

Case Study

RO Cleaning Station, 2008



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When an ethanol plant in Texas, serviced by US Water Services, started experiencing problems with their reverse osmosis system, conventional, on-site methods of cleaning failed and the reason soon became clear. When the city changed the flow of the water to accommodate the ethanol plant, it stirred up red clay that had settled in the distribution piping. The fine clay silt found its way to the ethanol plant RO system, fouling the membranes.

Fouling in RO systems is often caused by a build up of organic compounds such as tanins and lignins (dissolved leaves) or super saturated salts, most often calcium carbonate. Membrane fouling by these contaminants can be treated by dissolving the fouling materials; by elevating pH which can break apart organic contaminants and lift debris from the element; or by dropping the pH in dissolving scale deposits. The membranes can usually be cleaned successfully on site, without removal from the RO. But what do you do when the fouling in your RO system is caused by inert clay and dirt so fine it can pass through a 1 micron filter and so plentiful that it could fill a 20' x 20' room?

Attempts were made to clean the red clay using the same methods as those used to

remove organic compounds, but with limited success. With conventional methods failing at every turn, unconventional methods had to be taken into consideration. Replacing the 180 membranes would be expensive, especially if the situation persisted.

The Texas plant decided to turn to US Water Services' RO cleaning station, located in Cambridge, Minnesota. The RO station is unique in the industry, utilizing a variable frequency drive (VFD), along with complex valve and control schemes, which allow water to flow through the membrane in either direction, adjusting the pressure over a wide range in order to achieve the best results. Membranes, by design, allow water to flow in a single direction. Reversing the water flow can provide enough force to kick a majority of the debris free from the membrane, something that is impossible to do on site, and is rarely seen in other off line cleaning systems. Finally, the US Water Services membrane cleaning station has the ability to test the performance of each cleaned membrane at actual operational flux rates, to ensure that the membrane meets industry specifications before being sent back to the customer.

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On its very first test run, the RO cleaning station proved successful. The red clay silt was successfully removed from a substantial number of the membranes. The performance was verified, and the membranes were sent back to our customer, ready to reinstall.

The US Water Services membrane cleaning station is the newest and most sophisticated system in the industry. It was designed and built by our engineering group using knowledge gained from extensive experience with our customer's reverse osmosis applications. Not every plant will need to clean membranes. However, considering the critical nature of a properly functioning water treatment plant, and the cost of replacing membranes, it's good to have the option of enhanced cleaning when needed.

