the first stage of the train housing the conventional fouling-resistant RO elements repeatedly declined in performance (Figure 1). Because of this, the plant had to shut down and clean these elements three separate times in effort to restore membrane performance. Despite these cleanings, the conventional RO elements have not fully recovered performance.

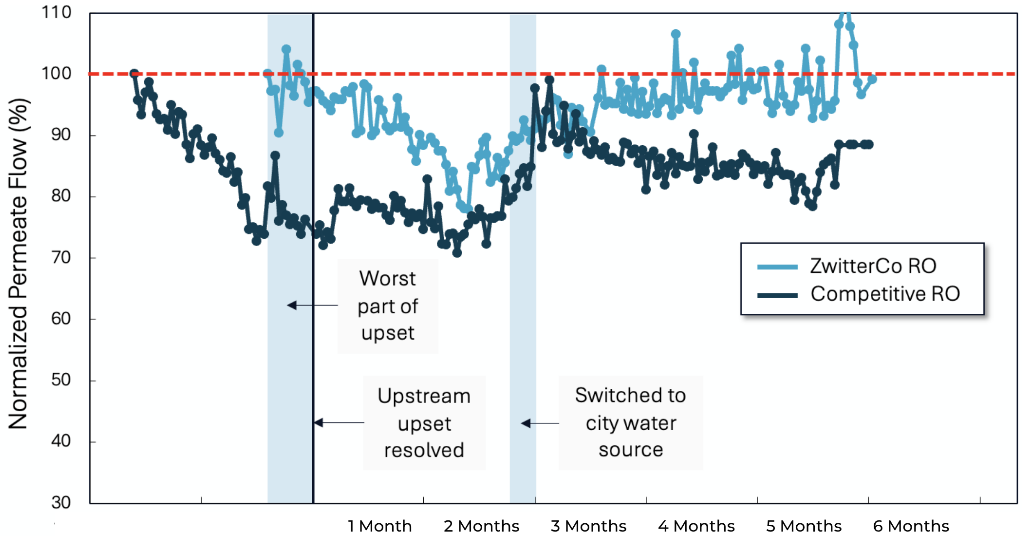

Figure 1: ZwitterCo RO elements operated at higher normalized permeate flow than the conventional elements, despite not being cleaned.

The ZwitterCo RO elements on the other hand, have demonstrated more stable performance and have consistently operated at 10% higher normalized permeate flow than the conventional elements. This shows that ZwitterCo RO elements are far less susceptible to organic fouling and therefore will require less frequent cleaning, resulting in longer operational life and reduced element replacement.

Reverse Osmosis, Reinvented

ZwitterCo
12 Cabot Rd, Suite B
Woburn, MA 01801

Contact Us
zwitterco.com
sales@zwitterco.com