

Case Study

RO Membrane Cleaning, 2008

After months of operation, the RO system at a 50 million gallon per year ethanol plant in the Midwest began experiencing progressive increases in pressure differential (Delta P) between primary and final RO pressures.

The plant tried conventional CIP procedures using high and low pH cleaners, as well as heavy doses of non-oxidizing biocides. Unfortunately, these conventional cleaning did not have the desired effect of reducing pressure differential across the system.

The plant then removed membranes from their RO system to send them out for cleaning and replaced them with refurbished membranes until they returned. This was the only way the plant could manage the RO system pressures. The problem with high Delta P is that fouling can quickly become irreversible and even rupture membranes if the pressure gets too high.

In order to determine the root cause of the problem, US Water Services and the customer opened up the RO system for inspection and sent in a membrane for RO autopsy. The system was caked with iron fouling and slime forming bacteria.

So the question was could anything be done to control the bacteria to eliminate the problem.

The unusual solution was to control the bacteria using US Water Services Stabrom; stabilized bromine chemistry, which provided a halogen punch, but is less aggressive to the RO membranes than bleach or other oxidants.

The bleach being fed ahead of the multi-media filters was replaced with Stabrom. A positive halogen residual was maintained in order to oxidize iron and remove it efficiently in the filters. The excess stabilized bromine was allowed to flow into the RO, where it prevented the growth of bacteria slime in the membrane elements. This achieved the reduced pressure differential across the RO system that we were after.

The improvement in performance on this system was dramatic. The Delta P across the RO system was reduced from 195 to 140 psig. In addition, the normalized flow was increased from 388 gpm up to 492 gpm, a 27% improvement in available water production.

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