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Reuse helps meet water demand

Southern Florida communities rely on upgraded wastewater treatment technology to supply reuse water for irrigation, easing potable water demand.

By Steve Gibbs

Project

Loxahatchee River Environmental Control District (LRD), Fla., wastewater treatment plant expansion

Civil engineers

LRD and Hazen and Sawyer

Product application

Synthetic compressible media technology expands wastewater treatment capacity for reuse water in a small-footprint plant.



The Loxahatchee River area along Florida's southeast coast has experienced steady growth for many years. The communities of Jupiter, Juno Beach, and Tequesta, which are located within the Loxahatchee River Environmental Control District (LRD), grew by a combined 25 percent since 2000. But with growth came problems. The rapid population increase created tremendous demand on the district's water supply — water for human consumption and for irrigation.

Fortunately, the LRD has been a pioneer in treating and reusing wastewater. "Reuse water" is defined as wastewater cleaned so that suspended solids are below 5 parts per million. The district's ability to turn wastewater quickly into irrigation-quality water helps meet the needs of golf courses, schools, and thousands of homeowners within Northern Palm Beach County and Southern Martin County. The water-reuse program also makes it easier for public works

officials to process enough potable water for the burgeoning population.

The LRD recently expanded and improved its treatment facility to meet the area's growing capacity demands. The updated facility is more efficient, cleans water more effectively, and requires less maintenance. At the center of the successful upgrade is a technology that features small, fuzzy pink balls.

The LRD was formed in 1971 to provide public services such as water, sewer, and stormwater conveyance without endangering the neighboring Loxahatchee River. The Loxahatchee, which was designated a Wild and Scenic River in 1985, was threatened by the ever-growing population in the area that was creating more wastewater than the environment could handle. In the mid 1970s, the district opened its first wastewater treatment plant. In 1984 it began a water-reuse program.

"In the '80s, we recognized that we

Compressible, synthetic fiber spheres that comprise the filter media are slightly larger than ping-pong balls.

did not have enough water to meet the growing demands within the district," said Richard Dent, executive director of the LRD. "We had to find ways to better use the water supply that was available to us. We now have a 23-year record with the reuse program and it has proven to be very successful. Reusing wastewater allows us to use the groundwater supply for higher and better purposes, specifically potable water."

The LRD's water-reuse program has been so successful that the district has barely been able to keep up with demand. It currently sells reuse water to more than 30 homeowner associations, more than a dozen golf courses, a university campus, several local schools and businesses, and two Major League Baseball spring training facilities. In the mid 1990s, the district relied on a sys-

tem of traveling bridge rapid sand filters capable of cleaning 9 million gallons per day (gpd). But significant expansion was needed to keep up with the increased amount of wastewater coming into the system and the increasing demand for reuse water throughout the area.

“At peak use, we needed 17 million gallons of treatment capacity per day,” said Dan Burden, Ph.D., P.E., a senior associate with Hazen and Sawyer in Boca Raton. Hazen and Sawyer has been the engineer of record for the district for 30 years, and Burden is currently the engineer in charge of the LRD’s treatment plant. “This meant a significant expansion of the existing facility, so we began exploring filtration methods that would be both efficient and cost effective.”

Burden explained that expansion of the existing traveling bridge filtration system filters to meet treatment needs would have been extremely expensive and required a relatively large footprint. Furthermore, the district desired a filtration technology that would provide a

high rate of filtration yet with a minimum amount of maintenance.

“Traveling bridge rapid sand filtration systems typically operate on hydraulic rates of about 2 to 3 gallons per square foot per minute. This is a slow rate, but acceptable for this technology,” said Burden.

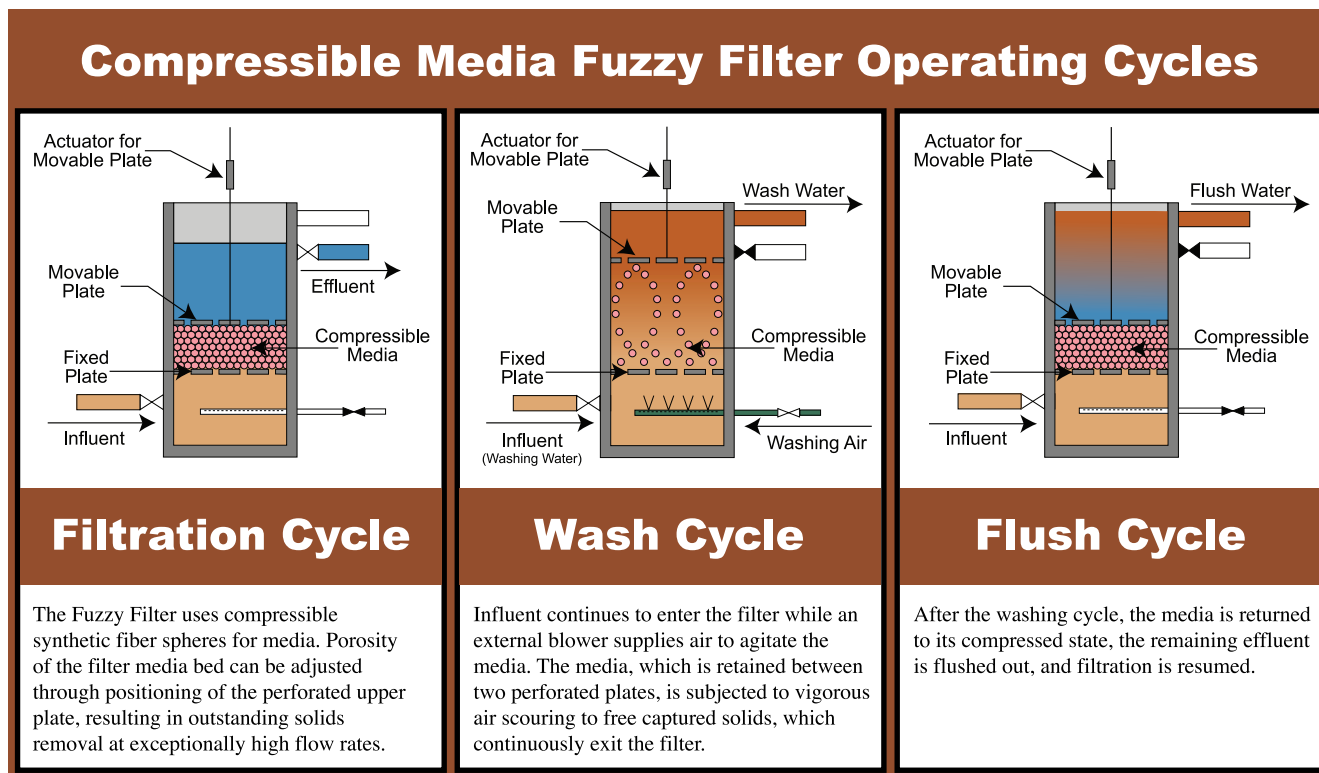
Looking for filtration alternatives, the LRD’s engineers considered two options to traveling bridge sand filters. They looked at surface filters, which are essentially cloth media filters that require frequent cleaning, and they examined a synthetic compressible media technology from Schreiber, LLC.

The Schreiber synthetic media filters (Fuzzy Filters) are an upflow system using small, pink compressible synthetic fiber spheres slightly larger than ping-pong balls. The synthetic media are set between two plates, one of which is moveable, within a large upright chamber. Changing the compression in the chamber can alter the porosity of the filters. Uncompressed, the pink balls have a void ratio of 80 to 85 percent.

“About three years ago, Dan Burden took me to see the Schreiber treatment model. When I saw the little pink balls I said, ‘Oh no, that’s not for us,’” said Dent. “The more we looked into this technology, the more we realized that it had a number of the benefits we were looking for.”

According to Burden, the footprint required for the Schreiber synthetic media system was only one-tenth of that needed for a traveling bridge system. Additionally, the Schreiber system provided high-rate filtration at a capital cost approximately one-half that of the sand filtration system currently in place. Maintenance costs are low with Fuzzy Filters; according to the manufacturer, they almost never clog, can be easily cleaned, and the system has only one moving part.

“The flow rate of the Schreiber system is about 40 to 45 gallons per minute per square foot,” noted Burden. “This was an enormous leap in capacity and seemed to be the perfect fit for the Loxahatchee River District’s needs.”



Construction of the Schreiber synthetic media filters was completed in September 2006 at a cost of about \$1.2 million. So far the new technology has exceeded expectations. "Our operators are very happy," noted Tom Vaughn, LRD's director of operations. "We have tremendous demand for reuse water here. Right now we are processing about 98 percent of the wastewater coming into the facility for reuse."

Vaughn is especially pleased with the low maintenance requirements of the Schreiber technology. In the rapid sand filtration system, solids frequently built up in the media, he said. Workmen had to shovel out the sand and replace it, a laborious and time-consuming process.

This was a weekly maintenance chore, according to Vaughn.

By comparison, the synthetic media in the Schreiber system requires cleaning only once a quarter. The small pink balls are rinsed in a chlorine bath, and are not replaced. According to Schreiber, some of the media have been in service for almost 20 years.

The LRD's water-reuse program is a model of efficient water usage. During recent drought conditions in Florida, the South Florida Water Management District instituted 45-percent cutbacks in golf course irrigation and limited homeowners to one lawn watering per week. Meanwhile, no such restrictions were needed in the LRD.

"We've won awards for our treatment facility at the state and federal level, so we are very proud of our program," said Dent, the district director. "More and more people are moving into this area, so we'll have more wastewater to treat and more demands on the water-reuse program, so we have to have confidence in the equipment we use. We're well prepared for the next several years." ■

Steve Gibbs has written about public works and infrastructure for more than 20 years.



At the Schreiber control panel, Director of Operations Tom Vaughn can adjust the filter porosity or set the automatic washing.