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Practical Information For Environmental Professionals

Jupiter utility boasts nanofiltration plant unique in the nation

By MELORA GRATTAN

The town of Jupiter doesn't mind being first in terms of its water treatment technology. In 1990, Jupiter was the first town in the southeastern part of the state to build a reverse osmosis desalination plant. Now, it is first again with a nanofiltration plant that features a design that is new to the nation.

The biggest difference is the hydraulically efficient design of the treatment train that saves 30 percent in the amount of energy needed to drive the membrane process compared to a conventional plant in Florida. As a result of the design, the utility will save $100,000 annually or $3 million over the life cycle of the plant, said David Brown, director of Jupiter Utilities.

The new nano plant, which was dedicated in December, replaces a lime softening facility that was around 35 years old and would be "hard pressed" to meet the Stage 2 disinfection byproducts rule, said Brown.

"The drinking water regulations were the primary driving force behind the new plant," he said. "Due to the RO plant, we were familiar with the technology and had a lot of confidence in it. And, I'm biased toward membrane treatment. I've served on an RO association for close to 20 years, and I think it is the best technology to address raw water in South Florida."

The cutting-edge design was considered after hearing about concepts being implemented in the Netherlands. A membrane pressure manufacturer friend allowed Jupiter to use a prototype for pilot testing.

"After a couple of years of testing, we were able to tweak and improve upon what was being done and translate it into full scale (operations) for our plant," Brown recalled.

While the RO plant treats brackish water from a depth of about 1,500 feet with a membrane at pressures of 200 psi, the new facility takes shallow raw water and treats it with membranes at pressures close to 60 psi.

This difference in pressure requires less energy and is the main reason for the reduced expenses.

"I think the innovative design will serve as a milestone for future nanofiltration and as a stepping stone for others to replicate and build on as time progresses," said Brown, who has already had a lot of plant operators visit since operations began in August.

Hazen and Sawyer PC in Boca Raton designed the plant, which has a capacity of 14.5 mgd, expandable to 17 mgd.

In addition to saving money with energy efficiency, the utility is taking the byproduct from the membrane process and generating revenue by reusing it.

Since the source is fresh water from the aquifer, it is ideal for blending with reclaimed wastewater and using for irrigation. The town will generate more than $115,000 per year from selling up to 3 mgd to the Loxahatchee River District.

"The river district has 40 acres of lakes where wastewater is stored, but they were falling short of meeting demands for reuse," Brown said. "This will help shore up their supply, as well as reusing another resource."

The combination of the two plants also will promote sustainability by adjusting how much each plant produces depending on weather conditions.

Normally the plants would share the burden equally. However, during times of drought, the RO plant will be used more since the deep aquifers are more drought-resistant and will not impact the river and area wetlands.

This will also help conserve local supplies of fresh water during droughts. In opposite conditions, the nanofiltration plant can be used more due to its lower operating costs.

"We have built in a lot of flexibility that has led to a greater long-term sustainability of sources, which is critical," Brown said, particularly because the river is one of only two nationally designated Wild and Scenic rivers in the state.

The new plant cost $43 million to build, which came in $1 million under budget. It was paid for primarily with renewal and replacement reserves the utility regularly sets aside to replace assets, with the remainder coming from impact fees on future development. As a result, the utility does not plan on raising rates, which are about 19 percent lower than other area utilities.

"We religiously try to set aside reserves to minimize the impact," Brown said. "This has been hard to do with the economy, but this is the reason for doing it. We have this new state-of-the-art facility and the rates remain lower than other utilities."

Construction administration for the plant was conducted by Kimley Horn and Associates of West Palm Beach. Value engineering services were provided by Rostek Services, Aqualyng Holdings, Duranceau Consulting Services, and Kimley Horn.

Brown attributed the utility's access to design innovations to his staff's involvement in numerous regional and national trade associations, such as the American Membrane Technology Association and the Southeast Desalting Association, and the relationships they have forged there.

"This involvement led us to having access to ideas and technology that ultimately saved our customers substantially," he said.

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