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JULY 2017

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Superintendent
Eden, N.C.



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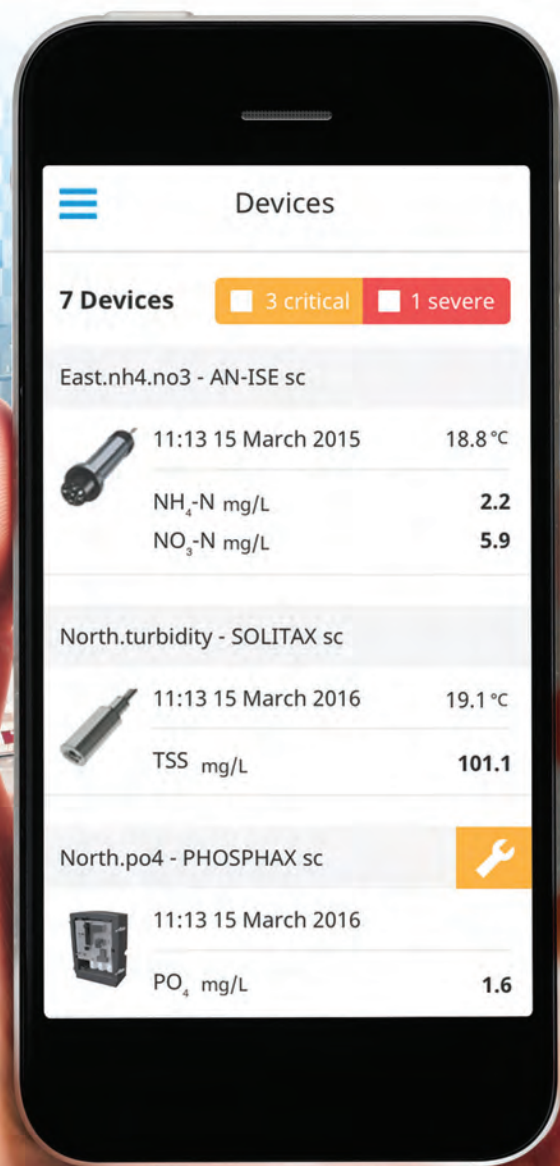
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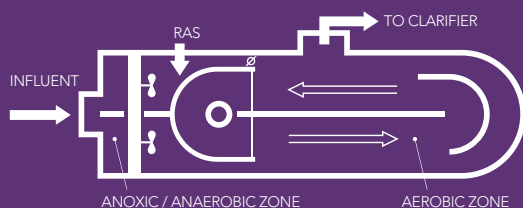
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on the cover

William D. Hatfield Award winner Melinda Ward tries to instill in her colleagues in Eden, North Carolina, lessons she learned from her father: "One thing he always taught me was to walk through the plant to see what everything looks like, smell what everything is like, listen to all the different sounds, and get a feel for the plant." (Photography by Andrew Craft)

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From irrigation to drinking water to boiler feed to effluent pale ale, clean-water operators are proving that when it comes to reclamation, anything is possible.

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» Technology Deep Dive: A better way to manage instrument data



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let's be clear

A Toast to Technology

FROM IRRIGATION TO DRINKING WATER TO BOILER FEED TO EFFLUENT PALE ALE, CLEAN-WATER OPERATORS ARE PROVING THAT WHEN IT COMES TO RECLAMATION, ANYTHING IS POSSIBLE

By Ted J. Rulseh, Editor

The latest trend in microbrews seems to involve beer made from recycled wastewater. I came back from a weekend with the grandkids to find a news story about the Madison (Wisconsin) Metropolitan Sewerage District and Nine Springs Effluent Pale Ale, named for the district's treatment plant.

I first read about effluent beer when Clean Water Services in Oregon sponsored a home brew contest in summer 2015. Then later that year, the Water Environment Federation held a tasting of treatment plant microbrews at its WEFTEC conference.

There's a fun and a serious side to all this. The fun side is the idea of hoisting a glass of amber-colored beer made from water that once passed through a wastewater plant (and additional advanced processes, of course).

The serious side is the good news that people would actually consider

drinking a product made from such a source as wastewater, and that newspapers and websites wrote about the subject with (for the most part) a notable absence of potty humor.

RECYCLING ARRIVES

What it means, in my opinion anyway, is that water recycling has gone mainstream. It wasn't so many years ago that cleaning up water to use for irrigation raised some eyebrows. Now, water reuse to water golf courses, parks and even people's lawns is routine in many places.

Next came what we call indirect potable reuse: putting tertiary-treated wastewater into reservoirs that store drinking water, or injecting it into groundwater wells from which drinking water is later drawn. The next frontier, of course, is direct potable reuse: putting highly treated water straight into the drinking water distribution system.

Direct potable reuse still carries an ick factor, understandably so, especially since the vast majority of people don't know about all the technologies that can turn sewage into pure H₂O.



The instinctive revulsion might go away faster if we could somehow banish the phrase “toilet to tap” from the lexicon.

Of course, that’s difficult, but in the meantime I think the effluent beers can help. Somehow it’s easier to imagine drinking a glass of beer made from recycled water than turning a tap at the kitchen sink and filling a glass with the water itself. Beer already carries a reputation for meticulous purity. Water from the sink is too tied up with the idea of plumbing and bathrooms.

NO LIMITS

Regardless, direct potable reuse will have its day — in fact it already has in some communities. For other communities troubled by drought, wider acceptance can’t come soon enough. While surface water supplies dry up, imported sources get more expensive, and aquifers are stressed; perfectly good water is getting sent downstream or at best sprayed on grass.

In a way, it’s remarkable that the filthy, smelly water entering our wastewater treatment plants could ever be turned into something clean and healthful. On another level, it isn’t remarkable at all. It’s a question of science and technology.

The good news is that the more water recycling goes mainstream, the closer we get to the day when direct potable reuse becomes the norm where water is precious. And recycling has gone decidedly mainstream. Reclaimed water gets used for irrigation, for industrial processes, for boiler feed and more. Some uses call for even higher purity standards than drinking water.

In a way, it’s remarkable that the filthy, smelly water entering our wastewater treatment plants could ever be turned into something clean and healthful. On another level, it isn’t remarkable at all. It’s a question of science and technology. From wastewater, today’s processes can make water suitable for almost any purpose under the sun.

Screening, settling, biological treatment, media filtration, membrane filtration, reverse osmosis — all these are part of the plant operator’s technology arsenal. They’re all thoroughly proven, and they’re being made more efficient and more effective all the time.

So while we wait for potable reuse to become so routine that it’s no longer news, it’s worth raising a glass to the companies that deliver the treatment technologies and the people who expertly operate them. Maybe I can get one of my Madison-resident siblings to get me a bottle of that Nine Springs ale.

Cheers! Or as my Norwegian ancestors would prefer: Skoal! **tpo**



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CLIMATE CHANGE

New Coastal Challenges

Thanks to recent research, Rhode Island is gearing up to meet the challenges of climate change head on. The study examines the potential risks climate change poses to the state's wastewater collection and treatment infrastructure, paying special attention to the rising sea level and likelihood of more severe storms.

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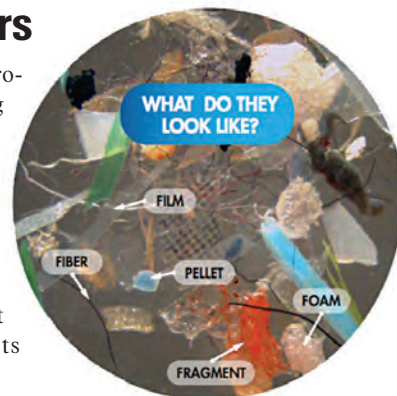
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MICROPLASTICS IN WWTPs

Educating Consumers

New studies are showing that microplastics and microfibers are entering the wastewater stream on a massive scale. One such study skimmed nine locations throughout San Francisco Bay, finding between 14,000 and 2 million microparticles/km². It also discovered their presence at eight Bay Area treatment plants. Check out what the experts have to say about the solution.

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BIOSOLIDS SURPLUS

Too Much of a Good Thing

There's a growing stockpile of biosolids fertilizer in the rural British Columbian cities of Kelowna and Vernon. With the current space limitations at the facility, it's a problem of too much supply and not enough demand that has city officials and Kelowna Biosolids Supervisor Gordon Light seeking a long-term solution.

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One Thing At a Time



Sam Soth, Operator I, cleans an AquaRay 40 vertical-lamp UV disinfection system (Ozonix) at the Oakdale Wastewater Treatment Plant.

A DELIBERATE AND PATIENT APPROACH TO OPERATING CHANGES HELPS THE OAKDALE WASTEWATER TREATMENT PLANT MAINTAIN CONSISTENT EFFLUENT QUALITY

STORY: **Ted J. Rulseh**

PHOTOGRAPHY: **Lezlie Sterling**



TO CODY BRIDGEWATER, AN UNEXPECTED CHANGE in effluent quality is no cause for hasty action — it's a time for deliberate steps and patient observation.

“One thing I really stress to our team is that when we make changes to the system, we're going to make them one at a time, so we can determine whether that change has had an effect, negative or positive,” says Bridgewater, plant supervisor at the Oakdale (California) Wastewater Treatment Plant.

“We have to be patient enough to allow changes to take effect. Usually, after two to three weeks at the earliest, we'll re-evaluate and see what kind of impact we've made. So far we've had a lot of success with that.”

The approach has served the plant well since Bridgewater came on board two years ago. Effluent typically shows BOD and ammonia below detection limits and total nitrogen below 3 mg/L (permit level 15 mg/L). The latest plant upgrade, to tertiary treatment in 2011, earned a Wastewater Treatment Project of the Year award from the American Society of Civil Engineers Sacramento Section.

LONG HISTORY

Oakdale, known as the Cowboy Capital of the World, lies at the base of the Sierra Nevada foothills in central California. Its treatment plant, built in the 1940s, has seen several upgrades. A 2001 project added four cement-lined biosolids drying beds and a new headworks structure.

The 2011 project included:

- Lining of the plant's two aeration ponds
- Upgrade of the existing Biolac aeration system (Parkson) to include the Wave-Ox process
- A 120-foot-diameter, 16-foot-deep secondary clarifier (Envirodyne) with return activated sludge pump station

City of Oakdale (California) Wastewater Treatment Plant

BUILT: | 1940s; upgraded 1965, 1984, 1990, 2001, 2011

SERVICE AREA: | **City of Oakdale**

POPULATION SERVED: | **20,700 (7,300 connections)**

FLOWS: | **4 mgd design, 1.59 mgd average**

TREATMENT LEVEL: | **Tertiary**

TREATMENT PROCESS: | **Biolac process; cloth-media filtration**

BIOSOLIDS: | **Landfill cover**

EFFLUENT: | **Rapid infiltration ponds**

ANNUAL BUDGET: | **\$787,000 (operations)**

WEBSITE: | **www.oakdalegov.com**

GPS COORDINATES: | **Latitude: 37°46'33.53"N; longitude: 120°52'1.66"W**





ACROSS GENERATIONS

Team members at the Oakdale Wastewater Treatment Plant cross generational lines, but work well together regardless.

Senior operator Lovanna Brown and maintenance mechanic Todd Cordoni are in their 50s, plant supervisor Cody Bridgewater is 32, and operator Sam Soth is 29. All pitch in to help keep the plant running efficiently and in compliance.

"Lovanna's biggest asset is her 25-year history with the plant," Bridgewater says. "She knows all the ins and outs, the idiosyncrasies that someone can only know from being around," she holds Grade III Wastewater Treatment and Grade I Lab Analyst certifications.

Soth started in early 2015 as a part-time lab technician and later that year became a full-time operator in training. He completed his 1,800 hours for certification earlier this year and became a full-fledged operator with Grade III Wastewater Treatment certification. He also holds Grade II Lab Analyst and Grade II Environmental Compliance Inspector certifications.

Cordoni came aboard in 2007. "During construction for the 2011 upgrade he was out there daily just learning," Bridgewater says. "He knows where every pipe is in this plant." An expert fabricator, he built the pontoon used for replacing diffusers in the aeration basins. It has an electric winch and solar panels to keep the batteries charged: "It's amazing what he can do with a welder."

Bridgewater adds, "Being able to communicate and having commonality of experience in the industry has allowed us to work through our generation gap."

The team at the Oakdale Treatment Plant includes, from left, Todd Cordoni, maintenance mechanic; Cody Bridgewater, supervisor; Lovanna Brown, senior operator; and Sam Soth, Operator I.

“We have to be patient enough to allow changes to take effect. Usually, after two to three weeks at the earliest, we’ll re-evaluate and see what kind of impact we’ve made.”

CODY BRIDGEWATER

- Four AquaDisk cloth-media tertiary filter cells (Aqua-Aerobic Systems)
- AquaRay 40 vertical-lamp UV disinfection system (Ozonix)
- Two biosolids dewatering screw presses (Huber Technology)

The plant (4 mgd design flow) serves a community of 20,700 that includes a candy company as its only industrial discharger, contributing about 20 percent of influent BOD. "Their discharge is consistently about 40,000 to 50,000 gpd, but the strength is pretty inconsistent," Bridgewater says. "We've had samples come in as low as 200 mg/L BOD, and as high as 9,600 mg/L."

PROCESS STABILITY

Influent averaging 1.59 mgd comes to the plant by way of an aerial pipe that crosses the Stanislaus River. It passes through a CleanFlo Monoscreen 3 mm fine screen (WesTech), followed by a Schloss vortex grit collector (Smith & Loveless).

From there the influent mixes with return activated sludge and the flow is split between the east and west lined aeration basins, each 380 feet long, 176 feet wide and 16 feet deep, and with 9.12 million gallons total capacity.

The Biolac process uses a long hydraulic retention time with more biomass in the system, providing stability to handle load and flow fluctuations.

The process uses fine-bubble aeration, and at Oakdale the air is supplied by eight positive displacement rotary-lobe blowers: two 100 hp Robuschi units, along with two 100 hp, two 75 hp and two 40 hp Sutorbilt units (Gardner Denver).

In each basin, 20 6-inch air lines (aeration chains) float on the surface, each with 15 air manifolds suspended on 1-inch air lines half a foot above the basin bottom. Each manifold has five diffusers. When air is activated, the manifolds oscillate in the water in response to the rising air bubbles. This enables highly energy-efficient aeration and mixing.

REMOVING NUTRIENTS

The Biolac Wave-Ox technology simplifies total nitrogen removal by enabling automatic aeration control among groups of aeration chains to create multiple oxic (nitrification) and anoxic (denitrification) zones.

“We can dictate if a given chain is always open or always closed, or if it is in Group A or Group B,” says Bridgewater. “So, for example, while Group A is aerating, Group B is becoming anoxic and causing denitrification to happen. Then after a certain time, which right now is set for 20 minutes, those zones switch. We can change that time based on what kind of response we’re getting out of the basins. We can pick which chains we want to be in each group-ing, and we can work each basin independently.”



Lovanna Brown cleans one of the clarifiers at the Oakdale facility.

From the aeration basins, the flow travels to the 120-foot secondary clarifier. An older 90-foot clarifier, now being rehabilitated with a new drive mechanism (WesTech), will be available for redundancy. After clarification, a low-lift pump station feeds the cloth-media filters, operated in pairs in alternating months. UV disinfection is the final step before discharge to rapid infiltration ponds.



Biosolids are dewatered to 14 to 15 percent solids on two screw presses (Huber Technology). The cake solids are sent to the local landfill for use as an alternative daily cover. During summer, waste activated sludge can be pumped to drying beds to enable additional wasting.

ATTENTIVE OPERATORS

Plant team members take pride in keeping a close eye on the process. “When I started, we did our in-house labs three to four days a week to track what was going on in the system and where we needed to be operating,” Bridgewater

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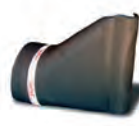
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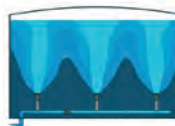
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says. “At one time the system was a little bit solids-bound. Since I started, we’ve been wasting five days a week for six to seven hours a day. We’re wasting consistently to keep our mean cell residence time at a good level.

“We do our morning reads every day at the same time. We check the DO levels and the equipment runtime hours. We clean the floatables out of the clarifier scum box twice a day. We check the return activated sludge pumps, the low-lift pump station and the filters to make sure they are operating properly with no alarms.

“I think the biggest item has been staying on top of our UV system cleaning and maintenance. We pull the UV modules out of the channels and put them in the acid dip tank every Tuesday and Friday, making sure the intensity of those lamps is as high as it can be. That really helps us maintain an effective disinfection process. We also have very clear water coming to the UV system. Average turbidity at that point is under 1 NTU.”

Operators monitor the process of a SCADA system installed by Tesco Controls and using Wonderware software (Schneider Electric - Invensys). “We have a lot of ability to trend data, whether it be influent flow or DO,” Bridgewater says. The blowers operate on a feedback loop using a DO sensor (Hach) at the effluent end of each basin and a Hach SC200 controller. Changing blower operation from manual to automatic last year has saved about 10 percent on electric bills.

BEING METHODICAL

Upsets in the process have been rare at Oakdale, but when some parameter starts to stray, the team responds with care and discipline. For example, when effluent nitrates began to climb, Bridgewater saw a need to make adjustments to the basins. He decided to try reconfiguring the aeration zones in one basin and shared the plan with the operators.

“I wanted to change the way the zones operated and create a bigger area for the bugs to move around and come in contact with the nitrates,” he says.

“The biggest thing I could stress was just to watch it — leave it alone. We kept monitoring it, keeping to our normal routine and normal tests. And sure enough, over the course of a few weeks, the nitrates started to drop.”

On a daily basis, Bridgewater takes pride in general housekeeping: “I truly believe the appearance of your plant is a representation of how you feel about your job.”

Technology helps the team keep tabs on maintenance, analyze data and prepare reports. They use the cloud-based MobileMMS computerized maintenance management system, which generates work orders for emailing to team members every morning.

“We went from paper work orders and paper checklists to everything being done on iPads,” Bridgewater says. “Our morning rounds are all done electronically. We hand-enter the data as we go through, and it’s automatically uploaded to a secure server. Everything is held there so that I can filter the data and create reports.

“If I want blower runtimes for December through April, I can generate that. I can set a couple of filters and the system brings me all the DO readings for the past month. I don’t have to thumb through file drawers to find something — it’s there at the click of a mouse. The ability to integrate technology with hands-on experience has been valuable. We’re a lot more organized now. The wealth of data we have at our fingertips helps a lot with troubleshooting.”

iPads and wireless technology enable the team to operate and monitor the SCADA system from home, which allows them to work minimal two-hour shifts on weekends and holidays. The plant is normally staffed weekdays from 7 a.m. to 3:30 p.m.

STILL LEARNING

The Oakdale plant marks a step in Bridgewater’s progression as an operator. His grandfather is retired as a Grade III operator with the city of Modesto.



“Our morning rounds are all done electronically. We hand-enter the data as we go through, and it’s automatically uploaded to a secure server. Everything is held there so that I can filter the data and create reports.”

CODY BRIDGEWATER

Cody Bridgewater checks on the plant’s two biosolids dewatering screw presses (Huber Technology).



City of Oakdale Wastewater Treatment Plant PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
BOD	310 mg/L	ND	30 mg/L
TDS	NT	330 mg/L	450 mg/L
TSS	320 mg/L	ND	NR
Ammonia	25 mg/L	ND	NR
Nitrate	ND	2 mg/L	NR
TKN	35 mg/L	ND	NR
Total Nitrogen	NT	< 3 mg/L	15 mg/L

ND = Not detected / NT = Not tested / NR = Not regulated

"Shortly after I graduated high school, he told me, 'You need to get into this field.' Being the typical teenager, I knew better."

He went into land surveying instead, but after a half-dozen years found himself out of work within a weak economy. "I started applying to wastewater jobs throughout California," he recalls. "It took me a year and a half to get in as an operator in training."

He worked two years at a small trickling filter plant in Jamestown, 40 minutes east of Oakdale. Two years later, as a Grade II operator, he moved to the Salida Sanitary District to help operate a 1.1 mgd activated sludge plant. After two more years, certified Grade IV, he came to Oakdale, where he received his Grade V certification in November 2015.

Now he's pursuing an online four-year degree in water resource management through Florida Gateway College and enjoying another step up in the profession. "At Oakdale I've been able to get to a whole new level with tertiary treatment and UV disinfection," he says. "It has really opened my eyes to how much opportunity there is in the industry." **tpo**

Cody Bridgewater supervises a facility that received a 2011 Wastewater Project of the Year Award from the American Society of Civil Engineers.

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A LEED GOLD-CERTIFIED NANOFILTRATION PLANT SAVES ENERGY WHILE PRODUCING HIGH-QUALITY WATER FOR MIXING WITH A LIME-SOFTENED STREAM

By Doug Day

When it opened in 2012, the Dania Beach Nanofiltration Water Treatment Plant was the first LEED Gold-certified water plant in the world. Since then, the 5 mgd (2 mgd average) plant has run efficiently, yielding a better product for its 30,000 customers.

“The water quality has improved immensely,” says Phil Skidmore, treatment manager. “With the old lime softening filtration plant, it was a constant of jockeying pressures and levels in the two clearwells. Adding nanofiltration smoothed out a lot of that problem.”

The \$8.8 million plant upgrade allowed water with high organics from a regional wellfield to be treated in the nanofiltration plant and blended with water from the city’s 50-year-old lime softening process. The wellfield water has higher color and organics, making it hard to treat in the lime softening system.

The project was funded through the state’s revolving loan fund along with \$2.55 million from the American Recovery and Reinvestment Act (federal stimulus). Design assistance came from senior students of Dr. Fred Bloetscher, associate professor in the Department of Civil, Environmental and Geomatics Engineering in the College of Engineering and Computer Science at Florida Atlantic University.

HOW IT WORKS

The treatment process begins with a pair of 65-foot-deep wells that pump raw water from the Biscayne Aquifer. Source water is also purchased from a regional wellfield operated by Broward County. After going through sand strainers, half of the raw water is sent through cartridge filters before it enters the two-stage nanofiltration membrane system (BiWater). The plant also has third- and fourth-stage reverse osmosis membranes (all membranes from Hydranautics). The filtered water goes to two clearwells.

A student thesis led to the addition of reverse osmosis, which increases the finished water yield. “This plant can potentially get the highest recovery, 96 percent, of any nanofiltration plant in the world,” says Bloetscher.

The Dania Beach facility includes a washwater recovery pond.



The plant design pushed the envelope with a fourth stage in its nanofiltration membrane systems (Hydranautics).



One of two lime softening accelerators. A 2-million-gallon storage tank appears in the background.

WIDELY RECOGNIZED

The Dania Beach Nanofiltration Water Treatment Plant has won a string of awards in its short life span to date. They include:

- Florida Institute of Consulting Engineers Engineering Excellence, 2012 Grand Award
- Florida Design-Build Honor Award from the Design-Build Institute of America, Water/Wastewater Category
- Design Build Institute of America Grand Award
- U.S. EPA award for sustainable infrastructure
- National Council of Examiners for Engineering and Surveying Engineering Award for connecting professional practice and education
- 2012 Engineering Excellence Award National Recognition Winner from the American Council of Engineering Companies
- Consecutive honorable mentions in the Florida AWWA Region VI Drinking Water Taste Test

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Most nanofiltration plants use two stages and achieve a total recovery rate of about 85 percent. “We decided to see how far we could push recovery and got to 96 percent with a fourth stage,” says Bloetscher.

“It typically operates as a three-stage system and gets 93 percent recovery, but they can ratchet it up if they need to, such as if water supplies get tight. It takes a lot more operator observation because there is a narrow range in which the fourth stage will work efficiently. It’s easily fouled and gets saturated with barium sulfate.”

BLENDING STREAMS

The half of the raw water that doesn’t get nanofiltration treatment goes to the old 3 mgd lime softening system, where calcium and magnesium are precipitated out. After sodium hypochlorite addition, the finished water is sent to the two clearwells for blending with the nanofiltered water. Once blended, the finished product goes to a 2-million-gallon above-ground storage tank for distribution. The high-service pump stations that send the water to the distribution system have variable-frequency drives, as do all pumps and motors in the nanofiltration process.

The blending is important because nanofiltration removes too much alkalinity, while lime softening restores it. “We’ve figured out that if you mix the two finished waters, you actually get a better product, and you save huge dollars in post-treatment chemical costs,” Bloetscher says.

The raw groundwater has a pH of about 7; nanofiltration water is acidic (about pH 6). “That’s a little too corrosive to put out, so we have to raise the pH by blending the water,” says Skidmore. “Without blending, you’d be adding sodium hydroxide and other chemicals. Lime is a more natural chemical to use.”

“This plant can potentially get the highest recovery, 96 percent, of any nanofiltration plant in the world.”

DR. FRED BLOETSCHER

The finished water goes into the distribution system with a pH of 8.5 to 8.8 and a Langelier Saturation Index slightly on the plus side to help prevent corrosion.

LEED CERTIFICATION

The LEED features of the building added about 3 percent to the construction cost, but the sustainable design saves enough energy to make up the difference in seven years. LEED certification through the U.S. Green Building Council promotes sustainable strategies and practices. “It has to do with using recycled material, ambient and efficient lighting, and sustainable building materials right down to the paint and carpet fibers,” says Skidmore. “It all comes into play. Overall, it’s a savings in electricity especially. Employees are very happy here.”

The idea to seek LEED Gold certification came from the students in Bloetscher’s senior design class, who developed the conceptual designs for the plant and provided them to the bidders. The general contractor was CDM Smith.

“The plant is a tour in itself,” says Bloetscher. “When you walk around, you see gold plaques to note places we got LEED points.” The building, with a white cool roof, was constructed with recycled steel and locally sourced concrete block. The windows are made of glass that allows light in but reflects heat to reduce the need for internal lighting and cooling.

Nearly five years after opening, the first-of-its-kind Dania Beach plant has presented few issues for the city. Says Bloetscher, “It operates just the way it’s supposed to.” **tpo**

What’s Your Story?

TPO welcomes news about environmental improvements at your facility for the Sustainable Operations column. Send your ideas to editor@tpomag.com or call 877/953-3301.



Detail of the water cycle as depicted by one of the 3-panel ceramic murals mounted on the wall of Kenosha's water production plant.

Not Your Average Murals

MOSAIC ARTWORKS CREATED BY A YOUTH GROUP GRACE THE WALLS AT WATER AND WASTEWATER TREATMENT PLANTS IN A WISCONSIN CITY ON LAKE MICHIGAN

By Jeff Smith

Nearly 2.5 miles of Lake Michigan shoreline separates the Kenosha water and wastewater treatment plants, but the facilities share a theme: city parks, public art and murals.

"The murals are not your ordinary painted mural on the wall," says Ed St. Peter, general manager of Kenosha Water Utility. "They are made of 1- and 2-inch square ceramic tiles and artistically arranged as a mosaic to depict our water and wastewater treatment processes."

One of the murals is a 10-foot-high by 14-foot-wide beauty that graces a wall of the pump house at the 28 mgd wastewater treatment plant. Highly visible to the public from the parking lot of the Southport Park next door, the three-panel mosaic depicts the wastewater collections piping system, biological treatment and final clarification.

At the O. Fred Nelson water production facility, on a peninsula named Simmons Island, three murals of similar character grace the wall of a sedimentation tank and show the water cycle and the progress of water through the 40 mgd facility.

YOUTH GROUP PROJECTS

The murals were the creation of a city-sponsored group, Youth Employment in the Arts. Each summer, youth members chose a building or structure in the city on which to produce a work of art to reflect what goes on inside.

The group worked on the treatment plants in two successive years. Once a project and theme were defined, the members prepared a concept and final layout drawings. They assembled sections of the murals in manageable sizes and transported them to the plant sites for installation by a contractor.

"It took all summer for the students to complete each project," says St. Peter.

Complementing the mural at the water plant are nearly a dozen pieces of public art across a 100-foot-wide boat harbor that the facility fronts. Created by various artists and funded by private donations, the sculptures are part of Celebration Place at Harbor Park, an epicenter of community events and festivals.

"We just happen to have an ideal location that makes our facility almost part of that park," says Roger Field, director of water production. "In fact, we already are part of the Simmons Island Park, which is being expanded and improved."

“We are highly visible to the public, and we appreciate having the mural and sculptures to help with our overall landscape and appearance.”

ROGER FIELD

MULTIPLE AMENITIES

Simmons Island Park, one of the city's most visited parks, offers features that include walking and biking trails, a swimming beach, volleyball courts, playgrounds, observation decks and overlook platforms. A new 8-foot-wide composite wooden boardwalk passes the water plant.

The parking lot of a beach house built in 1934 and designated as a historic building on the national register abuts the plant's north side. Sand dunes created as part of the city park master plan serve as a buffer against



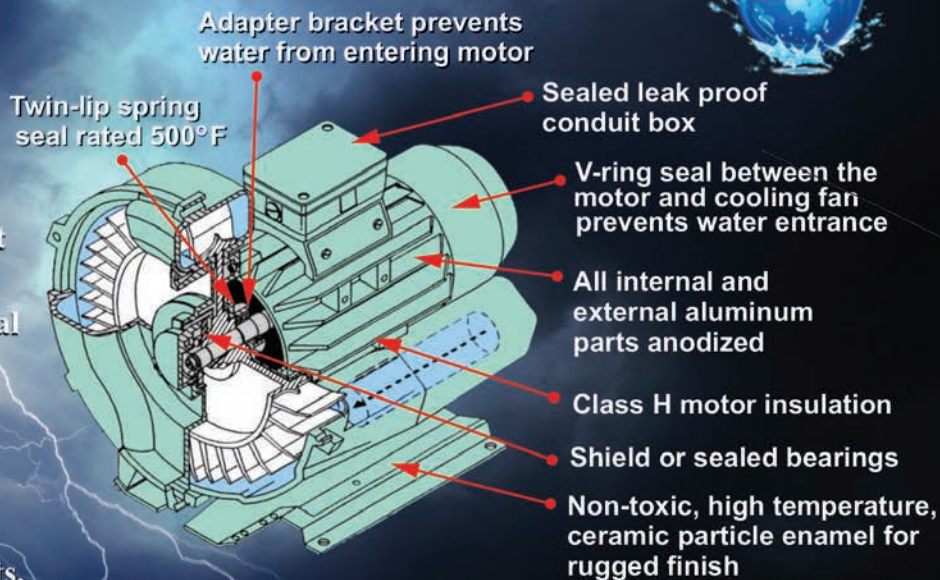
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Across the shipping channel which flows in front of the water production plant is a sculpture called "Porcine Player" by Joe Bobrowitz Jr. Seen in the background is a boardwalk that connects Simmons Island, the plants location, with the Kenosha Pierhead Lighthouse.

Lake Michigan, the plant's water source. A lighthouse sits at the end of the harbor channel that flows in front of the plant and allows pleasure boats access to a pier and mooring slips.

"We are highly visible to the public, and we appreciate having the mural and sculptures to help with our overall landscape and appearance," says Field.

The wastewater treatment plant has some of the same good-neighbor features as the water plant. Even though the Southport Park is smaller and



The 3-panel ceramic mural that depicts the water cycle is mounted on the front of Kenosha's O. Fred Nelson Water Plant.

only part of its parking lot adjoins the plant, it also has a beach and a historic beach house nearby. Two playgrounds, hiking and biking trails and the sand dunes all attract visitors.

"We're quite pleased with the impact our mural has on users of the park," says Katie Karow, director of wastewater treatment. "The architecture of our building is very pretty, and the mural adds a lot to the whole overview." **tpo**

RAISED IN THE BUSINESS

MELINDA WARD CARRIED LESSONS FROM HER FATHER INTO A CAREER IN THE CLEAN-WATER PROFESSION. SHE APPLIES THOSE LESSONS AS A PLANT SUPERINTENDENT IN NORTH CAROLINA.

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Andrew Craft**

WHEN MELINDA WARD WAS 5 YEARS OLD, SHE WOULD CLIMB a grassy hill to the digesters at the local clean-water plant, and then roll down, just for fun.

She wasn't trespassing. In fact, she was welcome: Her father, Lynwood Sessoms, was superintendent of the plant in Tarboro, North Carolina. Over the years, Ward spent many hours at the plant, "hanging out" with her dad, going with him on rounds, helping pull samples, observing lab work and doing odd jobs. She didn't do it for pay — instead, she was rewarded with valuable lessons.

"One thing my father always taught me was to walk through the plant on a regular basis to see what everything looks like, smell what everything is like, listen to all the different sounds, and get a feel for the plant," says Ward. Today she tries to instill that sense of awareness in her team members as superintendent of the Mebane Bridge Wastewater Treatment Plant in Eden, North Carolina.

Since she arrived in Eden nine years ago, Ward and colleagues have dealt successfully with a sharp drop in industrial flows to the plant, rated at 13.5 mgd. Ward has also pitched right in to serve on committees of the North Carolina Water Environment Association, promoting plant safety and operator training and development. For her efforts, she received a 2016 William D. Hatfield Award from the NCWEA.

NATURAL ATTRACTION

Although she grew up with the clean-water industry, Ward didn't set out right away to follow in her dad's footsteps. After high school, she enrolled at Western Carolina University unsure about a career direction.

"Once I started exploring different fields, I realized I didn't like anything except the environmental field," she recalls. "My father was steering



Melinda Ward, superintendent, Mebane Bridge Wastewater Treatment Plant.

me toward private business, but once I started taking classes, the ones that interested me the most were those dealing with water and wastewater."

She finished a degree in environmental health in 1993, along the way doing an internship at the Tarboro plant, then spending a summer in a clerical role with an engineering firm and contractor completing a plant expansion for nutrient removal at that facility. "Over the next Christmas break and the following summer, I came back as a construction worker," she says.

Her first job after college was as a lab technician at the water plant in Rocky Mount, about 20 minutes from Tarboro. A year later, she became lab supervisor at the wastewater treatment plant, where she met her future husband, Michael Ward, who was doing an internship there. He then went to work in Clinton, North Carolina, and soon became plant superintendent. They married a couple of years later. She joined him to live in Clinton and ran a small plant in a nearby community.

Ward took several years off as a stay-at-home mom. Eventually, her husband took a job with the Henry County (Virginia) Public Service Authority, and in January 2008 she went to work for Eden, on the Virginia-North Carolina border about 30 minutes from their home.

LOW-FLOW CHALLENGES

Eden, population 15,500, was incorporated in 1967 with the consolidation of three towns. Its clean-water plant was expanded in 1992 from 6.75 to 13.5 mgd design capacity, largely to accommodate flows from textile producers.

Wastewater passes through bar screens and a US Filter aerated grit chamber (Evoqua Water Technologies) before directly entering the secondary process. "When I started working here, a lot of the textile manufacturers had



Ward, shown checking an effluent sampler (Teledyne Isco), found her professional passion in environmental work and gravitated toward wastewater treatment.

“ I try to share with [my team] what each change means so they know what kind of operational changes to look at and try. We never do anything abruptly. We try to slowly make little changes until the problem corrects itself.”

MELINDA WARD

**Melinda Ward,
Mebane Bridge Wastewater
Treatment Plant,
Eden, North Carolina**

POSITION:	Plant superintendent
EXPERIENCE:	20 years in the industry
RESPONSIBILITIES:	General process oversight, reports, budgets, interaction with city leaders
EDUCATION:	Bachelor's degree, environmental health, Western Carolina University
CERTIFICATION:	Multiple wastewater, water, lab and collections certifications
RECENT AWARDS:	2016 William D. Hatfield Award, North Carolina WEA
GOALS:	Complete Grade 3 Collections certification; continue delivering quality effluent
GPS COORDINATES:	Latitude: 36°28'36.23"N; Longitude: 79°44'37.97"W



The Mebane Bridge Wastewater Treatment Plant in Eden, North Carolina.

THE SOLIDS SIDE

Biosolids handling has been an issue for the Mebane Bridge treatment plant. Today, Synagro Technologies handles the biosolids (700 dry tons per year) under a design-build-operate contract. The company dewateres the material on a press to 18 to 20 percent solids and applies it to area farms. A covered pad provides storage against bad weather that could disrupt land application.

A key concern is how to accommodate rising biosolids production if new development drives plant flows upward. The one aerobic digester holds 2 million gallons, dates to the original plant built in 1967 and is in poor condition. Repairs would be costly, and room for a new digester is limited.

Therefore, Melinda Ward and the plant team plan to install the CleanB biosolids treatment solution (BCR Environmental), which chemically treats waste activated sludge and produces Class B biosolids in less than 10 minutes, bypassing the digestion process.

The one-stage process combines sulfuric acid and sodium chlorite in a generating system to produce chlorine dioxide, which in turn is injected into the solids stream to disinfect and deodorize. The compact system has control and monitoring devices to record process parameters and deliver a consistent end product.

"The system comes in a box about the size of a tractor trailer," says Ward. "You can waste sludge directly to it. We toured sites in Florida and had a demonstration in August where they brought a system in at pretty much full scale. They ran our sludge through the system and the press just to make sure it would work. We had to make sure the state was on board too, to approve it, because it has never been done in North Carolina."

four clarifiers," says Ward. "So when the flow stopped coming from the clothing plant, we saw a lot of issues real quickly with the low flow going through this plant."

Part of the answer was to close down one aeration basin and two clarifiers. Valving work had to be done to shut off one basin and equalize the flow to the two remaining clarifiers. Then came the challenge of optimizing the process. "We had to learn the optimal levels for everything," Ward says. "Technically, we have an extended aeration plant, but with only 3.5 mgd, the water sits in the basins so long that we can't follow typical textbook procedures for keeping optimal treatment.

"The textbook will tell you how your plant should run, but you've got to check so many things. You've got to keep track of the bugs and the sludge levels. We have trouble maintaining the sludge blanket in the clarifiers. Most of the time it's less than a foot in each one. We had to experiment with wasting. Our mixed liquor suspended solids is not what textbook says. We had to figure out the optimal MLSS for summer as well as winter."

ISSUES UPSTREAM

Another issue was that the aerators had to run essentially around the clock to keep the basin contents mixed. That wasted electricity. The remedy was to install three Medora Corporation - SolarBee / GridBee solar-driven mixers. "That way, during the day we can turn some of the aerators off for a few hours, usually during the peak hours. We were able to reduce our electric bill by 31 percent. In terms of dollars, we saw a decrease the first year of a little over \$61,000." A fine bar screen (MN Water Treatment Solutions) installed between the grit chamber and the aeration basin traps fine fibers that at first were fouling the solar mixers.

Meanwhile, the flow reduction caused trouble in the 5 mgd pump station and 5-mile sewer line that had delivered the clothing plant's wastewater. "It went from averaging 4 to 4.5 mgd to less than 1 mgd," says Ward. "That flow, instead of taking a day or so to get here, now takes five days if not more. So we started seeing septic conditions in the collections system.

"Within a few months we started seeing corrosion in our headworks area. The only thing we could attribute it to was the change in the water coming to us. We had to replace a number of the electrical boxes with fiberglass or stainless steel." Mark Bullins and the collections system team took to adding calcium nitrate at the pump station to keep the wastewater fresher so that less hydrogen sulfide is produced. They also adjusted pump run-times and began adding water to sustain the flow and dilute the wastewater enough to keep chemical addition low.

Despite it all, the plant discharges high-quality water to the Dan River. Effluent typically contains less than 5 mg/L BOD and TSS, against permit limits of 30 mg/L for each. Effluent ammonia is usually not detectable.

TEAM ETHIC

Running the plant is a team activity. Ward relies on Joel Freeman, chief operator and pretreatment supervisor, to keep operations on a daily even keel. The operator team includes Ron Wright, Chris Powell

and Michael Baxter, relief operators; and David Greer, Charlie Manley, Glenn Pulliam and Matthew Tuttle, shift operators.

Jerry Prillman is maintenance supervisor; his team includes electricians D.J. Tucker and Carl Booth, and mechanics Dan Spence and Michael Brown. They keep the equipment running and help with troubleshooting problems

(continued)



Superintendent Melinda Ward, center, with her team at the Mebane Bridge Wastewater Treatment Facility. From left, Matthew Tuttle, shift operator; Chris Powell, pretreatment tech and lab supervisor; Ron Wright, relief operator; Joel Freeman, chief operator and pretreatment supervisor; Ward; Glenn Pulliam and David Greer, shift operators; and Michael Baxter, relief operator.

been leaving, but the flow was still about 6 mgd," Ward says. A couple of years later, a clothing maker that had been sending up to 3.6 mgd closed down, cutting the plant flow by more than half.

Today, the flow averages just 3.5 to 4 mgd, and that creates challenges. "We have two aeration basins that each can handle about 7 mgd, as well as

A detailed close-up of a Hyundai Crown Triton motor, showing the blue cast iron frame, the copper windings of the stator, and the shaft with a coupling. The Hyundai logo is visible on the frame.

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2 LOW OPERATING TEMPERATURES COUPLED WITH A PREMIER INSULATION SYSTEM

Heat is the largest factor leading to premature insulation failure - the larger the buffer between the actual motor temperature and the temperature rating of the insulation system is, the longer the insulation life will be.

Hyundai's approach for a reliable insulation system is to use **Class N varnish**, which is **rated for 200°C** and limits the temperature rise to ~74°C. This results in a larger buffer between the actual temperature and what the insulation system can handle without breaking down. With a 40°C ambient and a motor running at the nameplate load this buffer for an HHI motor is a whopping 86°C (200-74-40 = 86). Compare this to a typical motor with an 80°C rise and Class F insulation, the buffer is only 35°C (155-80-40=35). Remember the old adage, for every 10°C cooler electrical products run, the life expectancy of the insulation system doubles. An 86°C buffer is a big deal if you want a motor that will last a long time.

Summary - Hyundai motors run cooler and provide a larger buffer of protection for the insulation system which results in long life. An additional benefit of this design allows you to apply a stock motor in higher ambient conditions and still provide a good buffer.

3 LOW VIBRATION


Vibration leads to premature bearing failure and can damage the coupled equipment.

Hyundai's approach to a low vibration motor ... Shoot for less than half of the NEMA requirement, don't cut cost with lighter weight end bells, machine all motors with a precise foot flatness and use only the best bearings.

NEMA requires a finished motor to have a vibration level that does not exceed **.15 inch/second peak**. **Hyundai's conservative approach** sets the target at **~.07 inch/second peak**. All motors are precision balanced, feet are machined to a flatness of ~0.005", end bells are heavily ribbed and only premium bearings such as NSK, SKF or FAG are used.

Summary - heavy cast iron frames, precision balance rotors and precise foot flatness leads to lower vibration and thus longer bearing life and less damage to other equipment.

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“One thing my father always taught me was to walk through the plant on a regular basis to see what everything looks like, smell what everything is like, listen to all the different sounds, and get a feel for the plant.”

MELINDA WARD

Ward regularly attends training to expand her knowledge and skills and gives back to the industry by serving on committees of the North Carolina Water Environment Association.

in the pump stations and the plant. “Chris Powell, our lab technician, is great about keeping up with the numbers,” Ward says. “If anything changes suddenly, he always lets me know and helps in determining the cause.”

As a general approach to leadership, “I try to get everybody’s input on everything,” Ward says. “For me, it’s about getting to know how the plant runs. It’s a very personal process at each plant. Once you take ownership of it, that changes your philosophy. You don’t just go out there and do a job. You really try to make it your own.”

“I try to instill that in my team. Everybody here should be able to take ownership, because when they’re running the plant on their own, they’re responsible for everything that happens. I show them how to look for signs of something different going on — what to look for, what to listen for.”

“We look at the mixed liquor, the color, any foam that may be appearing. We check the bugs every week to make sure we’re keeping up with the biological activity in the basins. I try to share with them what each change means so they know what kind of operational changes to look at and try. We never do anything abruptly. We try to slowly make little changes until the problem corrects itself. Everybody takes pride in how the plant runs.”

LOOKING AHEAD

They may soon have more effluent to take pride in: new development is in the offing. Just across the Virginia/North Carolina border from Eden, several hundred acres are being developed as an industrial park. Although no ground has been broken yet, Eden has extended water and sewer lines to the state border. “We’re hoping our industries will slowly build back up,” Ward says. “We’re trying to be prepared.”

Meanwhile, the plant expects in the next year or two to begin treating leachate from an electric power company coal ash landfill. Effluent nutrient limits are most likely in the future for Eden’s and other plants in the Roa-

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noke River basin. “So we are trying to plan for alternative treatment so that we will be ready for the future,” Ward says.

The biggest item on Eden’s agenda is a U.S. EPA administrative order to improve the collections system. “A lot of the collections system is pretty old,” says Ward. “There are sections that date back to the 1920s.

We’ve done a whole lot to fix the problems, but only to the extent we’ve been able to get money.” Now, with a comprehensive plan in place and a state grant and loan package in hand, the city faces a major upgrade program it must complete in five years.

STILL LEARNING

Ward looks to the future confidently. She’s well equipped for her role with a state Grade IV (highest) Biological Wastewater license, as well as certifications in pretreatment, lab analysis, land application, surface water and water distribution. She’s looking to upgrade her Grade II Collections certification to Grade III.

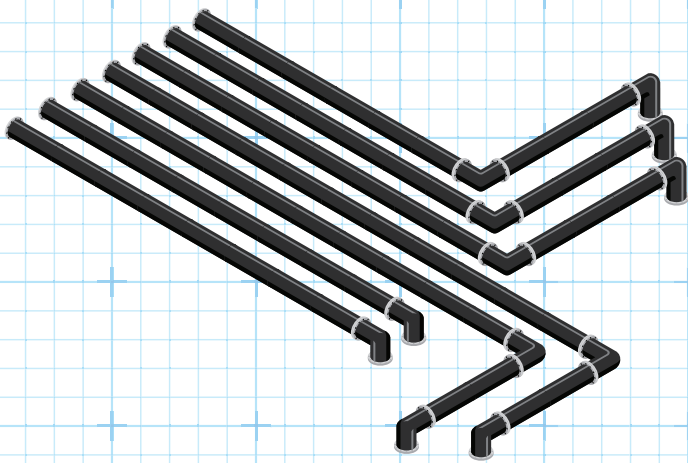
“I’ve had a variety of experience,” says Ward. “Whatever I have experience in, I go to one of the schools to get licensed for that area and keep a well-rounded education. That way I understand everything a little bit better.”

She gives back by serving on NCWEA committees, notably the Risk Management Committee. The Eden plant is certified under the state Safety and Health Achievement and Recognition Program (SHARP) and in 2016 received the NCWEA George W. Burke Jr. Safety Award.

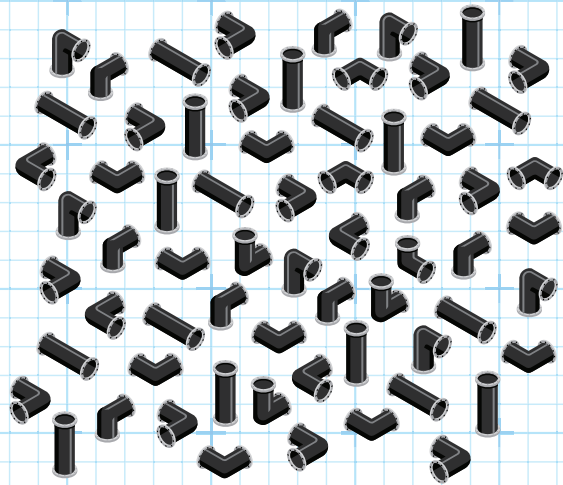
Ward also chairs the state Wastewater Board of Education and Examiners, which aims to ensure that wastewater treatment class material is up to date and truly reflects what today’s operators need to know. In addition, she is vice-chair of the state Professional Wastewater Operators Committee, which hosts group tours for operators at treatment plants to expand their knowledge of processes and technologies.

Her advice to operators aspiring to grow in the profession: “Try to diversify as much as possible. Look into all areas. We encourage cross-training at our plant so that operators know not just what their job is but what others’ jobs are. You can’t have tunnel vision to just look at your little area of the world. You’ve got to see all the parts that go into it.” **tpo**

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Jordan Kleinsmith, assistant plant manager, and Craig Carter, plant manager, with one of several progressive-cavity pumps used in multiple applications in the Carmel treatment facility.

Pumping Up Technology

AN INDIANA CITY FINDS A VARIETY OF USES FOR PROGRESSIVE CAVITY PUMPS FOR MOVING DIFFERENT WASTEWATER TREATMENT PLANT SOLIDS STREAMS

By Dan Miller

The Indiana city of Carmel has been recognized as one of the best cities in the U.S. to live. Its award-winning wastewater treatment facility is known for using innovative processes and technologies to meet environmental challenges.

The careful, data-driven approach extends even to simpler devices, including sludge pumps. The city used progressive cavity pumps for more than 30 years to move solids. In the 1980s, issues with the pumps led plant management to investigate alternatives.

CHEAPER THAN REPAIR

The team chose a pin-joint, open-hopper, bridge breaker pump to convey gravity-thickened waste activated sludge from a 2-meter thickener at about 6 percent solids. Using a variable-speed drive, the pump maintained a constant level within a small hopper, meeting the challenges of rapidly changing sludge characteristics and variable flow rates from the belt thickener.

As an added benefit for Carmel, the staff found that the innovative technology came at cost lower than repair of the existing pumps. In the early 1990s, encouraged by the performance of the thickened sludge pumps, the city selected SEEPEx PC pumps to feed anaerobically digested sludge at 2 to 4 percent solids to the plant's belt filter presses.

Consistent, low-pulse feeding to any dewatering device is critical for effective dewatering. SEEPEx 6L stator/rotor geometry, which provides a longer pump cavity and better cavity sealing with reduced pulsation, performs well in that application, plant operators say.

PUMP PROTECTION

In a progressive cavity pump, a single-helix rotor turns inside a double-helix stator to create cavities that progress from the suction to the discharge side of the pump. The compression fit between the rotor and stator creates seal lines that keep the cavities separate as they move through the pump with each revolution of the rotor. The design lets PC pumps gently meter and convey fluids of nearly any viscosity in a wide range of temperatures, with or without solids.

The pumps in Carmel were fitted with thermal protection devices that shield the pump stator from run-dry damage. The devices have proven more reliable for protecting pumps than traditional pressure-sensing devices.

In 1997, two pumps were added to move primary solids from the north primary tanks to the anaerobic digesters. Primary sludge consistency can be highly variable, changing the discharge pumping head conditions. Using a centrifugal-style pump under these conditions changes the discharge output, while a PC pump maintains a constant flow.

The Carmel team at first tried to use a percent solids meter to maintain a consistent solids feed to the anaerobic digester. However, when the meter proved unreliable, the pump's ability to deliver a constant flow at a set speed enabled a switch to timed operation, thus maintaining a thick product delivered to the digesters.

FEEDING CENTRIFUGES

Two more SEEPEx pumps were added in 2004 to feed newly added centrifuges, which replaced the belt filter presses for dewatering. The plant per-

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sonnel repurposed and installed one of the old belt filter press feed pumps to pump primary sludge from the south primaries to the digesters. The ability of a PC pump to move a variety of solids made the switchover easy.

The city then selected SEEPEX as the pump supplier when installing the nation's first biopasteurization system (Kruger) in 2007. Pumping sludge at 160 to 165 degrees F from the heat exchangers to the pasteurization tanks proved challenging due to high temperatures and intermittent operation.

The pumps in Carmel were fitted with thermal protection devices that shield the pump stator from run-dry damage.

SEEPEX tested several combinations of rotor and stator materials during a trial period. The city also tested a variety of other pumps before selecting a SEEPEX pump with a defined rotor and stator material combination that proved successful and provided the expected operation and stator life.

EASY MAINTENANCE

Recently, Carmel chose a phased approach to deploy SEEPEX PC pumps with Smart Conveying Technology (SCT). The SCT design allows easy access to the pump internals by incorporating split stator halves covered by four metal segments and a smart rotor. The rotor and stator can be changed without special tools and without disconnecting the suction or discharge piping.

The SCT design also extends stator and rotor life, optimizes flow rates, and improves energy efficiency simply by tightening the stator's metal segments at the first signs of wear. This saves the city maintenance, time and money.

ABOUT THE AUTHOR

Dan Miller is an outside sales engineering representative with Pelton Envi-



This SEEPEX pump in the plant's biopasteurization Class A biosolids process transfers solids at 165 degrees F.

Share Your Ideas

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ronmental Products (www.peltonenv.com), a distributor of pumps and other water and wastewater equipment based in Lewis Center, Ohio. **tpo**

THE SCIENCE OF SUCCESS

MARTHA TASKER'S LOVE OF SCIENCE AND ENGINEERING SERVE HER WELL AS SHE WORKS TO OPTIMIZE HER KANSAS COMMUNITY'S WATER SYSTEMS

STORY: **Scottie Dayton** | PHOTOGRAPHY: **Denny Medley**

DRAFTING AND MATH UNLOCKED THE DOORS TO MARTHA TASKER'S future. While studying drafting in college, she worked as a part-time intern at Wilson & Company engineer and architect firm, turning engineers' rough sketches into finished drawings.

The job at the company in Salina, Kansas, became full time after she graduated. By 1980, Tasker was a member of the Environmental Department, where she did concept and design work for many municipalities' water and sewer projects.

Intrigued by what she saw at water and wastewater treatment plants, Tasker borrowed books on their designs, took classes, talked to operators, and taught herself to see underground piping in order to draft it clearly.

Her career took off, assisted by mentors Robert Crawford at Wilson, and Don Hoff, director of the Salina Utilities Department. Her aptitude earned her a reputation as one of the best unlicensed engineering managers in the state from the Kansas Department of Health and Environment.

When Hoff retired, he championed Tasker as his replacement. City officials agreed and, after 28 years at Wilson, Tasker joined the municipality in November 2003. She manages 57 Utilities Department employees responsible for the water and wastewater treatment plants and the distribution and collections systems. She oversees an operating budget of more than \$12 million, along with multimillion-dollar capital projects.

In 2016, Tasker was one of five area professionals to receive the Women of Achievement Award from the Young Women Legacy Fund. "I never thought about being a pioneer for women in the utilities engineering field," she says. "I'm just passionate about my job and doing it to the best of my ability."



Martha Tasker, director of utilities, Salina, Kansas

WATER FOR SALINA

Salina uses surface and groundwater as source water. Seventeen wells in and around the downtown area (two on standby) deliver 15 mgd. The water is piped to the 20 mgd (design) Salina Water Treatment Plant. In emergencies, three more wells south of the city can provide 2 mgd. Water from these wells, part of the former Schilling Air Force Base water system, is chlorinated on site and pumped to the distribution system.

Three 75 hp Peabody Floway pumps (Weir Specialty Pumps (WEMCO) in a pump station along the Smoky Hill River cutoff channel deliver up to 10 mgd of surface water to the river settling basin. The basin has lightning rapid mix, walking beam flocculators from Ralph B. Carter Company (JDV Equipment Corporation), and Eimco sludge removal (Ovivo USA). Primary treatment at the plant includes two groundwater air stripping towers (Layne Christensen), two solids contact softening basins, two Eimco secondary clarifiers (Ovivo), and 16 gravity sand and anthracite filter cells with surface wash.

Finished water flows to 1-million-gallon and 2-million-gallon underground reservoirs. Two 200 hp pumps and five 250 hp pumps (all Pentair - Fairbanks Nijhuis) deliver water to five booster pump stations and eight elevated storage tanks holding a total of 4,075,000 gallons. Water is distributed to more than 20,000 accounts through

330 miles of 2- to 30-inch cast iron, ductile, PVC and HDPE pipe.

EASY TRANSITION

For Tasker, stepping into Hoff's shoes wasn't difficult, since she had worked with many city employees while at Wilson. Nevertheless, there were adjustments.



Tasker designed a major plant upgrade in the late 1980s and a belt filter press upgrade in the early '90s.

**Martha Tasker,
Salina (Kansas) Water
Treatment Plant**

POSITION: | **Director of Utilities**

EXPERIENCE: | **13 years**

EDUCATION: | **Drafting degree, Salina Area
Technical College**

MEMBERSHIPS: | **American Public Works
Association, AWWA, WEF**

GOALS: | **Preserve and enhance water quality,
ensure future water availability,
improve community conditions**

WEBSITE: | **www.salina-ks.gov**

GPS COORDINATES: | **Latitude: 38° 49' 59.426" N;
Longitude: 97° 36' 6.484" W**

“I never thought about being a pioneer for women in the utilities engineering field.
I’m just passionate about my job and doing it to the best of my ability.”

MARTHA TASKER



Ray Starnes and Tasker check the filter console. Tasker thrives on the endless variety of challenges in running a treatment plant.

“One big change was leaving the private sector for the public sector and having 47,000 bosses,” says Tasker. “Another change was the unpredictability of each day. At Wilson, I planned every day, then carried through. Not here. If I arrive intending to accomplish something that won’t take long, three or four things happen straight out of the chute that need immediate attention. I’m constantly moving from one question or request to the next.”

In the monochrome world of engineering management, Tasker gave instructions to contractors and was responsible for the final word on everything. Now she had to adapt to solving human problems. Many employees stay with the city 20 to 30 years, and Tasker finds saying no to them difficult. “My goal is to make sound decisions for customers and staff,” she says. “By explaining a situation’s pros and cons and the reasoning behind my decision, they usually understand.”

Another management method Tasker finds helpful is to task employees to explain why their requests or suggestions make sense to everyone, not just within their department, and why they should be adopted. “Once they do the legwork, they discover that coordinating between the different work groups isn’t as easy as it appears,” she says.

MOVING AHEAD

Tasker enjoys helping citizens and wants to be the first person staffers talk to when things go wrong, but she is also her team members’ advocate. Her progression plan has accelerated their advancement.

LEMONADE FROM LEMONS

An invitation to take part in the first Science on Screen film and discussion series at the Salina Art Center intrigued Martha Tasker. As utilities director, she constantly sought to involve women in science, the objective of the series.

Her partner, Verna Fitzsimmons, was CEO and dean of the Kansas State University Polytechnic Campus. The two had worked together on groundwater contamination projects. “The film was about dysfunctional people and had little to do with science,” says Tasker. “As we left the screening, we wondered what we were going to say.”

The event, aimed at young women, failed to attract them. “We looked for bright, young, smiling faces in the room and couldn’t find any,” says Tasker. “There were two or three science teachers and 20 to 30 people who probably wanted to hear what we had to say.”

A different audience demanded a different approach. Instead of their planned discussion about their careers and the opportunities science affords women, Tasker and Fitzsimmons asked how the community could retain its bright students and bring back those who had left. “We heard many interesting comments and had lively discussions,” says Tasker. “It made for a great event, and everybody took away something positive.”



The Salina water and wastewater team includes, from left, Ray Starnes, operations foreman; Mark Peterson, electrical engineer II; Larry Charles, operator II; Wayne Juenemann, maintenance mechanic; Tye Baker, water quality coordinator; Lori Sullivan, laboratory technician; Glenn Qusted, operator II; Martha Tasker, director of utilities; and Kristina Sidebottom, administrative assistant I.

Until 2016, operators couldn’t progress until someone above them left or was promoted. Tasker’s plan, approved by city officials, allows new hires to advance from operator I to operator II by fulfilling certain requirements. One prerequisite is certification through the state Department of Health and Environment. Another is developing improvement plans for any phase of the Utilities Department.

“The next step up is senior utility operator, a new position created to groom people for supervisor positions,” says Tasker. “People determine how far they wish to advance, and some are aggressive. It’s exciting to see their interest, because they represent future operator replacements.” About 25 percent of employees are engaged in the plan.

Such quick results are the exception. Tasker’s projects usually take five or 10 years to reach fruition, and many focus on ensuring the future availability of water for the community. The wake-up call came in 2006 when the Smoky Hill River ran dry during a drought. Tasker pushed to develop a 50-year raw water supply study, and Phase One launched in 2008.

“Originally, our water rate was the more you used, the less it cost,” says Tasker. “We pumped 5 mgd in winter and 13 to 14 mgd in summer.” The city’s new rate is based on water conservation practices used by semi-arid communities west of Salina. It doubles the cost of water when usage exceeds 120 percent of normal winter volume. The study also revealed that 15 percent of customers caused peak demand by irrigating their yards. The new rates dropped usage to 10 mgd in summer.

GREENING THE FIELDS

Simultaneously, Tasker addressed the plight of farmers downstream from the Kanopolis Reservoir. Because the state purchases water storage in the lake, legislation limits its availability to municipal and industrial users. The drought brought to light the importance of stored water to downstream users. “Agriculture is our predominant economic activity, and irrigation accounts for 84 percent of raw water usage,” she says. “The survival of those farmers was at stake.”

Tasker spent five years working with the Kansas Water Office and partnering with farmers in the river basin to remedy the situation. In 2011, leg-

isolation created the Lower Smoky Hill Water Supply Access District. It enables more efficient management of water resources for downstream users, while helping the city meet water demands during droughts. “We do a lot of good things pertaining to water, and we’re feeling pretty good about it,” says Tasker.

Improving water quality was another project that made people happy. “When I first arrived, we had numerous complaints about bad-tasting, smelly water,” says Tasker. “Out of 330 miles of distribution pipes, 275 miles were old cast iron lines.” A study convinced city officials to begin a water main replacement program that included upsizing pipes to improve fire protection.

Another water-quality effort involves removing trichloroethylene, an industrial solvent, contaminating groundwater on the former air base. Tasker is overseeing a five-year, \$10 million study of the potable wells. “The project is a little out of my bailiwick, but incredibly interesting,” she says. “I think we’ll finish sometime in 2017, know the corrective action, and begin remediation.”

BUILDING FOR THE FUTURE

Tasker moved into Phase Two of the 50-year-plan in 2010. One project addressed how to provide water for the community if a natural disaster disabled the only treatment plant. An engineering study and countless meetings finally produced results.

In April 2017, the city selected a design-build team to improve the South Well Field and build either a 3.5 mgd membrane filtration plant or a lime-softening plant. “Industries would love the membrane treatment, and building the plant could attract new companies to town,” says Tasker. “We’ll also be able to support significant growth.”

By the time the build is completed in 2020, Tasker will be designing an upgrade for the wastewater treatment plant to meet new nutrient removal standards. She designed a major plant upgrade in the late 1980s and a belt filter press upgrade in the early ’90s. Whether designing for water or wastewater treatment, Tasker is in constant touch with end users. “I learned firsthand while at Wilson that bringing operators into the design process produces a superior product,” she says. “They know every good and bad thing about their plant.”

PLEASANT SURPRISE

With numerous projects on her plate, Tasker said nothing to family and friends when notified of her 2016 Women of Achievement Award. It wasn’t until a newspaper article broke the story and strangers extended congratulations that the tumblers clicked into place. “We do just as much as the police or firemen to protect our community and the environment, except our work isn’t recognized by the media,” she says. “The award shined a spotlight on our industry and maybe helped students see how much science, math and engineering are involved.”

Tasker actively encourages young women to explore careers like hers. She speaks to high school classes and is a regular presenter at the annual Teen Women in Science and Technology workshop developed by the community and the Kansas State University Polytechnic Campus.

Meanwhile, Tasker intends to finish all the projects she has worked years to put in place before retiring. “When I leave, I want to hand over a utility that meets current standards, meets future demands, and needs maintenance instead of repair,” she says. “That will be my legacy.” **tpo**

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Kids at the 7 Rivers Water Festival get an up-close look at wildlife, courtesy of the National Audubon Society's local chapter and the Florida Department of Natural Resources.



Less Than Meets the Eye

7 RIVERS WATER FESTIVAL BRINGS FLORIDA'S WATER-SUPPLY ISSUES TO LIGHT WITH A RANGE OF DISPLAYS, GAMES AND PRESENTATIONS FOR ALL AGES

By Craig Mandli

Florida is running out of water — seriously. To understand that, you have to look beneath the surface.

Nearly 19 percent of Florida's surface is water — but much of that is unusable. "Florida has had water issues for quite a while," says Jacqueline Hollister, an environmental specialist with Polk County Utilities. "You don't see national coverage of it because we aren't dealing with the droughts you see in the west."

FUN WITH A PURPOSE

Water conservation is an important, if under-appreciated, idea in Florida. Hollister hopes the subject moves to the forefront soon. It's one of the main drivers behind the 7 Rivers Water Festival, an annual May event that brings together community and conservation organizations in a fun and educational environment.

The family outdoor celebration offers games, prizes, demonstrations, food and exhibits. Speakers and displays show the com-

munity ways to protect and enjoy the county's numerous lakes and wetlands, and emphasize how conservation can slow the rise of utility costs.

Polk County is an ideal location for the event. According to the U.S. EPA, it is home to seven river basins and is an important feeding area for a large share of the state's clean water reserves. "Our water affects much of the state, so it's important that our residents understand that their actions matter," Hollister says.

The event demonstrates cooperation between conservation groups and the public, addressing subjects that affect current and future water supplies. Presentations on fish and wildlife, lake water quality, natural resources, utility services and water supply issues encourage personal responsibility and public involvement.

An important message is to understand that diverse water issues are actually interrelated.

"Our top aim is to educate families and young children in
(continued)



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“Our water affects much of the state, so it’s important that our residents understand how their actions matter.”

JACQUELINE HOLLISTER

Polk County, but as everyone knows, Florida is filled with transplants as well,” Hollister says. “Those people may have come from areas where water supply isn’t an issue, and they may not realize it’s an issue here.”

REACHING TRANSPLANTS

Over-irrigation is a major and easily preventable problem in the county. Hollister notes that the average resident uses about 50 gallons of freshwater per day, but those who overwater use more than twice as much.

“Florida gets 52 inches of rainfall a year, which isn’t a whole lot to replenish our clean water reserves, especially if they are being taxed by too much irrigating,” she says. “A lot of our transplants choose plants that aren’t right for Florida’s climate, so they need to overwater them just to keep them alive. At the festival, we have booths from horticulturists and landscapers who discuss the right kinds of plants to grow here.”

Excessive irrigation water also runs off into one of the seven river basins. “The runoff carries fertilizers and pesticides into the waterways,” says Hollister. “It ends up being one big circle and is doubly bad for our water reserves.”

ATTRACTIONS FOR ALL

Festival attendees can make a lasting impression by voting for the finalists in the county’s annual water conservation art contest. Every K-12 school student in the county can submit a poster, with first-, second- and third-place finishers adorning the county’s conservation-themed calendar.

“Having their art on display is a big deal to the kids,” says Hollister. “I think the attendees enjoy the chance to see conservation through children’s eyes.”

Attendees can also take part in a cardboard boat challenge and get an up-close look at area wildlife, while their parents can learn ways to reduce their water bills. “We want attractions that appeal to everyone,” says Hollister. “The key is to bring in more diverse organizations and get more of them on board with what we’re doing.

“Many people don’t realize that we’re literally running out of potable water here. Instead of making it sound threatening, it’s best to present the idea in a fun and friendly way.” tpo

The festival has plenty of attractions and activities for children and families, and parents can learn how to reduce their water bills.



7 Rivers Water Festival attendees vote for the finalists in the county’s water conservation art contest for elementary school students.

What’s Your Story?

TPO welcomes news about your public education and community outreach efforts for future articles in the Hearts and Minds column. Send your ideas to editor@tpo-mag.com or call 877/953-3301.



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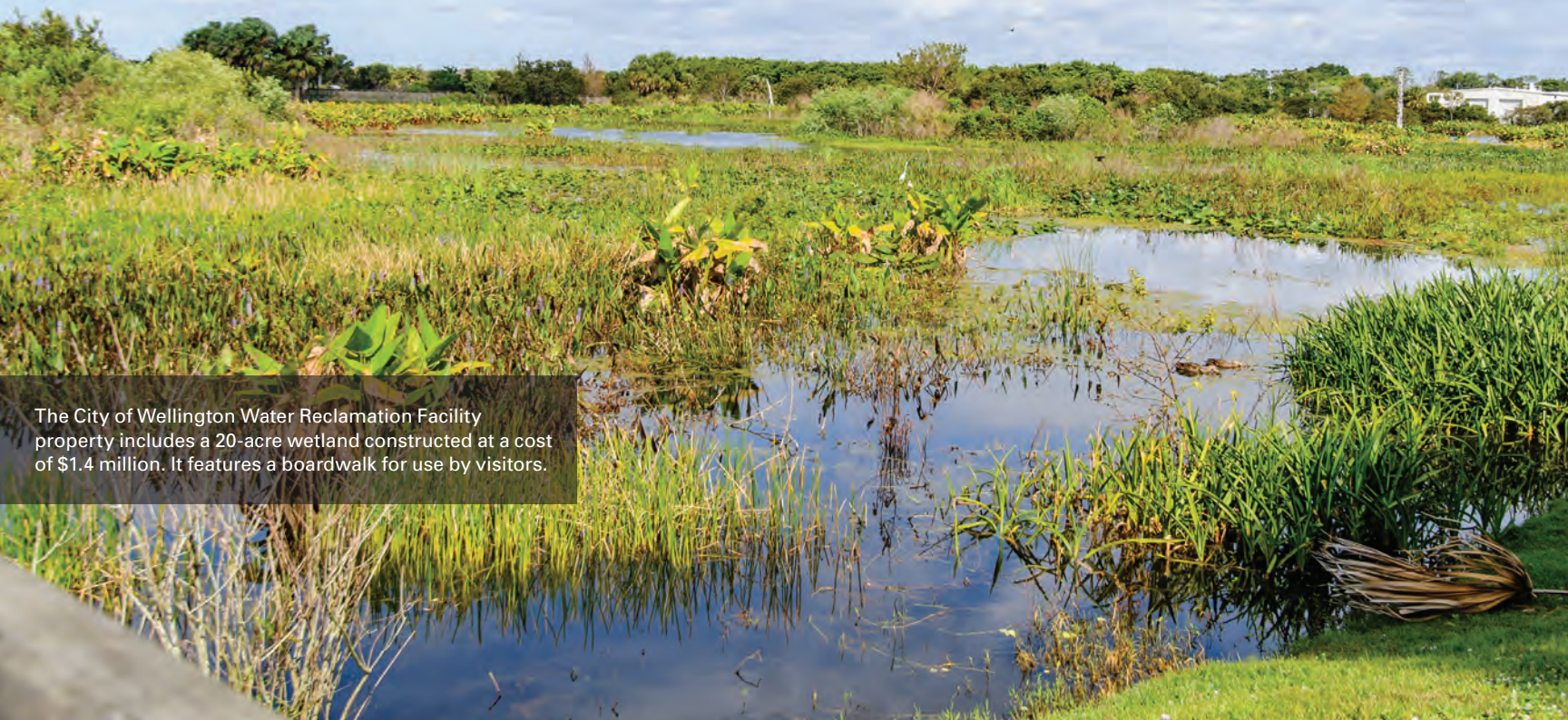
STORY: **Trude Witham** | PHOTOGRAPHY: **Rob Herrera**

THE WELLINGTON WATER RECLAMATION FACILITY has won numerous awards. Its compliance history, operation and maintenance practices, customer relations, and safety record are all outstanding. But what makes the plant's operators most proud is the biosolids program.

"For years, we land-applied our Class B lime-stabilized solids," says explains Bryan Gayoso, superintendent of the facility in Wellington, Florida. "Then, after a 2012 plant expansion, we were able to produce a Class AA product, which we sell to a hauler who markets it." The switch to Class AA came after land application sites grew scarce and difficult to permit.

The plant team installed an automatic batch solids drying system in 2012, and has operated it for the past five years with no downtime, thanks to excellent preventive maintenance and an inventory of spare parts. The biosolids program earned a Florida Water Environment Association (FWEA) Biosolids/Residuals Program Excellence Award in 2014 and 2015.

The Wellington facility is innovative in other ways. The team achieved high-quality reclaimed water, of which 10 percent is distributed to reuse sites and used to water village parks and median strips. The rest is pumped into a deep well. Effluent contains monthly averages of 2.9 mg/L BOD and 1 mg/L TSS.



The City of Wellington Water Reclamation Facility property includes a 20-acre wetland constructed at a cost of \$1.4 million. It features a boardwalk for use by visitors.

The reclamation facility provides water for village parks and median strips and for private customers. Water not reclaimed is deep-well injected.

INNOVATIVE PLANT

The Wellington Water Reclamation Facility was built in 1981 with 1.5 design mgd capacity. The water reuse system with deep-bed filter was added in 2005. A \$22 million upgrade in 2012 enlarged the reuse system and added new reuse pumps, an aerator, a clarifier, aerobic digesters, blowers, a belt filter press, a biosolids dryer, and new deep-well piping/pumps.

Says Gayoso, “The upgrade took almost three years, so there was disruption, or what we call organized chaos, to the operators during that time.” The new dryer posed training challenges: No one had run similar equipment, and the staff had to learn the operating modes and how to maintain the system.

Today, plant design capacity is 6.5 mgd. The influent is pumped to two Aqua Guard bar screens (Parkson), then to a PISTA Grit separator and classifier (Smith & Loveless). From there it flows to three Eimco carousel process aerators (Ovivo), followed by four clarifiers (Walker Process Equipment, A Div. of McNish Corp.; WesTech; Ovivo).

Biosolids are dewatered on two belt filter presses and dried with a Fenton Fenix indirect dryer (RDP Technologies). The effluent is treated to reuse quality with DynaSand bottom feed filters (three cells with six modules each) from Parkson. Odor is controlled by three Jacobs Air Water Systems scrubbers.

INNOVATIVE DRYING

The digesters hold and aerate an average of 140,000 gallons of waste activated sludge for five days. The material is then pumped to the belt filter presses, which dewater it to 15 to 16 percent solids. A pump (SEPEX) then sends the material to the dryer.

The batch process dryer automatically fills with biosolids cake and discharges material at 93 to 99 percent solids, based on preset parameters. A typical batch takes four hours from fill to discharge, when the product reaches 330 degrees F. The system operates four or five days a week and typically produces 2 to 4 tons of Class AA product daily.

“This indirect dryer is unique in that there are few like it in existence,” says Gayoso. “The flame or gas never comes in contact with the product, eliminating the possibility of an explosion.” The staff is happy with the dryer. With the Class B product, the plant produced one 45-cubic-yard trailer load per day. Now, it produces a trailer load every 10 to 12 days. The new process also limits odor. “We’re next to a park, so odor was a factor,” Gayoso says.



The Wellington Water Reclamation Facility staff includes, from left, David Cipriani, chief operator; Mark Simkowitz, Operator III; Michael Frank and Nathan Slack, mechanics; Bryan Gayoso, superintendent; and Randy Rennekamp, industrial electrician/instrument technician.

Wellington (Florida) Water Reclamation Facility

BUILT: | 1981

POPULATION SERVED: | 60,000

EMPLOYEES: | 10

FLOWS: | 6.5 mgd design, 3.5 mgd average

TREATMENT LEVEL: | Secondary

TREATMENT PROCESS: | Activated sludge

RECEIVING WATER: | Deep well

BIOSOLIDS: | Class AA, sold to a hauler and marketed

ANNUAL BUDGET: | \$2.1 million (operations)

WEBSITE: | www.wellingtonfl.gov

GPS COORDINATES: | Latitude: 26°39'53.85"N; longitude: 80°14'0.18"W





PEACEFUL WATERS SANCTUARY

Bryan Gayoso, Wellington Water Reclamation Facility superintendent, loves nature photography. While taking photos at a wetland in Palm Beach County, he learned it had been converted from treatment plant percolation ponds.

"I presented this same idea to my director of utilities, and after a few years, the Peaceful Waters Sanctuary was created from our percolation ponds at the Wellington facility."

The ponds sat on a 20-acre site that had been closed off to the public and required frequent mowing. "It seemed like a waste of usable land," says Gayoso. The Wellington Village Council liked the idea of greenspace. They approved the wetlands construction and provided \$1.4 million to fund the project. The area is now filled with plants, trees and a boardwalk, maintained by the village.

"There are lots of aquatic plants and birds," says Gayoso. "Photographers, birders and families can enjoy the wildlife and 20-foot-tall cypress trees. And, it can still serve the purpose it was originally intended for — a backup to our deep-well injection system."

“There is a lot of variety at the plant, and the staff gets a taste of almost everything. It’s a perfect place to learn wastewater.”

BRYAN GAYOSO

The Peaceful Water Sanctuary provides backup for the village’s deep-well injection system while providing a haven for birds and wildlife

DESERVED RECOGNITION

The staff is proud of the awards the facility has won for excellence in operations and maintenance and biosolids management:

- Florida Department of Environmental Protection Domestic Wastewater Plant Operations Excellence Award, 2004-'06, 2014, 2015
- U.S. EPA Operation and Maintenance Excellence Award, 2005
- FWEA Biosolids/Residuals Program Excellence Award for Technology Innovation, 2014
- FWEA Biosolids/Residuals Program Excellence Award for Small Operations, 2015



Says Gayoso, “The DEP award is for the entire plant. They ask about everything, and you have to write a narrative. I look at it as an accomplishment. We’ve run the plant properly and have met compliance. Winning the award is also good PR for the village of Wellington, and the village council promotes this.”

HIGHLY EXPERIENCED

Gayoso (Level A wastewater certification, 14 years at the plant) credits the staff for the plant’s success. Reporting to him are:

- Chief operator David Cipriani (Level A, 12 years)
- Operator III (Level A) Greg Lee (seven years), Mark Simkowitz (12 years)
- Operator II (Level B) Roger Black (three years), Glenn Burr (five years)
- Operator I (Level C) Keith Aiken (six years)
- Mechanics Michael Frank (three years), Nathan Slack (three years)

“People make a plant successful,” Gayoso says. “Our staff members all get along, and their personalities mesh. They’re highly experienced. David Cipriani has over 40 years’ experience in the industry and Michael Frank has more than 30.” All operators are certified and well trained. They receive safety refreshers monthly and utility-wide training once a year.

The operators take samples for plant TSS, influent and effluent CBOD, reuse TSS, and fecal coliform. They operate and monitor the aeration, digester and dryer systems, and the deep well and pumping system. They also monitor the reuse sites: four parks, a wetland and three street median strips. The mechanics handle all maintenance. The staff’s greatest achievement? “Keeping the system operating efficiently,” says Gayoso. “We don’t have any issues with this, really. We maintain it, we purchase new equipment when we need to, and we keep spare parts on hand.”

The staff members also use their ingenuity. Mechanics Frank and Slack helped develop a plan to refurbish the older aerators. As master welders, they rebuilt the aerator paddle blades up to original spec-

Odor-control scrubbers (Jacobs Air Water Systems) help make the Wellington plant a good neighbor.



Wellington Water Reclamation Facility PERMIT AND PERFORMANCE

	PERMIT (annual average)	EFFLUENT (annual average)
CBOD₅	30 mg/L	2.9 mg/L
TSS	5.0 mg/L	1.0 mg/L
pH	6.0-8.5	Compliant
Fecal coliform	25/100 mL	0.06/100 mL

ifications. The project took several months, since the aerators had to be isolated hydraulically and taken out of service.

Says Gayoso, “We immediately saw a change in the treatment process. The amperage draws on the motors increased, therefore adding a more effi-

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The Wellington facility operates a unique Fenton Fenix indirect biosolids dryer (RDP Technologies).

“This indirect dryer is unique in that there are few like it in existence. The flame or gas never comes in contact with the product, eliminating the possibility of an explosion.”

BRYAN GAYOSO

cient mixing of the aerator contents.” The plant also saved thousands of dollars by not having to replace mechanical aeration paddles.

LOOKING FORWARD

Although the plant is running well, Gayoso has his eye on the future: “I spend a lot of time evaluating our equipment needs and planning for upgrades.” Projects planned for completion in mid-2019 include a headworks and clarifier upgrade, an additional solids-handling pump, additional digesters and blowers, a new odor-control scrubber and a new control room. The team has started replacing failed lighting fixtures with LEDs.

The plant staff would like to develop a customer base for reuse water. “Right now, our only customer is the village, so we have to get out there and see what the needs are,” Gayoso says. “When there’s a drought, people need the water. Then it rains and no one is interested anymore. So, the interest level has to be maintained.”

Another concern is finding staff as people retire: “There are limited resources out there, but our reputation carries — people know the village and the plant as good places to work. There is a lot of variety at the plant, and the staff gets a taste of almost everything. It’s a perfect place to learn wastewater.”

Gayoso adds, with a laugh, “I’ve had employees move out of state and say it would be great if they could just move the plant there!” **tpo**



Bryan Gayoso, superintendent

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1



2



1. The GasMix system keeps moving parts on the outside of the digester.
2. Slurry feedstock before and after treatment with the GasMix system.
3. Nozzles at strategic locations around the digester provide the mixing action.
4. A GasMix system with insulated tank and piping.

3



4



Outside Job

MIXING SYSTEM FOR ANAEROBIC DIGESTERS USES BIOGAS INSIDE THE TANK TO HELP IMPROVE MIXING EFFICIENCY AND INCREASE GAS PRODUCTION

By Ted J. Rulseh

Effective mixing is important to optimizing biogas production in anaerobic digesters. There are various approaches to mixing systems, including mechanical stirring with paddles, pumping jets of material, and pumping biogas through the slurry.

Landia, based in Denmark with U.S. operations in North Carolina, offers a mixing technology to the North American market that combines two of those basic methods — jets of material, and aspirating and injecting biogas. The GasMix technology places all rotating components outside the digester tank, helping to reduce wear and tear and simplifying maintenance.

The technology is suitable for mixing solids from wastewater treatment as well as food processing byproducts, animal manures, and essentially any waste or sludge that contains decomposable organic matter. Soren Rasmussen, director with Landia, talked about the technology in an interview with *Treatment Plant Operator*.

tpo: What was the company's objective in developing and offering this technology?

Rasmussen: The basic intent was to mix the contents of anaerobic digesters, but to do so without having any rotating equipment installed inside the tank. When you have propellers or other devices rotating inside the

tank, there is a risk of stringy material catching onto those devices. Having all the equipment outside the tank provides easy access for maintenance and frees operators from entering the tank, which would present some health and safety concerns.

tpo: What components are inside the tank to enable mixing?

Rasmussen: The main things that are physically inside the tank are nozzles. They are installed through the tank wall and extend only a couple of feet into the tank. They're solid stainless steel, so they need no maintenance.

tpo: Please describe in basic terms how this system performs efficient mixing.

Rasmussen: The driving mechanism is a Landia chopper pump. A suction pipe pulls sludge from the bottom of the digester and runs it through the chopper pump. The resulting material is then recirculated to the tank through a nozzle at high velocity. There is also a Venturi nozzle in the system. When we run the sludge through that nozzle, it creates high pressure on the front side and a low-pressure area, or vacuum, on the back side. That Venturi chamber is connected to a pipe that extends into the digester headspace. The vacuum pulls biogas down and the nozzle injects it into the tank.

The gas then travels up and mixes the sludge on a vertical plane. That makes for energy-efficient and effective mixing of the digester.

tpo: How many of these nozzle combinations would be required for a typical digester?

Rasmussen: There could be one for a very small tank, or six to eight for larger tanks. We have some tanks with nine to 12. It really depends on the size of the tank and what is inside the tank — municipal sludge, thick manure or some industrial feedstock. The larger the tank and the thicker the feedstock, the more mixing energy is required.

tpo: How would you characterize the energy efficiency of this process?

Rasmussen: It is among the best in the industry. Several customers have reported that the increase in biogas they get from this system more than offsets the parasitic load that a mixing system imposes. So in effect, it's an energy-producing system. Some customers have put this system on in addition to an existing mixing system, just for the increase in biogas and therefore the increase in energy production.

tpo: How does mixing a digester in this way increase gas generation?

Rasmussen: Two things positively affect methane production beyond simply mixing the tank completely. First, the chopping of the solids makes the material easier to digest. Second, the high pressure in front of the Venturi nozzle and the rapid decrease in pressure after it actually ruptures the biomass cell walls releases more carbon for methane production. The amount of the increase depends on the nature of the feedstock. At the end of the day, any increase in biogas will add to the revenue stream, provided there is a beneficial use for the gas.

tpo: Are there any other advantages in terms of energy efficiency?

Rasmussen: An interesting thing that happens when the sludge is subjected to high pressure and rapid depressurization is that the viscosity of the sludge is reduced. Pumping a lower-viscosity sludge naturally requires less energy. So, for example, users can save energy when pumping the sludge through heat exchangers or pumping material to a neighboring plant. Some customers tell us they are saving more energy on sludge pumping than the amount of energy they put into the mixing system.

“The main things that are physically inside the tank are nozzles. They are installed through the tank wall and extend only a couple of feet into the tank. They're solid stainless steel, so they need no maintenance.”

SOREN RASMUSSEN

tpo: How does the capital cost of this system compare with other mixing technologies?

Rasmussen: It is competitive with other systems in the industry. In fact, because it doesn't put any load on the tank cover, walls or floor, there is no need to invest in extra infrastructure. For a top-mounted mixing system, there is a need to size the cover for that load and any torque or other forces the mixing will impose. That reinforcement can cost more than the mixing system itself. Tank wall strength would also have to be considered.

tpo: Can this system be retrofitted to existing anaerobic digesters?

Rasmussen: Yes, very easily. The vast majority of systems we sell are for retrofit applications. New digesters are being built all the time, but there are many more existing digesters that don't have adequate mixing. We have developed substantial experience in retrofitting. We treat every digester as

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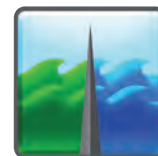
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unique and review the details of every project to make sure the mixing system is optimized.

tpo: What kind of in-the-field experience stands behind this technology?

Rasmussen: The vast majority of our installations are overseas. We have installed the GasMix system on five continents in hundreds of locations, but only a few in the United States so far. There is a lot of interest in the system, and we are working on a number of projects in the municipal sector. **tpo**



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AN EFFICIENT FINE SCREEN AND A PERIPHERAL-FEED CLARIFIER PLAY IMPORTANT ROLES IN A NEW YORK COMMUNITY'S MAJOR PLANT UPGRADE

By Chris French

Working alone in the Addison Village Wastewater Treatment Plant, plant operator Chuck Wright depends on high-performing and reliable equipment.

After a \$3.34 million upgrade to bring the 34-year-old facility up to code and meet New York State Department Environmental Conservation (DEC) requirements, Wright is proud of his clean and well-maintained plant, about 100 miles south of Rochester.

The equipment at the plant (220,000 gpd average flow, 420,000 gpd permitted) includes a Spiraflo clarifier and a Raptor fine screen, both from Lakeside Equipment Corporation. The clarifier was retrofitted into an existing concrete structure to replace an old center-feed peripheral take-off clarifier. The fine screen, besides removing debris in the headworks, also washes, compacts and transports the screenings.

MAJOR IMPROVEMENTS

For its plant upgrade, the village retained the Larson Design Group (LDG) for design and construction, developing the project scope and funding applications for rehabilitation of the anaerobic digester, replacing a wastewater pumping station, and installing a standby emergency generator and a mechanical bar screen.

Other improvements under the contract included the major task of replacing the clarifier internals and raw wastewater pumps, and upgrades to the trickling filter recirculation and HVAC systems. Larson has also provided engineering for the village's water supply and treatment system, street projects and drainage remedies.

“I have no problems at all with the clarifier or the screen. Apart from occasional oil changes and a few squirts of grease, they keep working very well.”

CHUCK WRIGHT

“I do my best to keep everything clean and running smoothly,” says Wright. “I have no problems at all with the clarifier or the screen. Apart from occasional oil changes and a few squirts of grease, they keep working very well. Lakeside's seals and bearings are of exceptional quality. Nothing gums up or clogs. The fine screen does a great job getting rid of the paper and heavier particles before they can get to the clarifier.”

EFFECTIVE SETTLING

The Spiraflo clarifier is a peripheral-feed, center take-off unit that eliminates short-circuiting. The flow spirals around the baffle skirt and under the skirt to ensure maximum use of the tank volume (26 feet in diameter



The new Spiraflo clarifier at the Addison Village plant (Lakeside Equipment Corporation).

and 8.5 feet deep) for effective solids settling.

Wastewater enters the clarifier at the periphery of the tank and is directed along the narrow raceway formed by the baffle skirt and the outer wall. This dissipates the wastewater's hydraulic energy as it flows around the raceway and eventually spirals down under the skirt. Wastewater enters the main settling area from the full circumference of the skirt and slowly rises to pass over the centrally located effluent weirs.

The inflow is prevented from flowing directly to the effluent weir by the specially designed race baffle skirt, which extends down to about 2 feet above the tank floor. The hydraulic flow pattern is in the same direction (inward) as the sludge collector is rotating and moving the solids (inward) to the sludge draw-off pit.

Gregory Cummings, P.E., twin tiers director of Larson's operations (Civil Division), observes, “Before the upgrade, the previous clarifier was getting overloaded and had started exceeding recommended values, so we had to act to keep the plant in compliance. We'd had experience with Lakeside and always found them good to work with. We also knew of the advantages of the Spiraflo clarifier and the raptor screen. Nine years after installation, the equipment meets the 'fit and forget' description.”



SCREENING EFFICIENCY

The Raptor screens have diameters of 26 to 71 inches and flow capacities above 20 mgd. Water flows through a three-plane screening basket, and solids are efficiently trapped by the screen bars that form the circular basket. When the water rises to a predetermined level, the rake begins to rotate, cleaning the screen bars.

The rake's teeth pass between screen bars to remove captured materials. When the rake reaches the top of the screen, the material drops into a central screw conveyor. For complete cleaning, the rake reverses direction and passes through a hinged comb. The central screw conveyor

Control panel (left) and inside view (below) of the Raptor screen (Lakeside Equipment Corporation).



then transports the material as it is washed, compacted and dewatered on its way to the discharge chute. Dewatered screenings have a solids content above 40 percent.

Screenings are initially washed as they are deposited in the collection trough. In the upper section of the transport tube, screenings are washed a second time. The macerating action of the screw breaks down large organic particles, which are then washed back into the flow stream. A spray wash system in the dewatering chamber removes any collected material to ensure free drainage of water, which is then removed during compaction.

I&I CONTROL

Larson is now working with the village to address I&I issues. During wet weather, the flow through the system can triple. Work includes uncovering buried manholes, televising the entire collections system, and rehabilitating portions where I&I is the most severe.

Cummings observes, "We very much embrace innovation and welcome cutting-edge new approaches, but the tried-and-tested design and cost-effectiveness of the Spiraflo clarifier is hard to beat. The Raptor screen is also well designed and extremely durable. We are happy as the village's adviser to provide high-quality, long-lasting solutions." **tpo**

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A Sharper Eye on Sludge Levels

THE LATEST SONAR TECHNOLOGY IMPROVES ACCURACY IN LEVELS MEASUREMENT, HELPING CLEAN-WATER PLANTS SUSTAIN COMPLIANCE AND ENHANCE EFFICIENCY

By Jack Evans

Wastewater treatment plants are major energy users, and efficient operation requires a fine balance between biological and hydraulic parameters.

Maintaining that balance can be daunting. It depends on reliable and meaningful data in critical parts of the process, such as the primary and secondary clarifiers and thickeners.

Accurate measurement of floc and high-density sludge levels is challenging in murky, turbid settling tanks.

Today, advanced sonar measurement devices can provide such accuracy, helping to improve process control, enhance permit compliance consistency, save energy, and extend equipment life.

COMPLEX PICTURE

Even with extensive sample extraction and lab analysis, it is difficult to obtain a clear picture of the sludge density profile: solids densities can range from 200 mg/L at the tank top to 3,000-6,000 mg/L or more at the bottom. Generally, operators are interested in quality return activated sludge with density greater than 2,500 mg/L. However, when problems occur, operators need to know the dynamics of the different layers to effectively control the treatment process.

Sonar measurement systems do not always provide comprehensive and reliable information because they lack the power or the correct frequency to penetrate the suspended solids. Other tools for gaining a full tank profile include manual dipping devices such as tube samplers or gap sensors, but these provide no continuous output for trending and control.

Because sonar systems typically cannot penetrate densities of 1,200 to 1,500 mg/L, they can measure only the upper floc layer. Users can then make the incorrect assumption that the denser RAS layer corresponds with the floc layer's movement.

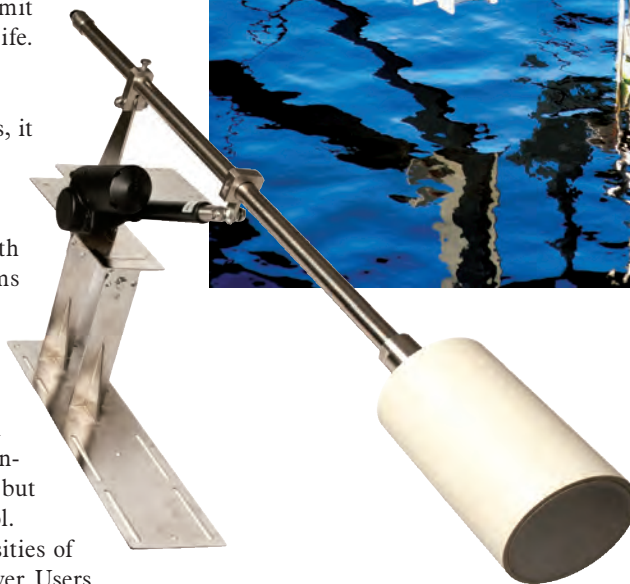
SIGNIFICANT IMPACTS

As the floc layer rises due to an upset, the assumption may be that the denser RAS layer is also rising. This tells operators either to increase the RAS pumping rate or drop the bellmouth to bring the rising blanket down. These actions have little effect on the lighter floc layer, but will quickly remove the good-quality biomass and then begin to pump back a lower-density, poor-quality biomass.

All this negatively affects the food-to-microorganism ratio, mixed liquor suspended solids and dissolved oxygen. At some sites, it could take weeks to fully rectify the situation, by which time increased aeration may have been required, increasing energy consumption and costs.



An ORCA sonar system (Hawk Measurement) is shown in full profile and as mounted to measure sludge levels in a clarifier basin.



The reality is that the denser, good-quality biomass has remained at the bottom of the tank and only the lighter floc layer has lifted. Thus, it is essential to monitor the biomass at 3,000 to 6,000 mg/L in order to properly control the RAS pumps and bellmouth and send only good-quality' biomass back to aeration or to the thickener.

IMPROVED TECHNOLOGY

Now, advanced sonar systems have been developed that submerge a high-power transducer to send sonar pulses through the liquid. These are reflected back by different density layers, including those in excess of 6,000 mg/L and even the tank floor. Signals are processed to provide outputs that relate to both the floc and RAS levels — vital information to help optimize energy usage and site operations. Alarm levels can be set to help operators make process changes in time to avert a permit violation.

Measuring through a liquid is straightforward, and almost any 700 kHz transducer will give reliable and repeatable results. But suspended solids particles attenuate and reflect the high-frequency short wavelength, causing unreliable and unrepeatable measurements.

However, with a lower-frequency (150 to 300 kHz) transducer, the longer wavelength can “ignore” the suspended particles more easily. This is why foghorns use a low frequency/long wavelength to project the sound through moisture particles in the air.

In line with this, the correct transducer frequency needs to be selected for primary sedimentation, primary and secondary clarifiers, sludge thickeners, lamella clarifiers, and sequencing batch reactors. The key to the success of the new systems is their wide range of transducers, from 150 to 700 kHz.

For example, SBRs are typically installed where space or cost is at a premium. They combine primary sedimentation, aeration and secondary settlement in one tank. The liquid levels change within the tanks, and a fixed transducer cannot cater to these variations. The new technology overcomes this with a floating transducer that tracks the settling blanket layer far more accurately, improving batch times up to 20 percent.

CLEAN AND ACCURATE

To provide regular cleaning of the submerged or floating ultrasonic transducers, the new measurement devices use an actuator lever arm system with an automatic cleaning cycle, triggered on a time basis or by a predetermined signal level. The actuator pushes the transducer through the water and returns it to the original position. The sharp shearing action removes debris and scum from the front face, sustaining optimum performance without any operator involvement.

There are several design issues to consider when evaluating a sludge monitoring system, whether electronic or mechanical. Hazardous area versions, used for enclosed settling tanks, are built to minimize odor release or to capture methane gas. These include transducers and cleaning mechanisms suitable for use in the hazardous area.

Communication protocols including Fieldbus, Profibus, HART and DeviceNet deserve consideration for ensuring seamless integration with plant instrumentation and distributed control systems (DCS).

The transducer can be remotely located from the control unit (typically up to 2,000 feet), providing a robust wireless link for instant access to all

Advanced sonar systems have been developed that submerge a high-power transducer to send sonar pulses through the liquid. ... Signals are processed to provide outputs that relate to both the floc and RAS levels — vital information to help optimize energy usage and site operations.

parameters for servicing, technical support and commissioning. Multiple outputs and relays should be available for alarm and control functions and for cleaner arm actuation.

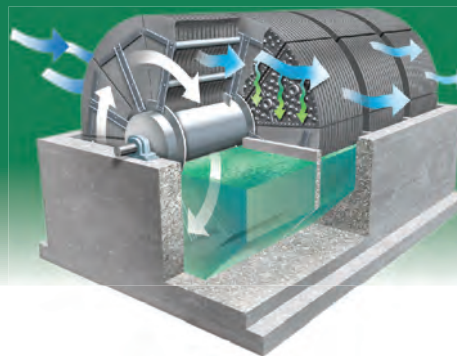
MULTIPLE USES

When using the new measuring devices with two analog outputs, two 4-20mA outputs are used for monitoring the different densities within the tank. For a primary tank, both the blanket level and the suspended solids can be monitored. The second floc output can be used to control the dosing mechanism, thus reducing flocculant/coagulant usage.

For a secondary tank, the two analog outputs can be used to monitor both the RAS and floc layers. Control of the RAS pumps and bellmouth optimizes the RAS density being returned for aeration and ensures that a consistent density is sent to the thickener. The floc output provides an indication of process problems and gives warning of possible permit exceedances.

For a thickener, the two analog outputs can be used to monitor both high-density sludge level and settling rate. Monitoring the high-density sludge

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level ensures that the filter presses and digester receive sludge of consistent density, and reduces foaming and mechanical wear and tear. Monitoring the floc level provides control for dosing based on settling rate, optimizing dosing and minimizing waste.

Using BUS communications options (HART, Fieldbus, Profibus or Modbus), the PLC or DCS can receive four outputs with any combination of RAS, floc level, high-density sludge level, clarity and temperature.

Whether using an instrument with two analog outputs or the four communications outputs, the information provided improves control, quickly indicates process problems, prevents permit violations, controls dosing in primary tanks and thickeners, and reduces wear and tear on filter presses. The net results are lower energy, maintenance and chemical costs.

ABOUT THE AUTHOR

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Infrastructure Grades Need an Upgrade

IT WILL TAKE SUBSTANTIAL INVESTMENT TO BRING CRITICAL FACILITIES UP TO SUITABLE CONDITION. EFFECTIVE COMMUNICATION TO OFFICIALS AND CUSTOMERS IS A KEY TO MAKING IT HAPPEN.

By Ted J. Rulseh

If America's infrastructure were a student, he or she would be a candidate for remedial classes. In its 2017 Infrastructure Report Card, the American Society of Civil Engineers gave an overall grade of D-plus to the condition of our water, energy, transportation, waste management and other critical systems.

In the language of letter grades, that's just half a step above "poor." Drinking water earned a D and wastewater a D-plus. In general, it's not a pretty picture, and it hasn't been since 1998, when the ASCE began issuing its Report Card every four years.

The Report Card section on wastewater notes that 76 percent of the nation's population is served by 14,748 treatment plants and that 56 million new users will connect to centralized treatment systems over the next 20 years, requiring at least \$271 billion of investment to meet current and future needs. The report also notes that through new technologies that turn waste into energy, the nation's 1,269 biogas plants are helping communities manage waste streams more effectively.

On the drinking water side, the Report Card states that drinking water is delivered to the nation's homes and businesses through one million miles of pipes, many laid 75 to 100 years ago. Even though water consumption is down, about 240,000 water main breaks per year waste more than 2 trillion gallons of treated water. The report cites an AWWA estimate that \$1 trillion will be needed to maintain and expand service to meet demands over the next 25 years.

A key to unleashing infrastructure spending is to help elected officials and the general public understand how important infrastructure is and the benefits of making the needed investment, according to Greg DiLoreto, a past president of ASCE and chair of Committee on America's Infrastructure. DiLoreto is a former chief executive officer of the Tualatin Valley Water District in Oregon and a former Public Works director with other cities. He talked about infrastructure matters in an interview with *Treatment Plant Operator*.

tpo: What is the exact function of your ASCE committee?

DiLoreto: The Committee on America's Infrastructure includes about 30 members who are experts in the 16 categories of infrastructure that we grade in the Report Card. Between those experts and the ASCE staff, we review and interpret published data, compare it to data from four years ago, and see whether the grades should rise, fall or stay the same. In the 2017 Report Card we had seven categories that went up and three that went down.

tpo: Why do you think the overall Report Card grade and the individual grades have stayed so low for so long?

DiLoreto: The clear indication is that we are under-investing in our infrastructure. Our Report Card has a D-plus overall, and we believe that in order to meet capacity conditions and have the economic prosperity, com-



Greg DiLoreto

petitiveness and quality of life we desire, we need to have a B. And we need to invest for that to happen. Between now and 2025 we show total needs of \$4.6 trillion, but based on current funding streams, we are investing \$2.5 trillion. So overall, we're looking at a shortfall of \$2.1 trillion.

tpo: How does a large figure like that translate into something an average person could understand?

DiLoreto: To put it in perspective, this shortfall in infrastructure funding costs every American family \$3,400 a year, or about \$9 a day, in lost disposable income. That represents costs they have to pay, for example, to get their car repaired because it hit a pothole. Or because they're wasting time in traffic and wasting gas. Closing that \$2.1 trillion gap would only cost about \$4 a day. That's a pretty good return on an investment.

tpo: What do you observe about the Report Card grades for water and wastewater?

DiLoreto: Our Report Card doesn't deal with water quality or wastewater discharge quality. It deals with the physical assets. The wastewater grade went up from a D to a D-plus, and that's because those agencies are making a little more investment than before. Drinking water stayed the same, at a D. The first dollar water agencies get goes to water quality because they

want to provide safe, clean drinking water. Money left after those funds are expended goes to pipe replacement, pump station repair and other projects.

tpo: What investments account for the improvement on the wastewater side?

DiLoreto: We've seen an increase in expenditures on treatment plant repairs and replacements, as well as pipe work aimed at eliminating infiltration and inflow. Agencies are also making their treatment plants more resilient.

tpo: What sources of funding are being tapped to make these improvements?

DiLoreto: Infrastructure overall is a user-based system. No matter how the financing comes together, at the end of the day, the users pay for it through the rates charged for wastewater and drinking water. The problem is that many agencies have a hard time raising their rates enough to meet their needs. As they continue to fall behind, projects become more expensive, and then they have to raise rates even more to catch up.

tpo: Do you see more agencies getting rate increases approved because they are becoming more effective at making the argument?

DiLoreto: Yes. At the drinking water agency that I led, we adjusted our rates every year at least by the cost of inflation. We communicated with our customers about what we were doing, what they were getting for the money they were already paying, and what they were going to get for the adjusted rate. In the 30 years I worked in the public sector I didn't have a problem doing that because our customers wanted safe and reliable drinking water, and they wanted wastewater taken away safely and treated properly. The more we talk to customers about what they're getting and about the impacts of not investing, the easier it is to pass those rate increases.

tpo: So would you say that effective communication plays a big part of filling the gap in infrastructure investment?

DiLoreto: Yes. And our Report Card is an advocacy piece for talking to elected officials and the general public to help them understand the issues. Infrastructure is fundamental to the quality of life. We need that basic infrastructure if we want to continue living the way we do.

tpo: What is the role of leadership and planning in filling the investment gap?

DiLoreto: During the last presidential campaign, both candidates ran on a platform of increased investment in infrastructure. So did a number of candidates for Congress. The same thing occurred at the state and local levels. All those people who got elected on that platform now need to live up to

“We can't do much of anything if we're not adequately investing. We have to agree as a country and as individuals who use the systems that we want them to work right and be reliable, and we have to invest for that to happen.”

GREG DILORETO

their campaign promises — make those laws and increase funding. One of the major uses of our Report Card is to help our elected officials show people what the condition of the infrastructure is and why it's important to invest in it. We can't do much of anything if we're not adequately investing. We have to agree as a country and as individuals who use the systems that we want them to work right and be reliable, and we have to invest for that to happen.

tpo: How do we get people to focus attention on those unseen underground assets and give them the priority they deserve?

DiLoreto: The crises we've seen recently have raised understanding



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about the importance of those facilities. Then it goes back to communication by the people who lead the utilities. They have to make that case so that people understand. Just as people couldn't live in their house if the roof leaked, they couldn't live in their house if the water system were shut off.

tpo: What are the future consequences of failing to make the necessary investments?

DiLoreto: In 2012 and 2016, we created studies called Failure to Act. We reported that if we make the additional \$2.1 trillion investment we need, we could avoid a \$3.9 trillion loss to our gross domestic product (GDP) by 2025 — that's the current (GDP) of Germany. If we make the investment, we can also avoid a \$7 trillion loss to businesses by 2025. To cite just one example, when a waterline breaks, businesses have to shut down. The business doesn't get income. Employees are sent home and don't get paid. Those are the kinds of things that happen. If we make the investment, we can also avoid the loss of 2.5 million high-paying jobs that would occur by 2025 because we are no longer economically competitive with the rest of the world.

tpo: In light of all this, what actions does ASCE recommend in the years to come?

DiLoreto: We recommend increasing investment in infrastructure from 2.5 percent to 3.5 percent of our GDP. We need leadership, bold leadership, to live up to those campaign promises. We have to design and build our projects sustainably based on the triple bottom line: the economy, the environment and society. We have to make them resilient so that storms like Hurricane Sandy don't wipe them out. And finally, we have to look at the total cost of projects — not just the first cost but the entire cost from the time they're built until they're retired. **tpo**

Pumps, Drives, Valves, Blowers and Distribution Systems

By Craig Mandli

Blowers

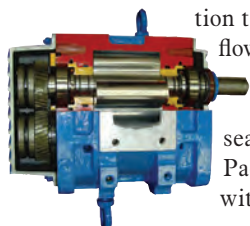
APG-NEUROS HIGH-SPEED TURBO BLOWER

High-Speed Turbo Blowers from APG-Neuros can help provide operation and maintenance cost savings and reduced environmental impact, lowering the carbon footprint through energy savings, the elimination of the use of oils/lubricants and the use of long-life air filters. They use a third-generation dual-layer bump foil air bearing, giving the owner high levels of blower reliability and availability of over 98 percent of total facility operating hours. **866/592-9482; www.apg-neuros.com**



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ZG tri-lobe aeration blowers from Eurus Blower

ZG tri-lobe aeration blowers for MBBR, biosolids and/or equalization tanks from Eurus Blower are rated to 15 psig and flows to 6,000 cfm. They have integral-shaft ductile iron impellers, dual-splash lubrication, oversized roller bearings, piston ring air seals, Viton lip seals, plus low vibration and noise characteristics. Packages have an integrated intake filter/silencer with washable filter media, heavy-duty base/integrated discharge silencer, vibration dampers, OSHA guard and a V-belt drive with auto belt tensioner. Options include motors,

check valves, safety valves, flexible connectors and sound enclosures. **630/221-8282; www.eurusblower.com**

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SG Turbo Blowers from Howden Roots include compressors that are designed to provide plant operators with efficiency across the actual operating range. Exceptional turndown capability is built in as standard to ensure that when plants are operating at low load, the efficiency of the aeration system is unaffected. They are available in a choice of 15 frame sizes with a capacity flow of up to 80,000 cfm to meet any demand needed, with achievable efficiency levels exceeding 87 percent. The blowers maintain effectiveness through the full flow range, including the key 60 to 80 percent window and dropping to as low as 40 percent capacity when required. **800/557-6687; www.howden.com**



SG Turbo Blowers from Howden Roots

Drives



PowerFlex 755TM drive system from Rockwell Automation

ROCKWELL AUTOMATION POWERFLEX 755TM

The PowerFlex 755TM drive system from Rockwell Automation allows users to build the system that best fits their needs for regeneration and coordination of multiple motors in common bus configurations. To optimize their system requirements and meet power-consumption needs, users can select from a series of predesigned modules with a power range from 250 to 3,000 hp. The common DC bus drive system is compliant to IEEE 519 specifications. TotalFORCE drive technology delivers motor control through precise, adaptive control of velocity, torque and position for electric motors, incorporating features that are designed to help optimize a user's system and maintain productivity. **414/382-2000; www.rockwellautomation.com**

Motors

BALDOR ELECTRIC DODGE QUANTIS

Dodge Quantis gear motors from Baldor Electric can be used to solve needs ranging from low speeds to high torque, from general-purpose safe areas to hazardous location operation and from stock product to custom-engineered solutions. The product line includes inline, shaft-mounted or offset parallel gearing up to 125,000 inch-lbs of torque, and come packaged with Baldor-Reliance motors either integrated or C-face mountings from fractional up to 100 hp. They are available in pre-engineered ratios up to 7,500-to-1, making them a fit for many applications in the water/wastewater industry. **800/828-4920; www.baldor.com**



Dodge Quantis gear motors from Baldor Electric

Motor and Pump Controls

GREYLINE INSTRUMENTS MODEL DFS 5.1 DOPPLER FLOW SWITCH

The Model DFS 5.1 Doppler Flow Switch from Greyline Instruments measures liquid flow with a noncontacting ultrasonic sensor mounted on the outside of 1/2-inch-diameter or larger pipes. It installs in minutes, no pipe drilling or cutting is required and there is no maintenance. It is designed for pump protection, valve control and flow/no-flow alarms, and is ideal to control wastewater, slurries, caustics, acids and difficult liquids. The watertight NEMA4X switch enclosure includes a 5-amp DPDT control relay with adjustable on and off setpoint controls, adjustable time delay, flow rate bar graph and relay status LEDs. A sensor mounting kit is included with each switch and the sensor cable can be extended up to 492 feet. **888/473-9546; www.greyline.com**



Model DFS 5.1 Doppler Flow Switch from Greyline Instruments

PULSAFEEDER PRE-ENGINEERED SYSTEM

Pre-Engineered Systems from Pulsafeeder are designed for use with single- or dual-metering PULSAtron Series diaphragm pumps with flow



**Pre-Engineered Systems
from Pulsafeeder**

capabilities to 600 gpd and pressures to 300 psi, or BLACK-LINE Series mechanical diaphragm pumps with flow capabilities to 132 gph and pressures to 150 psi. Systems include ball valves and unions throughout, suction-side Y-strainers and calibration columns. The discharge piping assemblies incorporate pulsation dampeners, pressure gauges with isolators and discrete back pressure and pressure-relief valves. They are designed to provide complete chemical feed solutions for all electronic metering

applications, including municipal water, municipal wastewater and institutional applications. **800/333-6677; www.pulsatron.com**

RONK ELECTRICAL ROTOVERTER

The ROTOVERTER from Ronk Electrical is available in a weatherproof fiberglass enclosure for convenient on-site installation. It offers tapped winding, which allows balancing of pump motor currents to maximize motor life and minimize maintenance. Since it can balance high power factor loads, it is especially valuable with today's efficient and high-power pumps. The fiberglass enclosure is an attractive green color, which not only blends into the surroundings, but provides years of maintenance-free protection. The unit is supplied as a complete prewired package. All controls, fans and timer are included. Convenient input and output terminals are provided. **800/221-7665; www.ronkelectrical.com**



**ROTOVERTER from
Ronk Electrical**

SEE WATER HYDRA

Hydra transducer panels from See Water are a complete line of simplex, duplex and triplex control panels ideal for sewage, wastewater and dewatering applications. They include a comprehensive HMI touch-screen device that allows for complete monitoring of tank level status, alarm/fault history and pump run data. **888/733-9283; www.seewaterinc.com**



**Hydra transducer panels
from See Water**

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The AGRULINE product group from Agru America offers a complete, high-quality product range of pipes, fittings, valves and customized components made from polyethylene for high-volume flow applications such as cooling water intakes for power plants, large sewage systems, seawater desalination or mining jobs. The large-diameter piping system is made from PE 100 or PE 100-RC in dimensions up to 98.4 inches and 1,968 feet in length. Their long-term hydraulic properties, which save operational costs, are based on a high resistance to corrosion, wear and tear, and UV radiation. **800/373-2478; www.agruamerica.com**



**AGRULINE product group
from Agru America**

PRIMEX ARC ARMOR

Arc Armor from PRIMEX is an enclosure system that reduces exposure to arc flash and electrical shock with its multiple-compartment design and single-wall construction. The service disconnect and motor



**Arc Armor enclosure
system from PRIMEX**

starters are isolated into separate compartments designed with electrical and/or mechanical locking mechanisms to only allow access to qualified service personnel with the appropriate personal protective equipment. The control logic circuitry is located in a separate compartment, where only control voltage is present (24 volts DC/120 volts AC).

This design limits operator access and exposure to higher-voltage electrical components capable of producing an arc flash incident. A control solution can be customized to individual specifications for lift stations, booster stations, stormwater, irrigation and industrial water/wastewater applications. Free-standing, wall-mount and pole-mount versions are available in a variety of enclosure sizes. It is UL/cUL listed. **844/477-4639; www.primexcontrols.com**

THOMAS & BETTS EX

EX explosion-proof enclosures from Thomas & Betts protect electrical components and devices in hazardous environments. When combined with industrial controls and circuit protection devices, a complete system solution can be tailored to specific application requirements and project schedules. Detailed drawings of each custom unit are available to ensure that the solution meets the exact needs of the application. The enclosures meet NEMA 7/9 hazardous location requirements. In addition to enclosures, instrument housing, and junction and control boxes, the line includes circuit breakers, disconnects, motor starters, control stations, pilot devices and panel boards. **800/238-5000; www.tnb.com**



**EX explosion-proof enclosures
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Pumps

BJM PUMPS SKG SERIES

SKG Series submersible pumps from BJM Pumps obliterate flushable wipes and other difficult solids in wastewater applications. They have RAD-AX Dual Shredding Technology, a four-pole motor, and double mechanical seals for long life and trouble-free performance. All cutting elements are manufactured from 440C hardened stainless steel. The impeller and suction cover are constructed from chrome iron for added durability. They offer up to 410 gpm and heads to 42 feet. **877/256-7867; www.bjmpumps.com**



**SKG Series submersible
pumps from BJM Pumps**

BLUE-WHITE INDUSTRIES FLEXFLO A-100N POLYMER PUMP

The FLEXFLO A-100N Polymer Pump from Blue-White Industries is designed to handle high-viscosity polymers. The built-in Tube Failure Detection System is designed to sense tube failure and the pump will automatically shut off and energize a relay or switch. This permits communication with external equipment, such as a backup pump or alarm. Polymer spills and downtime for cleanup are eliminated. No false triggering is caused by condensation and washdown procedures. It is self-priming, and tube assemblies are stamped with clearly visible part numbers for easy reorder. It offers

precise chemical feed to 124 gph, and a max working pressure of 100 psi. The A-100NFP offers a variable-speed motor, dial-knob control and ON/OFF switch, and the A-100NVP comes with available speed motor, digital control with remote, and local control. 714/893-8529; www.blue-white.com



FLEXFLO A-100N Polymer Pump from Blue-White Industries



BLUEline Rotary Lobe Pump from Boerger

BOERGER BLUELINE ROTARY LOBE PUMP

The BLUEline Rotary Lobe Pump from Boerger is a self-priming, valveless, positive displacement pump used for the conveyance of viscous and abrasive materials. There are 21 pump models in six series with pulsation-free operation, fully reversible rotation, dry-run capabilities and flow rates up to 7,500

gpm. The pumps are stable and wear-resistant with MIP-Design (Maintenance in Place) that allows for all wetted parts to be easily replaced through the front cover without the removal of pipe or drive systems. 612/435-7300; www.boerger.com

CRANE PUMPS & SYSTEMS BARNES SH SERIES

Barnes SH Series municipal-quality submersible nonclog pumps from Crane Pumps & Systems are available in 3-through 10-inch discharge sizes and 2 to 150 hp. They deliver clogging resistance by providing three impeller styles to match varying solids loads. Maintenance-friendly features deliver performance for wastewater collection and treatment system challenges. 937/ 773-2442; www.cranepumps.com



Barnes SH Series pumps from Crane Pumps & Systems



Concertor pumping system from Flygt - a Xylem Brand

FLYGT - A XYLEM BRAND CONCERTOR

The Concertor smart, interconnected wastewater pumping system from Flygt - a Xylem Brand senses the operating conditions of its environment, adapts its performance in real time and provides feedback to pumping station operators. It offers energy savings of up to 70 percent compared to a conventional pumping system, along with reducing inventory by up to 80 percent due to flexible performance. Clog-free pumping operation and clean wet wells can save up to 80 percent in vacuum

cleaning costs. Its compact design reduces cabinet size by up to 50 percent. It offers a wide performance field from which to choose the right operating point, making it simple and facilitating performance fine-tuning. 855/995-4261; www.xylem.com

GODWIN PUMPS, A XYLEM BRAND, DRI-PRIME BACKUP SYSTEM

The Dri-Prime Backup System (DBS) from Godwin Pumps, a Xylem brand, is an independent backup pumping solution permanently installed in a lift station for a variety of emergency situations. Plumbed directly into the wet well, it automatically pro-



Dri-Prime Backup System (DBS) from Godwin Pumps, a Xylem brand

tests against loss of power in the event of transfer switch malfunction, as well as control panel, transducer and permanent pump failures. Adding Field Smart Technology (FST) remote monitoring and control provides reliability. 800/247-8674; www.xylem.com/dewatering

GORMAN-RUPP RELIAPRIME

Designed to deliver all the benefits of a sound-attenuated silent pump, the ReliaPrime emergency bypass station from Gorman-Rupp operates on natural gas. Municipalities are using engine-driven pumps instead of traditional emergency generators for lift station backup and bypass. It is



ReliaPrime emergency bypass station from Gorman-Rupp

equipped with auto-start and level controls that allow the pump to start and stop in response to the liquid level. This unit has a 3-inch Ultra V Series pump capable of passing a 3-inch spherical solid and offers a sound-proof lightweight aluminum enclosure with lockable door panels that can be removed for maintenance of the pump or engine. It is a complete backup package, ready for hookup. It provides reliable bypass and backup for emergencies and

power outages, primary pump repair and additional pumping capacity, whenever and wherever it is needed. 419/755-1011; www.grpumps.com

LAKESIDE EQUIPMENT SCREW PUMP

Screw pumps from Lakeside Equipment have a built-in variable capacity that automatically adjusts the pumping rate and power consumption while operating at a constant speed to match the incoming flow. They have a high rate of acceptance for their ability to lift water efficiently at any stage of the treatment process.

They can be used in wastewater plant lift stations, return activated sludge, stormwater pumping, land drainage and industrial applications. They efficiently lift large quantities of water at low heads. Patterned after the Archimedean screw, the pump's assembly consists of a simply designed screw, upper bearing, lower bearing and drive arrangement. They offer lower operating costs, reduced maintenance, nonclogging operation, minimal head and the elimination of variable-speed electrical controls. 630/837-5640; www.lakeside-equipment.com



Screw pumps from Lakeside Equipment



MEMDOS Smart Series metering pump from Lutz-JESCO America

LUTZ-JESCO AMERICA MEMDOS SMART SERIES

The MEMDOS Smart Series mechanically actuated metering pump from Lutz-JESCO America is built for precise liquid dosing, and includes an additional size that delivers 12.7 gpd at pressures up to 300 psig in 316 stain-

less steel PVDF or polypropylene materials. Its compact design and sturdy tappet drive make handling acid, lye, coagulants and flocculants easy. It has remote start and stop control, level and diaphragm rupture monitoring, and batch dosing with interval and timer functionality. Double-ball check valves are standard, and it comes with an integrated dosing head venting device. 800/554-2762; www.lutzjescoamerica.com

NEPTUNE CHEMICAL PUMP COMPANY ABAQUE SERIES

Abaque Series peristaltic pumps from Neptune Chemical Pump Company incorporate a stronger and more durable rotor design and new hose-

holding system. They meet the challenging requirements of a wide variety of industries thanks to their seal-free design that eliminates leaks and product contamination. These self-priming pumps can run in forward or reverse and offer suction-lift capabilities to 25.5 feet, as well as the ability to run dry without adversely affecting performance, pressure and accuracy (no slip). They are available in ductile iron and stainless steel construction, allowing higher discharge pressure up to 232 psi and flow rates to 339 gpm. Hoses are available in natural rubber, Nitrile Buna Rubber, Nitrile Buna Rubber with FDA liner, EPDM and Hypalon. **215/699-8700; www.neptunel.com**



Abaque Series peristaltic pumps from Neptune Chemical Pump Company



Moyno 2000 Series progressing cavity pump from NOV

NOV MOYNO 2000 SERIES

The Moyno 2000 Series progressing cavity pump from NOV offers application versatility. The uniform design of the ring gear and gear ball components create greater surface contact, leading to less wear and better overall performance. Available in cast iron

or stainless steel and a choice of rotor and stator materials to suit individual applications, the pump uses small bore-

hole pipework and eliminates the need for series of pumps when pumping over long distances or with high head requirements. It minimizes shear and crush damage to the pumped product, while maintaining a steady flow when pumping products with a high solids content. **832/424-7300; www.nov.com**

PATTERSON PUMP COMPANY MUNI-PAC

Muni-Pac line of self-contained pump stations from Patterson Pump Company comply with the most rigorous standards for water supply where municipal volume or pressure is under-spec or nonexistent, such as rural water districts, resort communities, mountaintop communities and remote municipal line extensions. They incorporate the latest controls technology for both constant and variable-speed applications with automatic controls or control by SCADA. Optional weather-protective enclosures provide a level of noise abatement, are corrosion and UV resistant, and are aesthetically pleasing. All wetted parts are constructed from NSF 61-compliant materials. **706/886-2101; www.pattersonpumps.com**



Muni-Pac line of pump stations from Patterson Pump Company



Tube-mounted screw pump from Schreiber

SCHREIBER TUBE-MOUNTED SCREW PUMP

The tube-mounted screw pump from Schreiber incorporates the Archimedeian screw pump concept in a self-contained unit for ease of installation and construction. It transports liquid inside a stationary tube, simplifying design and eliminating grouting. Units are factory assembled and can be set at a fixed angle, or the lower

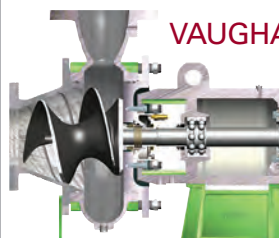
end can be supported by a hoist to vary the pump angle and for maintenance access. The pump provides variable capacity at constant speed. It uses a single-row spherical roller and self-aligning combination radial/thrust lower support bearing. A flanged bearing provides radial support at the upper shaft. **205/655-7466; www.schreiberwater.com**

STENNER PUMP COMPANY S SERIES

Built to NEMA 4X for demanding applications, the S Series peristaltic pump from Stenner Pump Company interfaces with process control systems through multiple programmable inputs and outputs. Operational modes include scalable, invertible 4-20mA or 0-10 VDC inputs, Hall Effect (frequency), PPM feed, pulse, timer and manual. Users can program up to three output relays in response to conditions such as tube leak, motor drive fault, process alarms or transfer to a backup pump. The tube's life expectancy can be programmed to initiate a tube change indicator on the operating display when the set runtime is reached. Tube replacement without tools is standard with the QuickPro pump head. The totally enclosed pump is outdoor rated and the brushless DC motor has ball-bearing support. Agency listings include NEMA 4X, NSF 61 & 372, cULus indoor/outdoor and CE IP65. **904/641-1666; www.stenner.com**



S Series peristaltic pump from Stenner Pump Company



Triton screw centrifugal pumps from Vaughan Company

VAUGHAN COMPANY TRITON

Triton screw centrifugal pumps from Vaughan Company handle thick biosolids, large or stringy solids, shear-sensitive fluids, and delicate or highly abrasive materials. They have non-overloading power characteristics, heavy-duty power frames and a flushless mechanical seal. A water-flushed mechanical seal or packing is available. **888/249-2467; www.chopperpumps.com**

VERTIFLO PUMP COMPANY MODEL 700

The Model 700 industrial vertical nonclog sewage ejector pump from Vertiflo Pump Company is designed for long life in tough services with heads to 100 feet TDH and flows to 1,500 gpm. The 1 1/2-inch Model 724 and 1 1/4-inch Model 720 are standard. The impeller is a fully enclosed two-vane nonclog design with wiping vanes that reduce axial loading and prolong bearing life. Wiping vanes aid in keeping particles from behind impeller and pump bearing assembly. The impeller is secured to the shaft by taper fit with woodruff key/nut. There is a flanged discharge on all sizes. Designed specifically for solids handling, it incorporates a long-radius elbow, reducing friction loss and allowing smooth flow through the discharge pipe. **513/530-0888; www.vertiflopump.com**



Model 700 industrial vertical ejector pump from Vertiflo Pump Company

Valves

DEZURIK WATER CONTROLS APCO SMARTCHECK PUMP CONTROL VALVE

Designed for maximum performance and economy, the APCO SmartCHECK Pump Control Valve from DeZURIK Water Controls is a single valve that combines the functionality of a full-featured electric motor-operated pump control valve with the best features

of a premium swing check valve. It controls pressure surges during normal pump startups and shutdowns, and closes positively upon power failure, without the need for hydraulic power units, accumulators and hydraulic controls. It produces low head loss, and the torque unit allows normal function, but will automatically close upon power failure, preventing backflow. Speed adjustments control fluid acceleration and deceleration, minimizing pressure surges. It has an internally pressure-balanced design that ensures reliable closure. 320/259-2000; www.dezurik.com



APCO SmartCHECK Pump Control Valve from DeZURIK Water Controls



Model 888 silent wafer check valves from Flomatic Corporation

FLOMATIC CORPORATION MODEL 888

Model 888 silent wafer check valves from Flomatic Corporation NSF/ANSI Standard 61 certified for drinking water systems. All sizes and models are constructed with EPDM

elastomers. The valve is designed for simple flange-supported installation and will operate equally well in any position. It is suitable for dual-flange ANSI 125 and 250 mounting, except for 8- and 10-inch sizes. The convex inlet, double-guided, spring-loaded poppet system maximizes efficiency and reduces water hammer. It has an easy field-exchangeable internal system. 800/833-2040; www.flomatic.com

PROCO PRODUCTS PROFLEX STYLE 790

The ProFlex Style 790 low-headloss check valve from Proco Products provides rapid dispersion of head pressures and with its low cracking pressure, it prevents upstream flooding. The inline design allows the valve to be installed without having to do any modifications to existing structures or pre-install planning. The fold-away design of the inner sleeve allows for a near full port flow, allowing for quick drainage. It will allow for passive flow operation, making it the fit for combined sewer overflows, sanitary sewer overflows and outfalls. It is available in many elastomers, making the valve compatible with virtually all weather and service conditions. Its neoprene elastomer is offered with an algae and barnacle-resistant compound. Internal expanding clamps are available in 304 and 316 stainless steel, or carbon steel. 800/344-3246; www.procoproducts.com



ProFlex Style 790 check valve from Proco Products



TF-1 check valve from Red Valve Co. / Tideflex Technologies

RED VALVE CO. / TIDEFLEX TECHNOLOGIES TF-1 CURVED-BILL CHECK VALVE

The TF-1 check valve from Red Valve Co. / Tideflex Technologies has a bill formed into a curve that returns to a closed position every time, achieving the tightest possible seal for backflow operations, particularly at low flow rates. The eccentric, flat-bottom design allows installation where the invert of the pipe is close to the floor. The stronger engineered spine provides long-term performance while handling water weight. 412/279-0044; www.redvalve.com tpo

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- ☐ Howden Roots SG Turbo Blowers

Drives

- ☐ Rockwell Automation PowerFlex 755TM drive system

Motors

- ☐ Baldor Electric Dodge Quantis gear motors

Motor and Pump Controls

- ☐ Greyline Instruments Model DFS 5.1 Doppler Flow Switch
- ☐ Pulsafeeder Pre-Engineered System
- ☐ Ronk Electrical ROTOVERTER
- ☐ See Water Hydra transducer panels

Pipe/Parts/Components

- ☐ Agru America AGRULINE product group
- ☐ PRIMEX Arc Armor enclosure system
- ☐ Thomas & Betts EX explosion-proof enclosures

Pumps

- ☐ BJM Pumps SKG Series submersible pumps
- ☐ Blue-White Industries FLEXFLO A-100N Polymer Pump
- ☐ Boerger BLUEline Rotary Lobe Pump
- ☐ Crane Pumps & Systems Barnes SH Series pumps
- ☐ Flygt - a Xylem Brand, Concertor pumping system
- ☐ Godwin Pumps, a Xylem brand, Dri-Prime Backup System

- ☐ Gorman-Rupp ReliaPrime emergency bypass station
- ☐ Lakeside Equipment screw pumps
- ☐ Lutz-JESCO America MEMDOS Smart Series pump
- ☐ Neptune Chemical Pump Company Abaque Series peristaltic pumps
- ☐ NOV Moyno 2000 Series progressing cavity pump
- ☐ Patterson Pump Company Muni-Pac self-contained pump stations
- ☐ Schreiber tube-mounted screw pump
- ☐ Stenner Pump Company S Series peristaltic pump
- ☐ Vaughan Company Triton screw centrifugal pumps
- ☐ Vertiflo Pump Company Model 700 industrial vertical pump

Valves

- ☐ DeZURIK Water Controls APCO SmartCHECK Pump Control Valve
- ☐ Flomatic Corporation Model 888 check valves
- ☐ Proco Products ProFlex Style 790 check valve
- ☐ Red Valve Co. / Tideflex Technologies TF-1 curved-bill check valve

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City uses piston pumps in Class AA process

Problem

The dewatering facility at the Conserv II wastewater treatment plant in Orlando, Florida, had four belt filter presses and a series of belt conveyors that transferred the dewatered biosolids to trucks. The city wanted to move away from the belt conveyor system to reduce odors and maintenance issues, and make the process more operator-friendly.

Solution

Schwing Bioset offered a process to convert biosolids to a commercial fertilizer product. City staff members were impressed with the simplicity of the process after visits to several Bioset operations. A KSP 25 piston pump was added at the end of each belt conveyor to transfer the cake to the Bioset lime stabilization process, which uses a third KSP 25 pump to blend the materials. The end product is then pumped into a plug flow reactor and ultimately out to two truck loading areas.



RESULT:

The pumps are programmed to work together to make sure that a consistent flow of biosolids can be treated to Class A status through the reactor. 715/247-3433; www.schwingbioset.com.

Relief valve with surge anticipator eliminates pipe breakage

Problem

The District of Central Saanich in Victoria, British Columbia, has a wastewater collections system with multiple lift stations. When fluids travel long distances, there is potential for pressure buildups from even slight changes in velocity. Hard stops at the pump or power interruptions can cause surges that blow lines out of the ground.

Solution

Singer Valve's Pneumatic Dynamic Lifter (PDL) with surge anticipator was installed to reduce stress on the pipes and prevent surge damage. The compact relief valve can handle 200 psi and uses standard plant air to hold the valve closed. The chamber is fitted with a relief pilot that is also normally closed so long as the line pressure is lower than the setpoint. If the pressure rises above the setpoint, the relief pilot opens, causing the air in the cylinder to vent, which in turn opens the valve.



RESULT:

The unit was effective. When a surge returns to the pump, it comes back not to a closed system where it can cause damage but to an open valve where it can discharge safely into the storage well under the pump. 888/764-7858; www.singervalue.com.

FEATURED case study

ODOR CONTROL

Retractable tank covers minimize odor threats from plant expansion

Geomembrane Technologies Inc. (GTI)

partnered with a large wastewater treatment plant in the U.S. for an impressive cover project. The plant was expanding its treatment capacity, which introduced odor threats. It needed an innovative cover solution that would address foul odors without hindering access for maintenance and sampling.

GTI custom-designed and supplied 49 structurally supported covers: 24 for its primary clarifiers, nine for its launder tanks, and 16 for its equalization tanks. These tanks are part of the early stages of wastewater treatment when odors are most intense, so it is crucial that the tanks be securely covered.

The **retractable covers** have successfully minimized odors as intended, helping reduce complaints. Plant workers can still perform their regular duties by simply retracting the covers.



Read the full story at www.gticons.com or call 855/484-4630

California resort wipes out pump clog problems

Problem

The resort community of Big Bear City, California, had weekly pump clogs at its pump stations because of consumer flushables. "Nine times out of 10 when we pulled a pump it would be clogged with rags," says Andy Keller, sewer department foreman. Contributing to the problem, the resort's population quadrupled on many weekends. Pump clogs often came in succession and on weekends, requiring overtime pay for workers.

Solution

The city purchased **X-PELLER Impellers** from **Smith & Loveless** for three problematic stations. The mono-port impeller design helps to counterbalance hydraulic forces and create a balanced, single flow path that passes 3-inch solids and problem flushables.

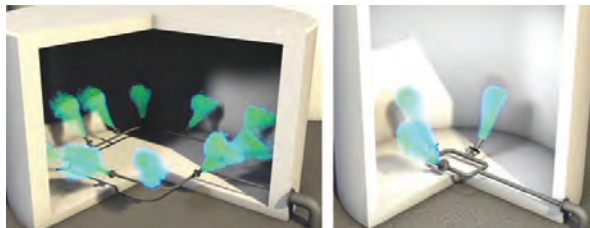


RESULT:

With fewer pumps to unclog, operation costs have been reduced. Workers are freed up to service other equipment and are safer with no more trips to the confined space of an underground station. Pump clogs have been nearly eliminated, according to Keller. 800/898-9122; www.smithandloveless.com. tpo

FEATURED
white paper

WASTEWATER TREATMENT



Use Eductors to Effectively and Affordably Treat Your Wastewater

Wastewater treatment has become an issue in the chemical and petroleum industry. As a result it is imperative to find solutions for the reuse or dumping of generated wastewater. In order to reuse or properly dump wastewater, the water must be maintained to have a pH balance of 7. Caustic and acidic additives are added to wastewater to ensure this, and with the help of proper blending, wastewater can become neutral in no time.

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With questions, please email Eductor Sales Specialist Clarence Dela Vega at cdeleva@clark-reliance.com, or call 440/846-7653. To download the white paper, go to www.jacoby-tarbox.com/wastewater.

De Nora announces new director of sales

De Nora announced Brian Shugrue as the new director of sales for the Americas. With over 25 years' experience, he will focus on expanding the company's filtration and disinfection products in the municipal, industrial, commercial, and oil and gas markets throughout North and South America.



Brian Shugrue

Chemline launches contractor services

Chemline announced a new dedicated sales team and website specifically for contractors. Chemline offers in-house technical services to train contractors, and they can also deliver equipment and replacement parts.

Agru America opens pipe production facility

Agru America opened a new large-diameter pipe production facility in Charleston, South Carolina. The facility is producing AGRULINE pipes with dimensions of up to 98.4 inches, designed for high-volume flow applications including gas, potable water and wastewater.

International Products' new website

International Products has a new website, www.ipcol.com. Features include how-to videos, application-specific content, product information in eight different languages, a new blog and global distribution locations.

Parkson acquires Meurer Research

Parkson Corp. announced it has acquired Meurer Research of Golden, Colorado. Founded in 1978, Meurer produces stainless steel and aluminum water and wastewater treatment products. **tpo**

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Regional Maintenance Superintendent
Brazos River Authority
Waco, Texas

wastewater: product spotlight

Conditioning pump combats floating mat

By Craig Mandli

It's no secret that "flushable" wipes can cause problems for pumping systems. They don't break down in sumps and wet wells, often conglomerating to form a floating mat, while some settle and accumulate on the sump floor, which decreases sump volume. The **Submersible Conditioning Pump** from **Vaughan Company** combats that problem, simultaneously mixing and conditioning waste sumps containing solids that both float and settle. The floatable solids can combine to create an iceberg-like floating mass with chunks that separate and get pulled into the suction of the nonclog station pump, effectively clogging the station pump.

The flow from the pump's mixing nozzle is designed to agitate the sump in such a manner as to break up the floating mat and resuspend the settled solids. In addition, because the pump utilizes a Vaughan Chopper Pump, all of the solids in the sump are reduced in size, which reduces the plugging of downstream pumps and valves.

"Because the conditioning pump also reduces the size of the solids through an effective chopping action, the nonclog station pumps can now operate without troublesome clogging issues," says Kent Keeran, the company's chief engineering and vice president of engineering. "Second, the chopping action also ensures that the mixing nozzle will not clog."

The chopper pump is mounted on a portable stand and fitted with a high-velocity mixing nozzle. It recirculates wet wells by chopping and mixing to produce a homogeneous slurry that is more easily pumped out. Floating mats are removed and solids that have accumulated on the floor are re-suspended. Being portable, it can be used in multiple applications at a single job site, facility or municipality.

"It fits in any sump containing solids that form a mat, or settle out, or clog the dewatering pumps," says Keeran. "It can be used with up to 8 percent solids in lift station conditioning, basin conditioning, influent station/channel conditioning, holding tank conditioning and digester clean-out/homogenization."

According to Keeran, Vaughan sold its first conditioning pump in 2010, and saw success with it from the start. "It's been well received in the wastewater industry as it can be used to keep all waste sumps operating at best efficiency without the need for vacuum trucks to clean the sumps or the need to unclog the station pumps," he says. "In addition, because the solids in the sump have been reduced in size, downstream equipment suffers fewer problems."

Keeran says that the municipalities that have installed the pumps typically see a return on investment in as few as four to six months. "Service calls with vacuum trucks and plugging of station pumps are eliminated." 888/249-2467; www.chopperpumps.com

Submersible Conditioning Pump from Vaughan Company



1



2

1. **AGRU AMERICA AGRULINE LARGE-DIAMETER HDPE PIPES**

The AGRULINE product group from Agru America offers a complete, high-quality product range of pipes, fittings, valves and customized components made from polyethylene for high-volume flow applications such as cooling water intakes for power plants, large sewage systems, seawater desalination or mining jobs. The company produces systems from PE100, PE 100-RC or PE4710 resins in dimensions up to O.D. 98.4 inches and 1,968 feet in length. The long-term hydraulic properties are based on a high resistance to corrosion, wear and tear, and UV radiation. 800/373-2478; agruamerica.com

2. **HEMCO EMERGENCY SAFETY SHOWERS**

Emergency shower and decontamination booths from HEMCO are fully assembled and ready for installation to water supply and waste systems. The molded, one-piece, seamless chemical-resistant fiberglass unit is equipped with a pull-rod activated shower and push-handle eye and face wash for quick drenching of personnel that have been exposed to hazardous chemicals. It has frosted front strip curtains, interior grab bars, raised deck grating and bottom or rear drain outlet. 800/779-4362; www.hemcocorp.com

3. **HAWK GLADIATOR MICROWAVE SWITCH**

The Gladiator Microwave Switch from Hawk Measurement provides a high-power, circulator-polarized microwave pulse that is emitted from the sending unit to the receiving unit in a transmission chain of approximately 100 pulses per second. It uses high-power digital microcontroller technology to achieve sensitivity and reliable output under adverse conditions. Used with Hawk's software, the unit detects a signal even with buildup in an acoustic and electrically noisy environment. 978/304-3000; www.hawkmeasure.com

4. **BLUE-WHITE'S CHEM-PRO M MC-2 METERING PUMP**

The Chem-Pro M MC-2 metering pump from Blue-White Industries is equipped with a variable-speed motor, offering smooth and quiet



chemical dosing with no hard pulses. A full stroke every time prevents vapor lock. It can handle high-pressure applications up to 175 psi with a maximum feed rate of 50 gph. The pump is fitted with a Dia-Flex single-layer PVDF diaphragm that exhibits zero breakdown or delamination, reducing field maintenance and downtime. Additional features include an operator-friendly control panel with a protective, snap-on polycarbonate cover to protect the LCD screen and the touch pad from UV exposure and the elements. The display indicates fluid output in several measurement units, including mL/min and gpm. **714/893-8529; www.blue-white.com tpo**

water: product spotlight

Product designed to provide permanent bearing protection

By Craig Mandli

Bearings are a critical component of pumps and motors, and are typically designed to operate for many years. However, when they do fail prematurely, it's often due to lubrication loss and contamination. The **VB45-S bearing isolator** from Inpro/Seal is designed to provide permanent bearing protection for the bearings found in the oil-lubricated pumps and motors used in many water treatment applications.

The IP66-rated bearing isolator comes in at only .625 inch in length, making it a small but appreciated safeguard.

"This product is a fit for any rotating equipment application that can benefit from increased bearing protection," says Neil Hoehle of Inpro/Seal. "Typically, the most likely application is in pump bearing housings in large pump systems."

Inpro/Seal's bearing isolator design consists of a unitized stator and rotor that form a compound labyrinth seal with no wearing parts, ensuring permanent equipment protection. The stator is typically pressed into the bearing housing, while the rotor turns with the shaft. The bearing isolator serves as an effective replacement for contact seals such as lip seals, mechanical seals and magnetic seals. Those types of seals have a finite life expectancy, eventually wearing at the point of contact or grooving the shaft. As a result, they no longer effectively seal the bearing enclosure, making rotating equipment unreliable, and opening the door to catastrophic failure due to bearing degradation.

"It is a great fit for water treatment systems, as equipment reliability is paramount," says Hoehle. "Bearing protection for rotating equipment such as pumps is one of the best investments you can make for increasing reliability."

The VB45-S ensures premium protection in such a small design envelope by utilizing multiple design features. The VBXX Interface and oversized contamination chamber blocks contaminants from entering the bearing housing, while the enlarged D-Groove protects against oil loss by capturing oil on the shaft and returning to the bearing housing. The VB45 Chamber houses the VBX Ring to inhibit the transfer of vapor contamination created by the heating/cooling of the bearing enclosure. After the most extensive testing, development and launch process of any previous bearing isolator from Inpro/Seal, the product officially launched in December 2016.

"Sales have been expanding exponentially since launch, and feedback has been universally positive," says Hoehle. "Many customers are switching from our previous model, the established industry standard, to our new VB45-S design." **800/447-0524; www.inpro-seal.com**



VB45-S bearing isolator from Inpro/Seal

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- ☐ 4. Blue-White Industries Chem-Pro M MC-2 metering pump
- ☐ Vaughan Company Submersible Conditioning Pump
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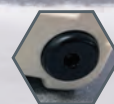
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people/awards

James Elmore was promoted to director of wastewater treatment and water reclamation for the city of Rockledge, Florida. He began with the city in 1980 and was assistant director for 22 years. **Alan LaDuke** retired from the director's post after 37 years with the city.

Tony Wood, wastewater superintendent for the town of Osgood and system operator for Friendship Regional Sewer District, received the Wastewater System Operations Specialist of the Year award from Alliance of Indiana Rural Water.

David Lawrence was named the general manager of the Big Bear Area Wastewater Agency in California. He had been city engineer and Public Works director for the city of Big Bear Lake.

Corey Brooks, utilities crew leader for the city of Brighton, received the Wastewater Operations Specialist of the Year award from the Michigan Rural Water Association.

The **Rhineland Water and Wastewater Treatment Plant** received the Laboratory of the Year award from the Wisconsin Department of Natural Resources for the work of **Jody Flannery**, who has been an environmental laboratory technician for 24 years.

HDR's **Edith Hadler** was named principal program delivery manager for wastewater. Based in the office in Bellevue, Washington, she will facilitate partnerships with offices to continue expanding the company's wastewater program. She is a professional engineer with more than 25 years' industry experience, 14 with HDR.

Steve Carroll, wastewater superintendent for the village of LeRoy, received the Uhl T. Mann Operations Award from the New York Water Environment Association for facilities treating less than 50 mgd.

The **North Bay Wastewater Treatment Facility** received the Wastewater Facility Award from the Florida Department of Environmental Protection.

The city of Mountain Iron (Minnesota) named **Tyrel Hebl** lead water/wastewater operator and **Tim Satrang** director of Public Works.

Mark LeClair, Public Works director for the city of Paxton, received the Wastewater System Operations Specialist of the Year award from the Illinois Rural Water Association.

Mike Norris, manager of water quality for the city of Tyler, received The Daniel C. Allen Memorial Distinguished Service Award from the Texas Water Utilities Association.

The **Quonset Development Corporation Wastewater Treatment Facility** in North Kingston, Rhode Island, received an Excellence Award from the U.S. EPA.

Clay Duffie, general manager of Mount Pleasant Waterworks, received the William T. Linton Service Award from the Water Environment Association of South Carolina.

Spartanburg (South Carolina) Water received eight Silver, Gold and Platinum Peak Performance awards for permit compliance from the National Association of Clean Water Agencies.

events

July 9-12

Kentucky-Tennessee Section AWWA Annual Conference, Lexington, Kentucky. Visit www.kytnawwa.org.

July 12

Joint Water Resources and Infrastructure Climate Resiliency Specialty Conference and Exhibit, presented by the New England Water Works Association and the New England Chapter American Public Works Association, UMass Lowell Inn & Conference Center, Lowell, Massachusetts. Visit www.newea.org.

July 16-19

Georgia Section AWWA Annual Conference. Visit www.gawwa.org.

July 20-21

Central States Water Environment Association CSX 2017, Kalahari Resort, Wisconsin Dells, Wisconsin. Visit www.cswea.org or email ahaque@cswea.org.

July 20-21

Nebraska Wastewater Operators Division Heartland Conference 2017, Holiday Inn Convention Center, Kearney. Visit www.nebwea.org.

July 23-27

International Water Association IWA Reuse 2017, Long Beach (California) Convention Center. Visit iwareuse2017.org.

July 25-27

AWWA 2017 Summer Workshop, Holiday Inn Denver-Cherry Creek. Visit www.awwa.org.

Travis Hays was appointed head of the water and wastewater departments in David City, Nebraska, replacing Kevin Betzen.

The city of **Stayton** was honored for the Best Surface Water in Oregon for 2017 by the Oregon Association of Water Utilities.

Stanley Shaffer, chief operator of the city of Oneonta Water Treatment Plant, received the 2017 Operators Meritorious Service Award from the New York Section AWWA.

The **Kenosha (Wisconsin) Water Utility** received the Grand Award from the American Council of Engineering Companies for its Energy Optimized Resource Recovery Project.

The **Prince William County (Virginia) Service Authority** community outreach program received the Education and Public Service Award from the Universities Council on Water Resources for its efforts in the classroom and community in 2016-'17.

The **Cucamonga Valley Water District** received the Collections System of the Year award from the California Wastewater Environment Association Santa Ana River Basin region, in the category for medium-sized collections systems (250 to 500 miles).

The **Concord General Services Wastewater Treatment Division** received the 2017 Outstanding Public Outreach Award from the New Hampshire Department of Environmental Services.

Marshall Municipal Utilities received the Plant of the Year award from the Missouri Water Environment Association in the 5 mgd or less category.

Rebecca Lewis, wastewater division manager with the city of Wichita,

Kansas, received a 2017 Excellence in Public Service Award from the DeVore Foundation.

Several city of Columbia drinking water and wastewater employees were honored at the 2017 South Carolina Environmental Conference:

- **Clint Shealy**, director of utility operations, Herman F. Wiedeman Award for contributions to the drinking water industry, from the South Carolina Chapter AWWA
- **Jill Martinez**, laboratory analyst, and **Chris Williams**, drinking water operator, SCAWWA Top Ops Quiz Bowl
- **Ashley Dove**, wastewater maintenance manager, Golden Manhole Award from the Water Environment Association of South Carolina
- **Melissa Engle**, laboratory analyst, received the WEASC Laboratory Analyst of the Year award
- **Sarah Hickman**, wastewater laboratory manager; **Rachel Furtick**, laboratory analyst; **Candace Mathis**, wastewater operator; and Engle, second place, Process Control Event, Operations Challenge

Hickman was named chair of the WEASC Laboratory Committee; **Ketki Sheth**, drinking water laboratory manager, serves as co-chair.

Derek Albertson, MPA, of Aquarion Water Company, was named superintendent and chief operator of the New Hartford (Connecticut) Water Pollution Control Facility. He was also appointed by Arnold-Hanafin Corporation as a technical adviser for the wastewater treatment plant at the United Technologies Aerospace Systems facility in Windsor Locks, Connecticut.

Todd Kellison was named Lab Technician of the Year by the Virginia Rural Water Association. He is assistant superintendent for the town of Luray Wastewater Treatment Plant.

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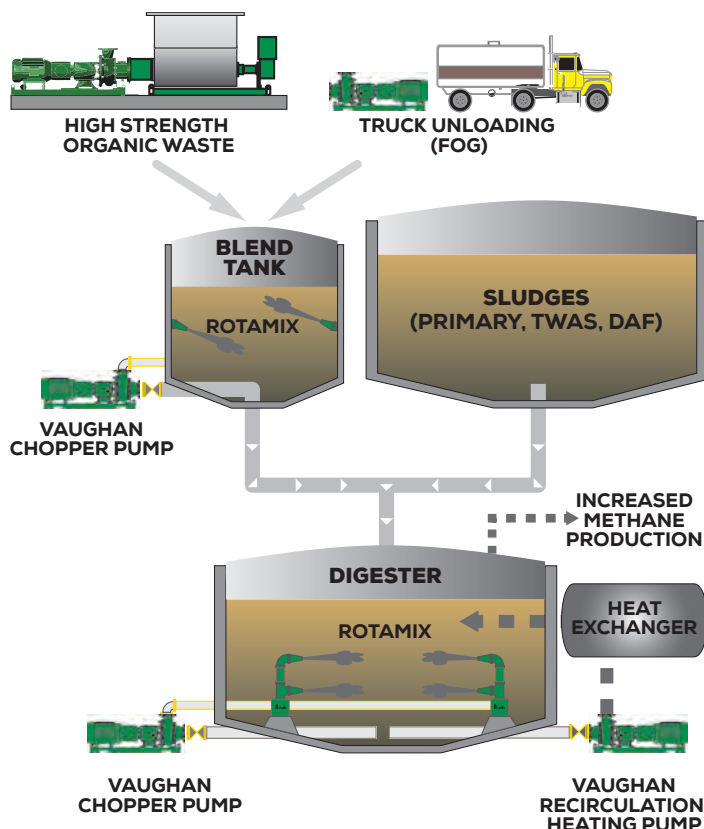
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In 2011, Algonquin's Wastewater Treatment Facility was nominated for Class 1 Plant of the Year by IAWPCO (Illinois Association of Water Pollution Control Operators). Criteria for such nominations include exemplary levels of compliance and cleanliness, operator certifications, and ongoing safety programs. Through their hard work and dedication, the team at Algonquin has shown that they're up to the challenge of continued success.

Leading the crew is Chief Wastewater Operator Ed Brown. He works closely with USABlueBook to make sure his team always has the supplies they need to keep their facility up and running. "It's great to know that even when I don't know who to call, I can just call USABlueBook," shared Ed.

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Ed Brown
Chief WW Operator
Algonquin WWTP
Algonquin, IL

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For more information on these products, see pages 235-236 in Master Catalog 128.



1 Jetfoam Emulsifier

Use with a sewer jetter to liquefy grease and keep it in suspension. Non-corrosive surfactant blend lets you clean twice as much sewer in the same amount of time.



DESCRIPTION	STOCK #	EACH
5-Gallon Pail	48163	\$ 135.95

2 EHC-33 Bacteria

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DESCRIPTION	STOCK #	EACH
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3 Big Blue Bio-Blocks

Dissolve over 30 to 90 days to continuously add grease-fighting bacteria. Perfect for lift stations or wet wells.



DESCRIPTION	STOCK #	EACH
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10-lb Block	49829	201.95
30-lb Block	49831	401.95



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