

Replacement Bleach Dosing Unit Ends Leaks and NaOCl Shortage for UF Backwash at SWTP

*Also Adds New Capability for Control from SCADA Terminal;
Takes Much Smaller Footprint; Significantly Reduces CIP Frequency*



Replacement of bleach pump with special vacuum feeders eliminated frequent pipe and valve leaks that were caused by running the pump at 100% capacity just to get close to what was needed.



Replacement feeders gave operators new capability for providing required bleach dosage, and also for controlling it from the plant's SCADA terminal.



Replacement feeders require much smaller footprint than was previously needed for bleach delivery mechanism, and their installation has also resulted in greatly reduced CIP frequency.

The supervisor of the membrane system for a 7.5 MGD ultrafiltration (UF) and reverse osmosis (RO) facility at a 15 MGD surface water treatment plant (SWTP) in Granbury, TX reports that replacement of the bleach (NaOCl) pump with a vacuum feeder has eliminated frequent pipe and valve leaks in a bleach delivery system needed for UF backwash.

He also notes new capability for providing required NaOCl dosage, and for controlling it from the plant's system control and data acquisition (SCADA) terminal.

"We could only come close to what we needed by running the pump at 100% capacity, which caused excessive vibration throughout the bleach delivery system and consequent frequent leakage in its valves and piping," recalled Alain Richard, supervisor of membrane system at the Surface Water Advanced Treatment System (SWATS) plant operated by the Brazos Regional Public Utility Agency.

"Even then, we were always 1.5 gal. short of the 4 gal./min. of bleach that we needed to give us the 250 mg/L we wanted in the chemical backwash for the UF membranes," he added. "We looked at different pumps and decided to try the vacuum feeder. It's been running for over a year now, and we haven't had to do any plumbing work in the bleach delivery system—no leaks, repairs, nothing—and we're finally getting the dosage we need."

"I can also now control bleach dosage from my SCADA terminal, which I couldn't do before; I have a very small footprint for the bleach delivery mechanism compared to what I used to have; and clean-in-place (CIP)

frequency has been greatly reduced.”

Plant Operation

The UF system feeds an RO system, whose output is blended at the plant with raw water that has passed through conventional clarification and gravity sand filtration treatment. The blended water is to feature chlorides below 100-150 ppm.

The contribution from each source to finished water varies with raw water flow and quality, especially regarding turbidity and taste/odor. The finished water is sold to 2 separate utility districts that supply about 70,000 end users, who are mostly residential with some commercial.

The UF system is used as a pre-treatment for the RO system. It allows for production of feed water to the RO system at a silt density index (SDI) <3.

The UF/RO units were added in 2002 in order to eliminate chlorides. In 2007, UF expansion was retrofitted from 4 skids to five, with capacity increased from 6.5 MGD to 7.5 MGD. The same retrofit was also performed on the RO system in 2009.

“With the bleach pump always shorting us on what we wanted from it, even at the 100% capacity that was giving us the problematic excessive vibration, we were only getting 180 mg/L of the 250 mg/L of bleach that we needed in the UF chemical backwash,” Richard continued.

“As a result, the UF membranes were not getting clean enough, so trans-membrane pressure (TMP) would climb, and cleaning-in-place (CIP) was required more often, almost every month. Since we installed the vacuum feeder replacement, CIP is now needed about every six months.”

“We had entertained peristaltic pumps as a replacement, but they wouldn’t work because they couldn’t overcome the back pressure on the backwash system,” he said. “Fortunately, a former co-worker told us about this new vacuum feeding method, and we put it on trial. We were very happy to see right away that with essentially only one moving part, there was no vibration to speak of.

“We plan to continue to use this technology for the bleach feed system, and will probably be trying it for other chemicals as well.”

Product Information

The JCS Industries chemical feeder used at the SWATS plant utilizes real-time feed information via electronic flow sensors that allow for continuous monitoring and control of the chemical feed rates. The feeder will automatically regulate in both fixed and variable control modes, including fixed feed rate, flow paced, residual control, and compound loop.

The feeder system can dose a variety of aqueous chemicals commonly used in municipal and industrial water treatment systems.

The system is comprised of a vacuum injector to safely introduce the liquid into the feed-water stream; a reversing servo motor coupled with a V-notch valve to regulate the chemical feed rate; an electronic flow sensor to monitor and regulate the feed rate; and a control module for complete electronic control and communications.

A plant’s water flow rate and/or a chemical residual signal are used to adjust the chemical liquid flow rate by electronically positioning the servomotor driving the feed control valve. The ratio of input signal to liquid flow is adjustable over a range of 5% to 400% to enable increased liquid feed in response to additional chemical demand.

US Patents have been received for the all-vacuum liquid feeder, which can dose up to 60,000 gal/day.

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