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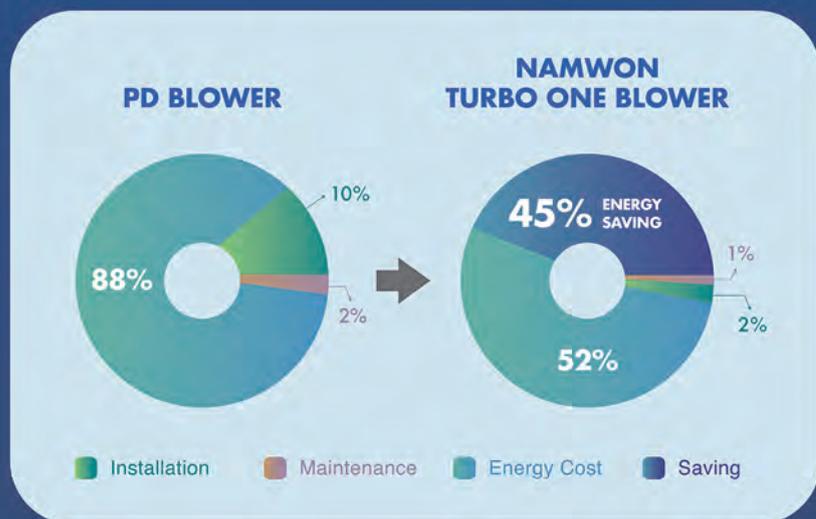
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let's be clear

The Bottled Water Boondoggle

THE WORLD IS AWASH IN PLASTIC TRASH. ACTIVISTS ARE RAILING AGAINST DRINKING STRAWS. MEANWHILE, BOTTLED WATER OCCUPIES ENTIRE AISLES IN OUR STORES.

By Ted J. Rulseh, Editor



Right now, out on the oceans, multimillion-dollar floating rigs are pulling crude oil up from beneath the seafloor, from depths of hundreds or thousands of feet.

Someone paid to explore for that oil. Someone paid to design and build the rigs, which incorporate vast amounts of technology and require teams of highly skilled and well-paid workers. Oil from those rigs is carried to shore by huge tankers and delivered to refineries costing billions of dollars.

Those refineries produce gasoline, which then is transported thousands of miles across the country to service stations, where we pump it into our cars. The price at local stations as I write this: about \$2.10 per gallon.

Meanwhile, not far from where I live, a grocery chain sticks a pipe in the ground, draws up groundwater and possibly gives it some minimal treatment before putting it into 16-ounce plastic bottles, which are then shipped a relatively few miles to the stores. The price per gallon: about \$8 (based on 99 cents for that pint bottle).

THE REAL VILLAIN?

Of all the reasons there are to consider bottled water absurd, this is the one that stands out for me. I can't fathom how the price of the stuff can be justified, or why people pay it when they can get water that's just as good from the kitchen tap for next to nothing.

More important, though, for anyone concerned about the growing problem of plastic pollution is that water bottles are a scourge on the environment. Activists have made plastic drinking straws the No. 1 villain. Meanwhile, walk into any grocery store or big-box department store and you'll likely find an entire aisle devoted to water in plastic bottles.

Some of these waters have flavors, and some are infused with vitamins, so there seems at least some justification for their existence. But much of that aisle contains bottles filled with just water, supposedly somehow better because it's from a "spring" or is "filtered" or "purified."

Objectively speaking, these waters are no better than what comes out of the typical household tap (exceptions for Flint, Michigan, and other cities with known contamination problems).

Then there are the environmental costs. Making plastic water bottles creates carbon emissions that contribute to climate change and uses, by one estimate, 17 million barrels of oil per year. Only about a quarter of those bottles get recycled, so billions of them end up in landfills, littering the landscape and polluting lakes, streams and oceans. That's to say nothing about the impact of huge trucks hauling water around.

It's true a bottle of water is convenient to carry in a knapsack or purse, but it's not a great deal less convenient (in most cases) to fill a reusable bottle from a tap or drinking fountain.

This is a chance for water utilities to tout the quality of their product. There is no need to rail in public about the problems with bottled water and water bottles. ... No, all that's needed now is to proclaim how good — and how inexpensive — tap water is.

HERE'S THE OPPORTUNITY

I know I'm preaching to the choir here. I wouldn't expect to find many advocates for bottled water among *Treatment Plant Operator* readers. The question is what to do about it.

I would argue that the current wave of concern about plastic pollution offers a chance for water utilities to tout the quality of their product. There is no need to rail in public about the problems with bottled water and water bottles — plenty of people and organizations are doing that already.

No, all that's needed now is to proclaim how good — and how inexpensive — tap water is. Look anywhere you want: You aren't likely to find a better bargain than municipal water, not even in localities where the rates are highest.

A number of utilities already make the case. Some, including Madison, the capital city of my home state of Wisconsin, have water wagons they take around to festivals and parades. I wish more utilities would do something similar. Less reliance on bottled water and more appreciation for tap water — that's a good recipe for improving our environment and elevating our utilities to the level of public respect they deserve. **tpo**

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“This is the second time we’re hosting this event, and we’re expecting even better projects and ideas to emerge this year.”

Teams of Students, Entrepreneurs Take Part in Water Innovation Competition

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SCHOLARSHIP WINNER

A Winding Path to Wastewater

Rebecca Burke — one of the winners of the 2019 National Association of Wastewater Technicians Hapchuk Scholarships — has seen a decade pass since completing her first undergraduate program. Returning to the academic setting after almost a decade, the scholarship winner took an unusual path through multiple occupations before discovering a passion for wastewater treatment.

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OVERSEAS EXPERIENCE

Inspiring a Wastewater Career

While traveling in Angkor Wat, Cambodia, Jennie Callahan met a civil engineer who was restoring temples. Years later, attending a graduate program in environmental engineering at the Colorado School of Mines, she cites the experience as a catalyst for joining the wastewater treatment industry. Read about Callahan’s entry into the industry in this online exclusive article.

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FOOD WASTE

Doubling Biogas Production

A slate of new legislation in California has spurred a movement to remove all food waste from landfills, and the Sanitation Districts of Los Angeles County has found a win-win solution via digester addition. By injecting processed food waste into existing sludge digesters, they remove a significant portion of the region’s food waste stream while also potentially doubling biogas production.

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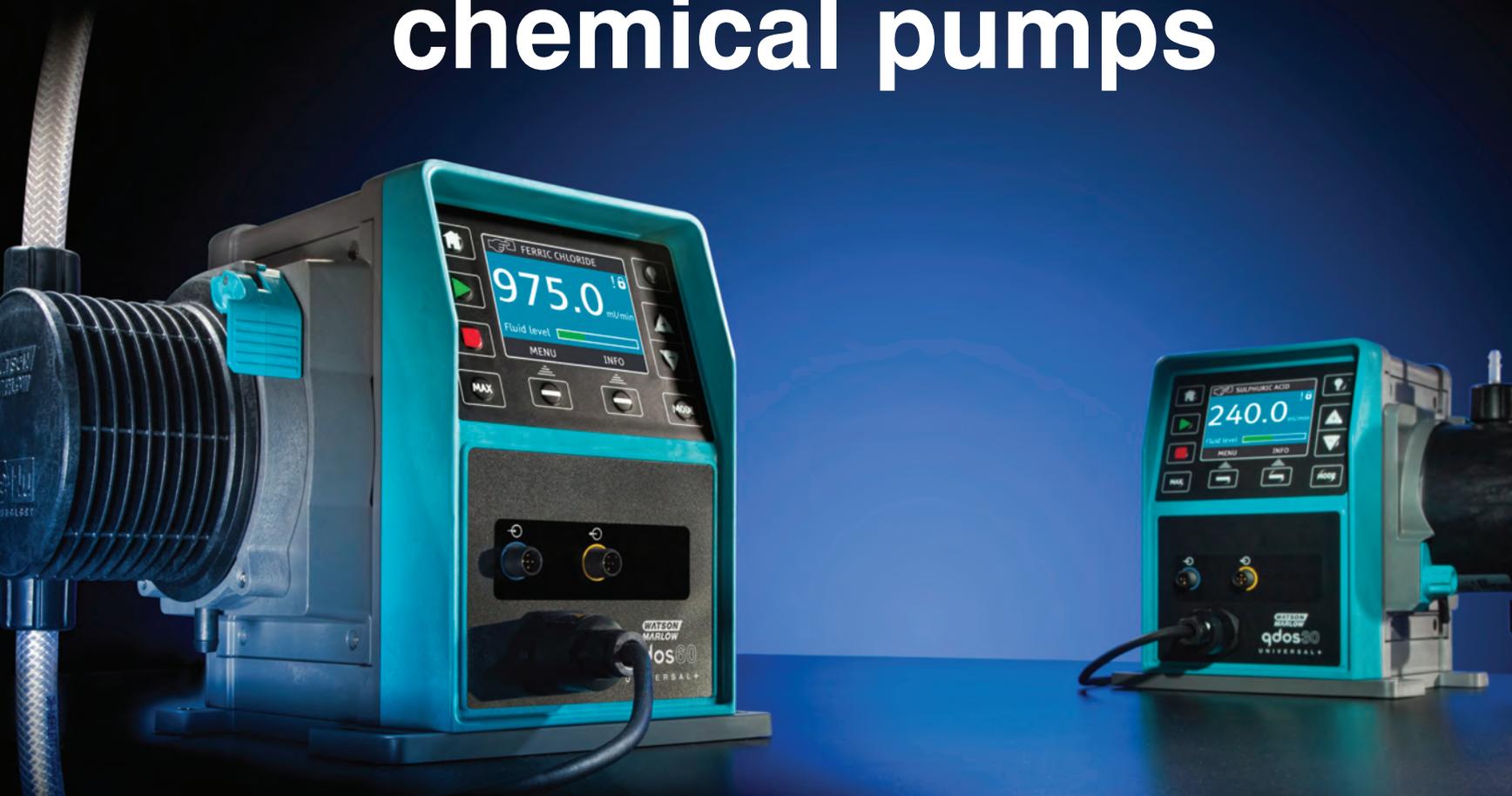
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Making the Leap

JANE LEATHERLAND TOOK A BIG STEP FROM A LONG CAREER IN THE LABORATORY TO BECOME OPERATOR IN RESPONSIBLE CHARGE TO TWO TREATMENT FACILITIES

STORY: **Steve Frank**

PHOTOGRAPHY: **Martin Cherry**

Jane Leatherland worked in labs for most of her professional career. But when the chance came to take over operations of the wastewater and water treatment plants in her Tennessee community, she was ready to make the leap.

Leatherland is supervisor of wastewater and water treatment with Humboldt (Tennessee) Utilities, about 90 miles northeast of Elvis Presley's Graceland mansion in Memphis. As operator in responsible charge of a 2.6 mgd wastewater treatment facility and a 1.5 mgd drinking water plant, she oversees services for nearly 10,000 people.

Advancing from the lab to her current role meant taking a leap of faith and pursuing a crash course for the needed certifications. She found the time to study, passed the exams, and has done — according to her peers and community leaders — an exemplary job not just running the two treatment plants, but improving their performance.

Now she's deeply involved in the design of a new sequencing batch reactor wastewater treatment plant for the community. For her efforts, she earned a 2018 William D. Hatfield Award from the Kentucky-Tennessee Water Environment Association.

HOPPING THE POND

Leatherland's journey has been a long one, professionally and geographically. She describes herself as “British by birth, American by choice.” She developed an interest in science in school and especially enjoyed her biology and chemistry classes at Queen Elizabeth's Grammar School for Girls in Mansfield, England.

She completed advanced studies in science there in 1973. After that, she got a job as a lab technician with the Coal Board Regional Laboratories in Mansfield Woodhouse where, she says, “The theoretical became practical, and I really enjoyed it.”

Jane Leatherland, supervisor,
Wastewater and Water Treatment



The Humboldt operations team includes, from left, Fred Glenn, maintenance technician; Jane Leatherland; Brett Waldrup, laboratory technician; and Clayton Cooper, maintenance technician.

“I attended every class I could leading up to the certification exam. When I left school, I thought I’d never use algebra again. But I did.”

JANE LEATHERLAND

Jane Leatherland, Humboldt (Tennessee) Utilities



POSITION:
Supervisor, Wastewater and Water Treatment

EXPERIENCE:
37 years in the industry

CERTIFICATIONS:
Grade IV Wastewater Treatment Operator, Grade II Water Treatment Operator, Level I Pretreatment Coordinator, Cross-Connection and Backflow Prevention

EDUCATION:
Advanced studies in science at Queen Elizabeth’s Grammar School for Girls in Mansfield, Nottinghamshire, England

AFFILIATIONS:
Kentucky-Tennessee Water Environment Assoc; Tennessee Water & Wastewater Assoc.

GOAL:
Get a new wastewater treatment plant built and operators trained before retiring

She performed a wide range of analyses related to mine safety and coal quality, working there from 1973 until 1986 when the opportunity arose for her, her son and her fiancé to move to Denver where her father was already working with a coal company. “I sold everything I had in England, gave up my job and was fortunate to get a job with the Metropolitan Denver Sewage Disposal District No. 1,” Leatherland says. That utility became the Metro Wastewater Reclamation District in 1990.

Leatherland remained with Denver Metro for 16 years, doing work similar to what she had done with the Coal Board and typical of a large wastewater lab. She mastered a number of analyses and learned about operations, too.

ON TO TENNESSEE

Then her husband’s job changed and they moved to Michigan, where she became a farmer: “I bred horses and also had cattle, geese, ducks and chickens.” She enjoyed the work, except in winter. “Even in the barn, the water would freeze all the way through the trough, not just on the surface. Getting that solid block of ice out of the trough was tough.”

In 2006, she moved to Tennessee and again set about raising horses. In 2010, while working for the U.S. Census Bureau, she was checking at Humboldt Utilities on whether certain houses were occupied. One thing led to another, and she learned that the utility had an opening at the wastewater treatment plant for a part-time lab technician.

“I figured I could handle that,” she says. “I dusted off my resume and dropped it off.” She started work there in October 2010. After just two months, Leatherland (who professes to be “passionate about what I do”) had improved quality assurance in the lab, and the utilities board was happy with her work.

About then, the board began planning to take wastewater treatment plant operations back in-house after a period of contract operation. The general manager asked her to take the wastewater operator exam so she could become the operator in responsible charge.

That meant she had six months to take and pass Tennessee's Grade IV (highest) wastewater operator exam. "I had to study like crazy," Leatherland says. "I attended every class I could leading up to the certification exam." She studied three to four hours a night at home, worked through the Sacramento course books and did all the math problems: "When I left school, I thought I'd never use algebra again. But I did."

She took an exam cram course through the Tennessee Association of Utility Districts, passed the Grade IV exam in May 2011 and became operator in responsible charge in October 2011. Since then, she has steadily improved the plant's performance. The state Department of



Jane Leatherland looks over blueprints for new water plants slated to be built in the coming years.

HORSING AROUND

Jane Leatherland has a lifelong involvement with horses: "My mother used to ride, so it was passed down. I came by it honestly."

She got her first horse in 1997 while living in Colorado. "I rode both days every weekend, and in the summertime I rode most evenings as well," Leatherland says. As a member of a group that rode in parades, she took part in the Cheyenne Frontier Days parade, the granddaddy of Western rodeo parades.

She also got her husband, Steve, involved: "We bought him a show horse that we showed in Wyoming and Colorado." Then Steve's job took him to Michigan in 2002. There Jane Leatherland became a breeder, with a stallion, broodmares and riding stock. They didn't ride the stallion: "He had one purpose only."

From 2002 to 2006, the stallion and her broodmares produced eight foals. Then Steve's job moved them to Tennessee, and the property there wasn't suited to raising horses. So she sold the stallion and began downsizing.

In 2014, Leatherland and a group of friends heard about 57 Missouri Fox Trotter mares that were to be auctioned off. They expected kill houses to buy them, so Leatherland and 53 horse-lover friends got together and bought them. "I came home with one and she was in foal," Leatherland says. Soon she had two more horses.

When the colt turned 5 months old, she gave him to a friend. Leatherland donated her remaining two horses to a therapy riding center in 2016. "They now help people who are physically or mentally challenged," she says. The patients range in age from 4 to 85. Riding horses helps them with everything from improving core body strength to building self-confidence.

Never one to sit still, Leatherland has morphed from horse rescue to dog rescue. She has two rescue pooches of her own. She and three other people formed a nonprofit group to build a dog rescue shelter for Humboldt.



A 3.25-acre retention lagoon helps the Humboldt team manage high-peak flows caused by I&I.

“They found the only way they could operate the plant was by sending everything into this lagoon and back out again.”

JANE LEATHERLAND

Environmental Conservation recognized her efforts in the latest permit by cutting back on the number of required lab analyses.

TO THE POTABLE SIDE

In 2014, the Humboldt drinking water treatment facility supervisor decided to retire. Leatherland passed the Water Operator Grade II exam in 2015; in 2016 she became operator in responsible charge of the utility's 1.5 mgd water plant, which pumps, treats and distributes groundwater.

The wastewater treatment plant has five significant industrial users, so Leatherland has added certified pretreatment coordinator Level I to her qualifications. On the drinking water side, she added a cross-connection and backflow prevention certification.

She has successfully educated her board on what is facing the plant in nutrient removal. "Eighteen months ago I persuaded the board that we needed to upgrade the wastewater plant because nutrient limits were coming at us like a freight train," she says. "We decided to build a 3 mgd SBR plant.

“We are currently a 2.6 mgd Frankenplant. That’s the best way I can describe it.”

JANE LEATHERLAND

“We did the cost analysis, and it was within about a million dollars whether we would upgrade this plant, which still would not be able to do denitrification and phosphorus removal, or build a brand-new SBR. We are currently a 2.6 mgd Frankenplant. That’s the best way I can describe it.”

The original plant was built as a trickling filter in 1964. In 1985, because the plant could not meet permit consistently, an aeration basin was added. Under a Tennessee Department of Environment and Conservation Commissioner's Order in 1995, a 3.25-acre, 17-foot-deep equalization basin was added to help address inflow and infiltration problems. "They found the only way they could operate the plant was by sending everything into this lagoon and back out again," Leatherland observes.

DATA POINTS AND BUGS

Despite the difficulties of operating an aging plant cobbled together over time, Leatherland used her understanding of key data points, wastewater biology and the impact of seasonal conditions to get the facility under control. Under her deft touch, the plant experienced fewer and fewer permit violations.

Leatherland is adamant that while she received the William D. Hatfield Award, "It's not about me, but we." She acknowledged the key roles of the other three people in the operations group: Brett Walrup, laboratory technician, and Fred Glenn and Clayton Cooper, maintenance technicians.

While awaiting final design of Humboldt's new plant, Leatherland has begun modernizing utility facilities through grants. Some \$22 million in new wastewater treatment facility work is now in place, along with \$7 million in water treatment plant upgrades. A major food processor recently contacted Humboldt Utilities about sending 2 mgd from a new

\$320 million chicken-processing plant. Capacity for that wastewater and its BOD load is being factored into the new facility design.

Leatherland's plans for the future include training a lab technician for the wastewater treatment plant and an operator for the water treatment plant. Meanwhile, she's happy to have made the leap from the lab to operations — another step on a long and productive career journey. **tpo**

video profile



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A Better Blend

AN AUTOMATED MIXING SYSTEM HELPS AN ILLINOIS TREATMENT PLANT IMPROVE BIOGAS PRODUCTION AND INCREASE VOLATILE SOLIDS DESTRUCTION

By **Scottie Dayton**

Operators at the Downers Grove (Illinois) Wastewater Treatment Center worked for four years with the vendor to repair the compressor on the gas recirculating mixing system in Primary Digester No. 1.

“The compressor ran, but it wouldn’t move any gas,” says Nick Menninga, the plant’s general manager. Then Menninga took a tour of self-sufficient Danish wastewater treatment plants and their equipment vendors. At the Landia factory in Denmark, he saw the externally mounted GasMix digester mixing system.

“It was only after my return when we were evaluating different options for fixing or replacing the old mixing system that Landia entered the conversation,” Menninga says. “Compared to other technologies, the GasMix retrofit was more economical to purchase and install.” In March 2017, Downers Grove became the first municipality in North America to operate a GasMix system.

COMPLETE MIXING

The plant provides primary settling followed by secondary treatment and ammonia removal using acti-

ated sludge, tertiary sand filtration and seasonal disinfection. Most treated effluent discharges to the East Branch of the DuPage River. Class A biosolids are distributed free to the public.

The facility has three primary digesters and two secondary digesters. Digester gas is stored, treated and used in the combined heat and power facility. Soren Rasmussen, director of Landia’s U.S.-based operations,

“Compared to other technologies, the GasMix retrofit was more economical to purchase and install.”

NICK MENNINGA

helped Menninga size the equipment for Digester No. 1, a 55-foot-diameter concrete cylinder with a cone bottom, a floating cover and a liquid volume of 460,000 gallons.

In phase one of the mixing process, an external 49 hp centrifugal chop-pump (Landia) draws material from the digester. Chopping is completed before the reduced particles are pumped through an aspirating venturi chamber. The resulting vacuum sucks biogas down from the digester head space

and injects it into the liquid, mixing the solids vertically and keeping a scum cap from forming on the surface.

In phase two, a high-pressure mixing nozzle injects liquid into the lower half of the digester, creating a rotational horizontal mixing pattern that keeps solids from settling. “The low-viscosity sludge helps knock down surface scum, increasing the volume of active digestion and making the system run more efficiently,” Menninga says.

PREPARATION AND INSTALLATION

To prepare for the retrofit, operators redirected the sludge flow to another primary digester, cleaned Digester No. 1, removed the gas piping inside the tank and enlarged the gas withdrawal piping from 4 to 8 inches.

Following Landia’s recommendation, a contractor core drilled through the tank wall at the proper locations and angles to install the two solid stainless steel nozzles. Workers set the centrifugal pump in the digester control room. They ran a 12-inch vacuum line from the digester to the pump and 6-inch discharge pipes from the pump to the nozzles. They wired the pump and the automatic valves controlling the nozzles to the plant’s SCADA system. The retrofit took a month.



PHOTOS COURTESY OF MARC MAJEWSKI

Sam Tatulli, left, biosolids mechanic, and Nick Menninga, general manager, adjust the Landia GasMix equipment via the SCADA system.

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Tatulli verifies that the mixing pump suction valve is open.



The 49 hp centrifugal Landia chopper pump (on right with knife valves) recirculates sludge from the digester.

UP AND RUNNING

Landia sent representatives to train the operators. "Each valve's operation time is determined by the sludge characteristics and can be fine-tuned to provide effective mixing with the lowest possible parasitic load," Menninga says. "Landia's startup default opened the sludge mix valve for 10 minutes and then the GasMix valve for 5 minutes every hour."

Operators experimented with the scheduling based on whether biogas was sent to storage or flared. "The default had us flaring hourly," Menninga says. "Our optimal runtime turned out to be opening each valve for 5 minutes every hour. We don't flare routinely with this schedule."

After 18 months, it's difficult for Menninga to characterize gas produc-

tion because of how data is collected. "In rough terms, it appears we have a 20 percent increase in digester gas production, and the destruction of volatile solids appears to have increased from the mid-50s percent to the mid-60s percent," he says. "From an operations standpoint, effectively mixing the tank has made improvements." **tpo**

Share Your Ideas

TPO welcomes news about interesting methods or uses of technology at your facility for future articles in the How We Do It column.

Send your ideas to editor@tpomag.com or call 877-953-3301



Cody Woods, operations supervisor, adjusts the regulator valves where the raw gas enters the treatment process.

“Biogas was an energy source that was basically being wasted. In the past three years, we started moving aggressively to utilize it, with help from newly available technologies.”

RAY SLATTERY, P.E.

Recycling Warriors

DODGE CITY'S WARRIOR BIOGAS PROJECT BRINGS A HEALTHY RETURN ON INVESTMENT AND ADVANCES THE CITY'S PROGRESS ON SUSTAINABLE OPERATIONS

STORY: **Ted J. Rulseh**

PHOTOGRAPHY: **Josh Roesener**

The Warrior Biogas crew includes, from left, Tanner Rutschman, Jorge Monte, Bobby Downey, Cody Woods, Peggy Williams, Kent Mindy, Rondey Nichols, Kevin Krisle, Shane Smith and Ray Slattery.



Dodge City’s South Wastewater Treatment Plant in southwest Kansas was built for zero stream discharge because even back in the 1980s, city leaders knew water would become a precious resource.

Today the plant sends effluent from its facultative lagoons to center-pivot irrigation systems that water and fertilize some 3,000 acres of cropland.

More recently, the city has taken to recycling biogas, to substantial benefit. The Warrior Biogas Project at the South Plant produces 1.6 million cubic feet of raw gas per day. After scrubbing, the gas is delivered via utility pipeline to a company that uses it to produce methanol for blending with gasoline for vehicle fuel.

The city expects to achieve full payback on the project in five years or less. After that, the biogas revenue will be available for treatment plant projects, city infrastructure work, development of park amenities like bicycling and walking trails, and tax levy reduction.

The project, conceived just three years ago and built on a fast track, went online in February 2018. It has earned a Project of the Year award from the American Biogas Council, a City Public Improvement Award from the American Council of Engineering Companies of Kansas, and an Infrastructure Innovation Award from the League of Kansas Municipalities.

It also received a 2018 PISCES recognition for excellence and innovation from the U.S. Environmental Protection Agency (EPA).

“Biogas was an energy source that was basically being wasted,” says Ray Slattery, P.E., director of engineering for the city. “In the past three years, we started moving aggressively to utilize it, with help from newly available technologies.”

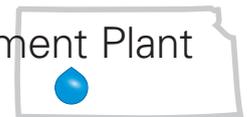
LAGOON TREATMENT

Dodge City’s two clean-water plants serve a population of about 28,000; both are operated by Jacobs. The North Wastewater Reclamation Facility is a 1.25 mgd (design) membrane bioreactor plant completed in 2011 to serve a growing section of the city. Its effluent is used to irrigate a municipal golf

Warrior Biogas Project, South Wastewater Treatment Plant

Dodge City, Kansas

www.dodgecity.org



BUILT:
Treatment plant 1982, biogas project 2017-18

FLOWS:
7.2 mgd design, 5.5 mgd average

TREATMENT PROCESS:
Facultative lagoons

TREATMENT LEVEL:
Secondary

RECEIVING WATER:
Zero stream discharge (reuse for irrigation)

BIOGAS PRODUCTION:
1.6 million ft³/day

BIOGAS USE:
Converted to methanol (future use as vehicle fuel)

course and to sustain the water level of a lake at the high school that’s used for environmental studies.

The South Plant (7.2 mgd design) isn’t the typical facility producing biogas in concrete circular digesters. Built in 1982 and expanded over the years, it’s a facultative lagoon system that receives on average 2.5 mgd of municipal wastewater and 3.0 mgd of higher-strength wastewater from a National Beef plant that processes 6,000 head of cattle per day.

The flows are treated separately. The municipal influent, at about 60 degrees F, is fed to a pair of anaerobic digester lagoons for a retention time of 14 days and then enters two aerated basins before passing to a pair of facultative lagoons.

The beef plant wastewater goes through screening and then dissolved air flotation for grease removal before discharge to South Plant at about 90 degrees F. There it is treated in the same manner as the municipal wastewater.



Kent Mindy with the thermal oxidizer that burns off impurities separated from the gas during the refining process.

the facility; UCI of Wichita handled construction under a modified design-build arrangement.

The raw digester gas contains, in addition to 72 percent methane, relatively high levels of water, hydrogen sulfide and carbon dioxide, according to Cody Woods, operations supervisor, who runs the gas project with the Jacobs staff in Dodge City.

REMOVING IMPURITIES

The gas requires significant treatment to meet the requirements of Northern Natural Gas, which serves as the conduit from the treatment plant to the ultimate gas users. The gas first passes through a feed compressor that raises it from atmospheric pressure to 100 psi and removes the moisture. Next comes a Molegate skid (Guild Associates) composed of four separate treatment trains that operate in sequence.

“Proprietary media in each train acts as a scrubber of the gas,” Woods says. “The raw gas goes into the bottom of each train, and methane, due to its molecular size, goes out the top very easily. The H₂S, CO₂ and the other impurities are captured in the media.”

At the end of each cycle, a valve closes at the top of the tank, and the impurities are drawn off by vacuum compressors and sent to a thermal oxidizer. There, the gases are burned off along with supplemental fuel at 1,400 degrees F, providing full destruction, “basically the same as if we were flaring biogas,” Woods says.

Methane emerging from the Molegate unit is fed to a two-stage product compressor that raises it to 700 psi. “From there, a valve equalizes the pressure of the city’s skid with the gas company line, and the gas is pushed into their system and out for distribution,” Woods says.

Slattery observes, “The line is capable of handling up to 800 psi operating pressure, and that’s why our product compressor is so large. So if someday in the future the utility goes to that higher operating pressure, we will still be able to achieve that and inject our gas.”

ON TO END USERS

The gas utility line delivers the gas to OCI Partners, which sends it by pipeline to a location in Beaumont, Texas, where it is converted to liquid methanol. The methanol is then taken by ship to the Netherlands, where it is added to automobile fuel to meet that country’s environmental regulations.

Tanner Rutschman, P.E., city engineer, observes, “When we put the gas into the Northern Natural Gas pipeline, they have all their analyzing equipment right there on site. They’re continuously checking for heat content, oxygen, water, H₂S and CO₂.”

“If our gas were to go out of their spec, they would shut us in. That hasn’t happened since the startup phase. They’ve been good partners with us.

(continued)

Warrior Biogas Project BIOGAS QUALITY

	Northern Natural Gas requirement	Raw biogas	Finished product
Methane	Not Specified	72 percent	99 percent
Oxygen	≤ 0.2 percent by volume	2 percent	0
Hydrogen sulfide	≤ 1/4 grain/Ccf	7,500 grains/Ccf	0
Total sulfur	≤ 20 grains/Ccf	500 grains/Ccf	0
Carbon dioxide	≤ 2 percent by volume	24 percent	< 1 percent
Water	≤ 6 pounds/MMcf	40-plus pounds/MMcf	1.8 pounds/MMcf
Heating value	> 950 Btu/cf	650 Btu/cf	1,000-plus Btu/cf

ter, with one anaerobic digestion lagoon and one aeration basin. All told, the three digester lagoons encompass 7.75 acres, and four facultative lagoons cover 181 acres.

Treated water from the lagoons, some 1.7 billion gallons per year, goes to water alfalfa, corn, sorghum and winter wheat on land owned by Nicholson Ventures, a partnership of Charles Nicholson and his sister Deketa Schuckman.

GEARING UP

Starting in the 1990s, biogas from the digester lagoons has been captured under fabric covers, drawn off and flared, at a cost of \$10,000 to \$12,000 per month for supplemental fuel. Several years ago, those covers were replaced with more durable high-density polyethylene material, 100 mils thick, anchored and sealed to the digesters’ concrete walls.

On deciding to pursue biogas utilization, the city and its consultants moved quickly. The team chose Guild Associates to supply the gas scrubbing equipment and associated vessels. The PEC engineering firm from Wichita designed

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They've been real helpful. We also have gas chromatographs (Emerson) and flowmeters monitoring the industrial and municipal gas streams so we know the volume and the heat content coming off each side."

While the OCI Partners business is going strong, another customer waits in the wings. Kwik Trip, which operates service station/convenience stores, plans to use the gas to fuel its fleet vehicles. "We are under contract to sell to them once our facility is certified with the EPA," Slattery says. "Once that is finalized, the biogas from our municipal digesters will be sold to Kwik Trip, and we'll continue selling the gas from the industrial side to OCI."

PAYING DIVIDENDS

At present, revenue from gas sales has the Warrior Biogas Project on track for a payback time of five years on an initial investment of \$10 million. "That could decrease once we have our EPA registration," Slattery says.

Initially, the revenue will be used to retire debt on the gas project and the construction of the North Wastewater Reclamation Facility. "Then it will



The Molegate skid (Guild Associates) filters raw gas in proprietary media.



“The thought was that to recycle and reuse wastewater, instead of using fresh-water for crop irrigation, would also help replenish the aquifer.”

RAY SLATTERY, P.E.

be used for deferred maintenance of infrastructure, other capital improvement projects pertaining to the city's infrastructure and quality of life projects for the citizens of Dodge City," Slattery says.

The Warrior Biogas Project isn't the only city recycling initiative that's paying dividends: Water reuse is also beneficial. "The thought was that to recycle and reuse wastewater, instead of using freshwater for crop irrigation, would also help replenish the aquifer," Slattery says.

"Our potable water comes from the Ogallala Aquifer. The last couple of years have been somewhat wet, and we've seen a little bit of an increase in the aquifer water level from Dodge City east. But we still need to be good stewards so the projected life of the aquifer can be extended." **tpo**



Water is pumped through irrigation sprinklers to lower the levels in the lagoons during winter.

THE SOLIDS SIDE

Biosolids management has not been a major concern for Dodge City's South Wastewater Treatment Plant in Kansas.

"The first part of the South Plant was built in the 1980s," says Ray Slattery, P.E., director of engineering. "In the early 2000s when we did our expansion, we dredged the solids out of the two lagoons that treat our municipal wastewater. There wasn't all that much.

"Now we feel we're getting better treatment of the water, and so our buildup is probably not at as high a rate as before. We put in a bar screen (Fairfield Service Company of Indiana) on the municipal side to help capture larger objects. In addition, National Beef has done a better job of screening its wastewater to catch material that would tend to fill up the lagoons."

The state permit calls for monitoring only on BOD and TSS because the South Plant is a no-steam-discharge facility. "We are required to do pretty stringent soil testing under the center-pivot irrigators and provide that information to the state," Slattery says.

"Based on what is measured in the soil, our farmer partner rotates the crops. We add some soil amendments to help maintain the status quo." That mostly means adding gypsum to offset salt buildup. "The nutrients the crops need are basically supplied through the effluent. It's been fairly high in nutrient level."

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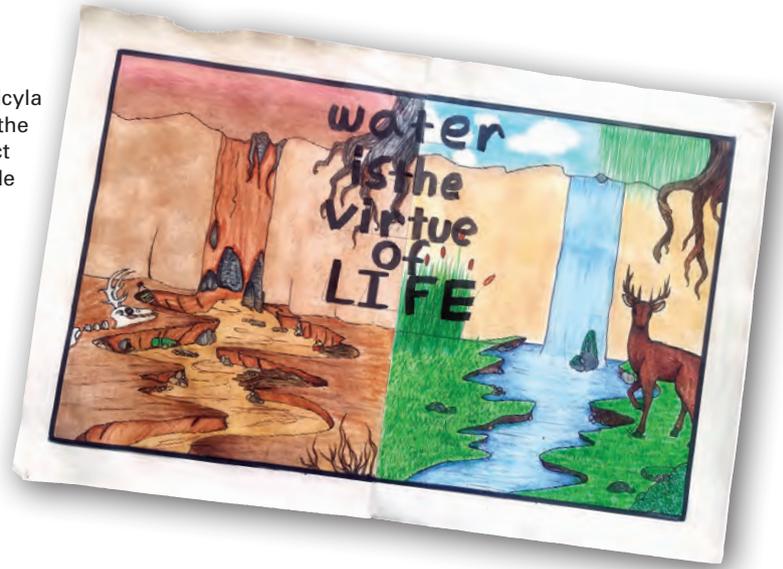
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This poster created by Pricyla Duarte won first place in the Monte Vista Water District poster contest in the grade seven to 12 division.



Art for Education

BRIGHTLY COLORED POSTERS CREATED BY KIDS HELP THE MONTE VISTA WATER DISTRICT SPREAD THE MESSAGE OF CONSERVATION YEAR-ROUND

By Sandra Buettner

A poster contest sponsored by California's Monte Vista Water District encourages K-12 students to promote water efficiency.

The contest was created in 1990 by the Metropolitan Water District of Southern California for its 26 member agencies. Monte Vista district, a member agency based in Montclair, began taking part in 2000.

"Metropolitan Water District, our water wholesaler, created the contest to encourage member utilities to help spread the water conservation message to customers," says Kelley Donaldson, community affairs manager for the Monte Vista district, which encompasses 30 square miles with a population of 130,000.

Her district's program, now in its 20th year, is popular with children and the community. Students from all schools in Montclair and three public schools in Chino are eligible to enter. The contest has three categories: grades K-3, four to six, and seven to 12. First-, second- and third-place prizes are awarded in each group.

RULES AND REGS

The district staff promotes the contest through emails and flyers sent to the teachers starting in November of every year. After that, the district uses social media to keep the contest top of mind. "Some teachers work the contest into the curriculum and some assign it as a class project," Donaldson says. Teachers who encourage their students to enter cover all subject backgrounds, not just science.

Posters must be submitted by April 11, and the winners are chosen the following week during a Public Information Committee meeting. Judges include two utility board members, the district general manager and the community affairs staff, for a total of five to seven.



Fifth grader Hannah Guthrie and first grader Logan Guthrie won first places in the Monte Vista Water District poster contest. Both posters were also chosen for Metropolitan Water District Student Art Calendar.

Poster guidelines include submitting an original drawing on a 12-by-18-inch poster board or white paper. Entries must include a short water message, such as "Water Is Life." Students are encouraged to use bold and bright colors with crayons, pencils, watercolors, markers and other media.

PRIZES AND RECOGNITION

First-, second- and third-place winners receive Barnes & Noble gift cards for \$50, \$35 and \$25. In addition, the first-place winners from each age group get a pizza party for their entire class. Teachers of the student winners receive a \$50 Target gift card.

Teachers are asked to pare down their students' entries to five and submit them to the district. Over the past several years, judges have received up to 200 entries to review. The nine student winners, their teachers and their parents are invited to the district board meeting at the end of April for recognition.

The children receive certificates and are recognized on the district website, through social media and in news releases to local media.

CALENDAR KIDS

The winners' entries are then sent to the Metropolitan Water District

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“This contest is really a great opportunity for us to engage with our students and teachers. ... It’s an easy way for us to continue the water awareness and conservation message throughout the year.”

KELLEY DONALDSON

for its annual calendar contest along with winning entries from other member agencies. Thirty-six winners are featured in the Metropolitan Water District’s annual calendar, which is mass-produced and distributed to member agencies that took part in the contest.

Last year a brother and sister, Hannah Guthrie (fifth grade) and Logan Guthrie (first grade) from the Monte Vista district won two slots for the 2019 calendar. Calendar winners, along with their parents, their teachers and agency representatives are invited to a student art exhibit and recognition event to be honored for their creations.

Students take a train to the Metropolitan Water District offices in downtown Los Angeles, where they receive a certificate and see their posters attractively matted and framed and displayed in the district boardroom for all attendees to walk around and observe. Students also receive a package of art supplies. After that, a luncheon is served.

Afterward, all the framed posters are offered to member agencies for one week as a traveling display for city hall and agency lobbies.

“This contest is really a great opportunity for us to engage with our students and teachers,” Donaldson says. “Our community and board really like it. It’s an easy way for us to continue the water awareness and conservation message throughout the year.” **tpo**

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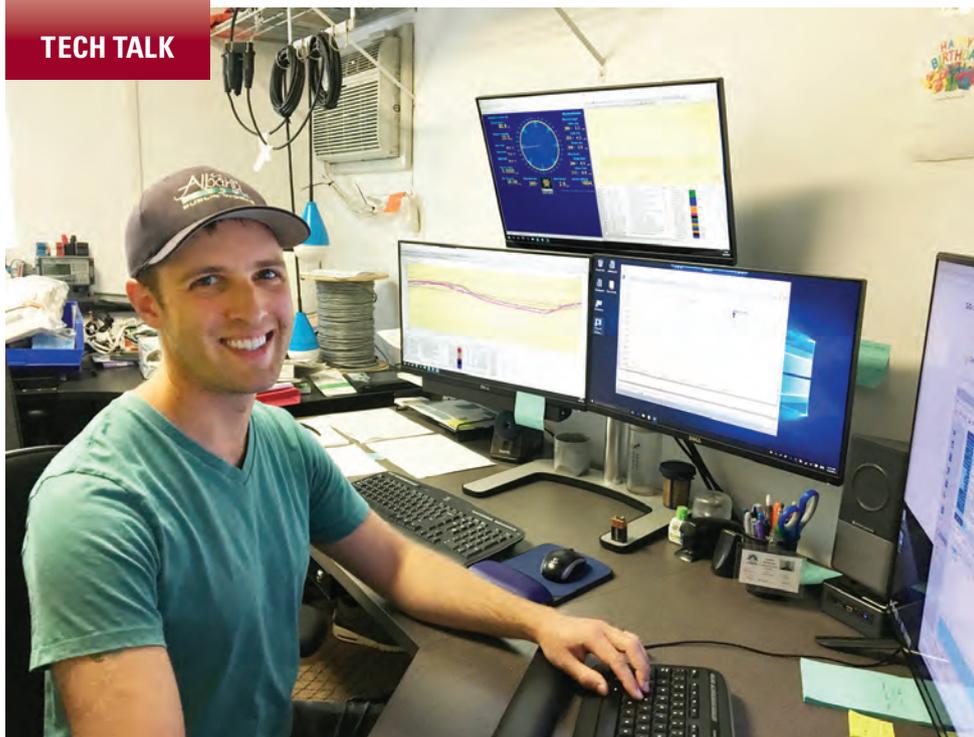
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Aaron Budiselich monitors the weather sensor data in Albany, Oregon, with Weather Master software from Columbia Weather Systems. The weather station automatically interfaces with the facility's PLC system.

Watching the Weather

ON-SITE METEOROLOGICAL STATIONS CAN HELP WATER AND WASTEWATER UTILITIES GATHER DATA TO SUPPORT SOUND OPERATING DECISIONS AND PUBLIC COMMUNICATION

By Nader Khoury

With the rise of data-driven decision-making, weather monitoring is increasingly important for water and wastewater utilities.

The Internet of Things movement is driving society toward smartphones, smart cities, smart utilities, smart everything. Within interoperable citywide systems, smart water can play a significant role, and weather monitoring is a part of it.

Access to timely weather information can help empower staff to maximize operating efficiency and make timely decisions. An on-site weather station can help a utility stay on top of changing conditions and respond appropriately.

SUPPORTING OPERATIONS

Whether dealing with water supply or treatment, weather affects operations. Procedures are established taking meteorological factors into consideration. Standard decisions can be automated for normal operations and planned and documented for special circumstances.

“Certain weather conditions trigger actions at our facilities,” says Jonathon Sudar of Central Utah Water Conservancy District. “We monitor air temperature, wind speed and water temperature. We know from experience what combination of these parameters will cause ice to form on our intake screens and when we need to open the bypass gates.”

Rainfall has a significant impact on water management. For example, sewer overflows can adversely affect systems and public health. Rainfall monitoring is key to helping manage flow conditions, whether that means diverting flows or chemically treating releases.

Some normal operations based on weather conditions can be automated with a weather station interfaced to SCADA or a PLC system. Weather monitoring can be used to activate alarms for notification and to exert control based on parameters such as precipitation accumulation, high or low temperatures and high wind speed.

In case of an emergency, such as a chlorine release or spill, the monitoring of temperature, wind speed and wind direction can support effective response, community notification and decisions about evacuation.

CONTROLLING ODORS

At facilities near commercial or residential area, weather data can help forward-thinking plant managers to be good neighbors and take steps to reduce odors.

If not dealt with, odor complaints can escalate, bringing negative media reports and pressure on public officials. Temperature, precipitation, wind speed and wind direction influence odor intensity and drift. For example, research shows a positive correlation between hydrogen sulfide concentrations and rising temperature, which facilitates microbial growth.

Monitoring and documenting of weather parameters can help in addressing neighborhood concerns and planning for odor control and mitigation. It helps operators understand how weather affects odors and make sense of how an odor plume disperses.

The Los Angeles County Sanitation District uses weather stations at its water reclamation facilities to help manage for odor. Weather stations with 4-20mA signal interface integrate with PLC systems that use FactoryTalk

(continued)



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software (Rockwell Automation). Automated weather monitoring provides time-stamped data for documentation and analysis when addressing complaints, and in modeling and mitigation to prevent future odor issues.

SERVING THE PUBLIC

Weather data can be an important part of a water utility's mission to serve the public and provide communication during extreme weather events that may affect service.

Reservoir conditions

Many water utilities open their reservoirs for public recreation, and these bodies of water are often in hilly terrain, subject to unique microclimates. Here, weather data can enable the utility to keep residents informed of the threats of unsafe conditions, such as rain, high winds and lightning. Weather



The water reclamation facility in Albany uses an Orion Weather Station all-in-one sensor from Columbia Weather Systems to monitor wind speed and direction with ultrasonic technology, as well as rainfall, temperature, humidity and barometric pressure.

Weather monitoring can be an important part of smart water and integrated and interoperable citywide systems. Besides serving the utility itself, climate data can improve intelligence in other areas, such as public services and energy.

stations are available with lightning detection in addition to monitoring of temperature, humidity, barometric pressure, wind speed and wind direction.

Believers in weather monitoring include the Jackson Bottom Wetlands Preserve in Oregon, owned by the city of Hillsboro and Clean Water Services. Created as a sewer farm to clean water polluted by canneries and lumbering, the preserve has become a regional draw for research and environmental education.

A weather station in place since 2002 is used for research and education and to provide weather data to the general public by way of Weather Underground, as well as widgets and buttons on the preserve website and city websites.

Promoting conservation

In home-based landscape watering and industrial irrigation, water conservation is based on factors such as rainfall, humidity and temperature. Public acceptance and cooperation relies on persuasive messaging that can be substantiated with weather data. Whether automated or manual, smart water usage can be as simple as whether it is raining or not, or more complex based on rainfall accumulation or evapotranspiration.

Dealing with extremes

Events such as floods and droughts are occurring more often and with greater intensity. These, in addition to winter storms with ice and high winds, affect the capacity and operations of water infrastructure and services. Managing services around such events includes monitoring conditions for operational safety, recording data for analysis and using weather data to notify the public about service disruptions or contingencies.

ANALYZING DATA

The concept of smart water includes the use of advanced technologies and data to improve efficiency and maintain quality of life for customers. Smart water utilities are adding IoT assets such as meteorological sensors in addition to traditional monitoring of flow, pressure, distribution and consumption.

Weather information can be automatically monitored and archived for periodic and incident reporting. Historical data can be analyzed for process optimization, modeling and planning. Adaptations can be automated based on weather parameters to make adjustments for minor fluctuations and to activate emergency measures based on extreme conditions.

Sudar, of the Central Utah district, observes, "Our weather data is collected through a PLC and stored in a historian program where it can be represented graphically and reviewed. Some of the data is exported and used for modeling for our reservoirs. One place where the data is used is in evaporation modeling."

Another example is handling of overflows. Given certain rainfall parameters, such as the accumulation and rate, combined sewer overflow programs can divert excess flow to storage facilities for processing once a wet-weather event has subsided.

At the Albany Water Reclamation Facility in Oregon, rainfall data is combined with values collected from throughout the city to provide a basin profile for meeting regulatory requirements. The data is used to determine storm event ratings when high rainfall conditions result in discharges at permitted sanitary sewer overflow sites.

PUTTING IT TOGETHER

Weather monitoring can be an important part of smart water and integrated and interoperable citywide systems. Besides serving the utility itself, climate data can improve intelligence in other areas, such as public services and energy. Efficiency is enhanced when departments can share relevant, actionable information.

Facing challenges such as climate change, revenue fluctuation, staff turnover and tightening regulations, water utilities are recognizing advanced technology as a way to give staff the best possible access to information. The data can help empower sound and timely decision-making related to multiple operations: remote pumping stations, wastewater collection, water distribution, sewer diversion, irrigation and wet-weather flow management.

For managing water supply, wastewater or stormwater, weather instruments can provide data to make operations more effective.

ABOUT THE AUTHOR

Nader Khoury is president of Columbia Weather Systems. He can be reached at nkhoury@columbiaweather.com or 503-629-0887. **tpo**



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On the Fast Track

A COLLEGE CHEMISTRY DEGREE HELPED CHRIS GOHMAN MOVE QUICKLY UP THE RANKS IN HIS KENTUCKY WATER DISTRICT. HE'S LOOKING AHEAD TO A LONG AND EXCITING CAREER.

STORY: **David Steinkraus**

PHOTOGRAPHY: **Martin Cherry**

At first glance, Chris Gohman's career looks pretty typical. He supervises the water plant where he started working, collected the 2019 Drinking Water Operator Award from the Central Kentucky Water & Wastewater Operators Association and was elected the central Kentucky chapter's water director officer. But then you notice that Gohman is just 27.

With only a few years of work experience and about a year as a supervisor, he represents the next generation of operators and is already in a position to make changes. Gohman oversees the Pirtle Spring Water Plant for Water District No. 1 in Hardin County, Kentucky. His plant and the district serve the northern part of the county and sell water to three other utilities. Another utility, Hardin County Water District No. 2, handles the southern part of the county and two other counties.

FAR-FLUNG OPERATIONS

District No. 1 runs the Pirtle Spring plant and the distribution system in its area. It also runs the wastewater treatment plants and collections systems for the cities of Radcliff and Fort Knox. The district operates the Fort Knox water plants under contract but subcontracts the work to Louisville Water, about 40 miles northeast. Recent interconnections with District No. 2 and Louisville allow the systems to share water in case of need.

Gohman's plant has two sources of water: Pirtle Spring, with an allowed 3.1 mgd withdrawal, and Head of Rough Spring, which is in a different watershed and has an allowed withdrawal of 1.152 mgd during the dry



A SCADA system helps operators keep tabs on plant operations.

months of May to November and 2.88 mgd during the rest of the year.

The district's most recent permits for withdrawing water from the springs (Pirtle Spring issued in 2017 and Head of Rough Spring issued in 2015) now include stream-flow limits, as well as limits on the volume of water pumped out. For Head of Rough Spring, operators must ensure that at least 1.5 cfs is flowing down the stream fed by the spring. The Kentucky Geological Survey installed a real-time stream monitor to measure the flow and will do the same at Pirtle Spring, Gohman says. The permit for Pirtle Spring requires at least 1 cfs flowing downstream.

The Pirtle Spring plant earned the 2018 Best Tasting Water Award from the Kentucky/Tennessee Section



MANAGING WHILE YOUNG

About a year ago, at age 26, Chris Gohman became a supervisor at the Pirtle Spring Water Plant in Kentucky. He is the next generation of water operators but has to manage the past generation.

A number of retirements a few years ago brought in new people, including Gohman. His staff is now mixed. He and two other people are in their 20s; five are in their 40s or older.

“As one of the youngest on staff and one of the newer guys here, I’m trying to make changes and ask operational questions, like why things have been run a certain way,” he says.

In any workplace, team members with 15 to 20 years’ experience can be less tolerant of change than younger people, who believe they have fresh ideas or viewpoints. Older workers may resist because they’ve seen new ideas fail or because they simply don’t want to deal with change. Gohman recognizes that and finds ways to work through it.

“I like to get their input,” he says. “They’ve been here longer than I have. I like to know why we do it this way. If they just say, ‘This is the way we’ve been doing it for years,’ then I’ll ease into asking if we can be more efficient or find an easier way. The operators here are awesome. They are willing to listen to anything I say and try anything I suggest. So it’s not like there’s a whole lot of restraint. They do make it easy.”

Another advantage Gohman has: All the team members are Hardin County natives, as he is. They know many of the same people and have a similar mindset: “That definitely helps.”

Chris Gohman, supervisor at the Pirtle Spring Water Plant

of the American Water Works Association. This year the team plans to submit an entry at the national AWWA conference in Denver. “It will be interesting because when we won the award for Kentucky/Tennessee, we had free chlorine disinfectant,” Gohman says. “Now we’re on chloramine. We believe our water still tastes best of the best.”

MORE DEMAND

Water demand growth at the Pirtle Spring plant is driven by civilian employees at Fort Knox. They live off

Chris Gohman, Hardin County (Kentucky) Water District No. 1

POSITION:
Supervisor, Pirtle Spring Water Plant

EXPERIENCE:
4 years

EDUCATION:
**Bachelor’s degree, chemistry,
Georgetown College**

CERTIFICATIONS:
Class IV water treatment and distribution

AWARDS:
**Drinking Water Operator Award,
Central Kentucky Water & Wastewater
Operators Association**

GOALS:
Finding better ways to do things



Chris Gohman sees value in his role as a working supervisor — to fill in when staffing issues arise and to improve his operating skills at the plant.

“I had no idea about the water industry before I started here,” Gohman says. He interviewed with the district and learned it had a lab where his chemistry degree would be valuable. He began as an operator trainee and did that job for about nine months until the water quality specialist job opened up in the lab. Gohman got the job and worked there for about two years until he was promoted to plant supervisor.

FAST-TRACK LICENSE

Gohman holds a Class IV (highest) water treatment and distribution license; he got there quickly because of his college studies. His four-year chemistry degree counted as four years of experience under Kentucky licensing standards. With a year of practical experience under his belt, he could test for the top-level license, but he misses the practical experience he would have gained by working as a trainee for a few more years.

“A lot of guys who went through their Class I, Class II, Class III — by the time they get their Class IV, they’re seasoned operators. But with me, I had only the one year of experience operating the plant. There are plenty of things around the plant that I’m learning.”

This isn’t a big problem; it’s more an irritation. “I guess one of the main things I’m thinking of is washing a filter,” he says. “Usually our filters

“I love the community, who I work with, and what I do. I see the water district growing and continuing to grow. I can see myself here for the next 20 to 25 years.”

CHRIS GOHMAN

are washed on the midnight shift, and I had very limited training on that shift. Sometimes the filters need to be washed during the day, and I still have to get my notes out, where others can do it in their sleep.”

He’s a working supervisor, one of eight people who run the plant 24/7. If one person is on vacation and someone calls in sick, Gohman may work from 8 a.m. to midnight to cover: “I don’t mind it. It helps me become more efficient at operating the plant. I do a little bit of everything, including mowing and weed-eating.”

SUCCESSES AND MISTAKES

The biggest success Gohman has seen in his career was the conversion from chlorine disinfection to chloramine. The change was years in the planning and came to fruition during his tenure as supervisor. It was driven by the interconnections with Louisville and District No. 2. Both were using chloramine, and both were reluctant to intermingle their chloramine water with the chlorine water from District No. 1. So the district had to switch to chloramine as well in order to buy outside water.

That meant a great deal of preparation and research and ultimately a decision to change direction, Gohman says. Originally the district team



Gohman cleans the Hach Surface Scatter 7 sc turbidimeter.

base, and many work in the 900,000-square-foot Army Human Resources Command building. In addition, Elizabethtown, the county seat, is gaining new businesses, and those people are moving to the northern end of the county.

Gohman was born in Elizabethtown (E-town to the locals). He studied science in high school and picked chemistry as his major at nearby Georgetown College. After that, his experience as an athlete drew him toward a career in health care. He was accepted at a chiropractic school in Davenport, Iowa, but had second thoughts about going so far from home. A friend at the gym told him the water district was hiring.

planned to create chloramine using ammonia gas. They set up a building for the gas, plumbed it and installed gas detectors and a water softener that would enable the water to carry the dissolved gas.

Then the district hired a new person for Gohman's lab job. That new hire came from District No. 2, where the switch to chloramine had been made using liquid ammonia. The liquid was easier and safer to handle, so the team abandoned gas and switched to liquid. Another benefit of the switch to chloramine is a drastic drop in disinfection byproducts. From a reading of about 40 ppb at one site, the highest reading after three months on chloramine was about 13 ppb.

What was to be the ammonia gas room may be repurposed for a different chemical feed. Chlorine gas is now used to create chloramine in reaction with liquid ammonia, but the team is considering a switch to 12.5 percent sodium hypochlorite. "If that's not more economically efficient, it's obviously safer than the gas," Gohman says.

A GO-GETTER

Gohman says his biggest mistake has come in communicating with his team. Telling one person to relay information to the next shift was not a reliable method because the message would sometimes become scrambled. "So I've been doing more emailing to everybody instead of verbally telling someone to tell the next shift," he says.

Communication is not a factor to Justin Metz, the county systems manager and Gohman's boss. It was Gohman's communications skills, along with the attention to detail he showed in the lab, that helped Metz decide Gohman was right for the plant supervisor job.

"He has a high aptitude for everything involved in the water treatment business," Metz says. "He's a quick learner. If anything new was thrown at him, it was a short time until he was as knowledgeable as anyone in the company."

Gohman is also a go-getter who looks for continuous improvement and sets high goals for himself and his department. After meeting those goals, he sets slightly tougher ones for the next year. "He wants to make sure we're doing the best of the best," Metz says.

A CAREER AHEAD

Gohman hasn't taken time to look ahead and plan a career. "I love the community, who I work with, and what I do," he says. "I see the water district growing and continuing to grow. I can see myself here for the next 20 to 25 years."

Growth may soon bring a new project. Although the plant is rated to produce 3.1 mgd, its source water allows at least 4.2 mgd. So the district is now looking at expanding the plant to process all the water it can legally draw. On many days, the district is already buying some water from Louisville or District No. 2 to meet its demand, Gohman says.

If a rural development loan comes through for the water district, some of that money will pay for a fourth filter that was planned during a plant rebuild in 2009. Engineers will also have to look at larger high-service pumps, how those may alter pressure in the system and whether another clarifier will be required to meet the capacity.

But for most days, a fourth filter should be enough to keep the plant at its rated capacity.

"I do enjoy my job, but it is a lot of work," Gohman says. Given the growth in his county, it looks as if Gohman will have enough to keep him busy for a career. **tpo**



The team at the Pirtle Spring plant includes, from left, Chris Cecil, Melissa Hartman, Mike Moseley, Cameron Cochran, Chris Gohman, Daniel Linder and David Buskhead.

video profile



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2. The system uses a structured laminar flow that helps retain fine and slow-settling grit particles while an interior baffle prevents short-circuiting.



2

Clean and Dry

THE HYDRO GRITCLEANSE SYSTEM ACHIEVES LOW ORGANIC CONTENT AND HIGH TOTAL SOLIDS IN WASHED GRIT ALONG WITH EFFICIENT PARTICLE RETENTION

By Ted J. Rulseh

Clean-water plants increasingly look for higher removal efficiency in headworks equipment, including grit systems.

The goal generally is cleaner, drier grit combined with efficient grit capture and retention to protect downstream equipment and processes and extend asset life.

In line with this, Hydro International has introduced the Hydro GritCleanse fluidized bed grit washing and dewatering system. The device receives slurry from a grit capture system, which can include Hydro International's Grit King HeadCell, and then efficiently removes organic solids and dewateres the material before discharge.

Cleaner and drier grit costs less to landfill and reduces odor issues. Patrick Herrick, regional sales manager, talked about the technology in an interview with *Treatment Plant Operator*.

tpo: What market trends led to the development of this technology?

Herrick: California and other West Coast states are looking at limits on organic content in material going to municipal landfills. There is also a general desire among plant operators to reduce organics and the associated odors in the headworks.

tpo: What else is driving greater grit processing performance?

Herrick: In the entire market, we're seeing a trend toward higher performance expectations from headworks processes. For example, years ago

1/2- or 3/8-inch screens were pretty typical. Today, quarter-inch is the coarsest most plants will look at. We're seeing a similar trend in grit management. The market perceives that as an industry, we need to target finer grit particles to maximize capture efficiency and thereby protect downstream processes.

tpo: How much of an improvement does this equipment achieve in producing cleaner and drier grit?

Herrick: Our legacy grit washing equipment typically has been able to achieve 15 to 20 percent volatile solids or less in the output, while the Hydro GritCleanse system consistently achieves less than 5 percent volatile solids.

“The market perceives that as an industry, we need to target finer grit particles to maximize capture efficiency and thereby protect downstream processes.”

PATRICK HERRICK

Whereas the legacy equipment was guaranteed to produce 60 percent or greater total solids, this product achieves about 90 percent.

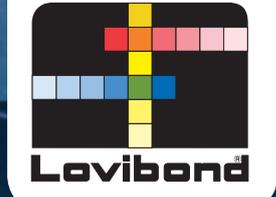
tpo: How well does this technology perform in grit retention?

Herrick: At flows up to 300 gpm, it retains 95 percent of grit particles greater than or equal to 106 microns. At flows from that point to 400 gpm, we characterize retention as 85 percent.

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“At flows up to 300 gpm, it retains 95 percent of grit particles greater than or equal to 106 microns. At flows from that point to 400 gpm, we characterize retention as 85 percent.”

PATRICK HERRICK

tpo: In brief, how does this process operate?

Herrick: Flow enters the conical clarifier tangentially. This forces the grit to contact the vessel walls, creating drag and establishing a rotary flow. The grit settles into the low-velocity boundary layer at the inside vessel wall. A structured laminar flow helps retain fine and slow-settling grit particles while an interior baffle prevents short-circuiting. Once in this boundary layer, the grit decelerates further and settles into a gently agitated fluidized bed.

There, physical forces separate the grit and volatile solids by density. The grit falls to the bottom of the bed, and the lighter organics stay in suspension. Organic material attached to the grit particles is scrubbed away by friction between particles, and the grit descends to the bottom. Organics then flow out through a valve that opens on a timed basis. The cleaned grit descends to a dewatering screw at the bottom of the unit that runs intermittently to discharge the grit.

tpo: What exactly makes the technology effective in separating organics?

Herrick: The keys are residence time in the bed, the action of a stirrer that keeps the grit from ratholing and getting stagnant and the four-point injection of the fluidization water from below. This forces the organics toward the top of the bed, where they stay until the organics discharge valve is opened.

tpo: What is the key to efficient grit retention?

Herrick: It's the tangential feed, where we put the grit slurry in immediate contact with the clarifier itself. We give the grit very little opportunity to escape with the effluent. That, coupled with a low surface overflow rate on

the clarifier, helps provide a residence time and surface loading rate low enough to retain the finer grit while washing the organics off.

tpo: What maintenance does this system require?

Herrick: The shafted dewatering screw has a bearing at the bottom that we consider a low-maintenance item. It's essentially the same design as on our SpiraSnail grit dewatering unit. We have a five-year history with the SpiraSnail, and that bearing has proven to be a very solid design. Another aspect of the Hydro GritCleanse is that the screw is on a single-point pivot. If the maintenance staff needs to separate the screw from the clarifier, the screw pivots to the side without the use of a lifting device for easy maintenance access. Otherwise operators really don't have to do anything except a weekly check to make sure everything is working.

tpo: Is the process fully automated?

Herrick: Yes. It comes with a PLC control panel. If it is integrated with our primary grit removal system, we control the entire system, including the pumps that feed the grit slurry to the Hydro GritCleanse unit. Everything is incorporated into a single panel, which typically would be a PLC-driven system with a human-machine interface panel for the operators. If the plant has SCADA or any other distributed control system, we can integrate the control system through that. **tpo**



An artist's rendering shows the Grand Rapids biodigestion facility, which is under construction. The three digesters are the cylinders in the foreground.

On a Mission

GRAND RAPIDS WATER AND WASTEWATER UTILITY PROJECTS PROVIDE A BIG BOOST TOWARD THE CITY'S GOAL OF 100 PERCENT RENEWABLE ENERGY

By Steve Lund

When the city of Grand Rapids, Michigan, committed to achieve 100 percent renewable energy by 2025, Mike Lunn knew the water utility would need to make big plans for conservation and energy production.

As in most cities, drinking water production and wastewater treatment in this Michigan city are the biggest electricity users. Lunn, utilities director, estimates that those two account for about half the city's power consumption.

Providing all that power from renewable sources will be a big chore, but the utilities are used to big projects. In 2015 for example, the city completed, four years ahead of schedule, a nearly \$400 million project to separate its storm and sanitary sewers. The resulting reduction in wastewater volume translated to nearly 30 percent lower power consumption for treatment.

The Grand Rapids Water System covers about 137 square miles and serves some 280,000 people. Although the city is on the Grand River, it draws water from Lake Michigan, 38 miles west. The 110 mgd (design) Lake Michigan Filtration Plant pumps about 40 mgd on average. The Water Resource Recovery Facility (61.1 mgd design, 40 mgd average) is operated by the Environmental Services Department and serves Grand Rapids and 11 other municipalities.

REDUCING THE LOAD

Grand Rapids had no renewable power sources in 2005 when the city first set renewable power goals. It hit the 20 percent milestone in 2007 and reached 34 percent by early 2019. That means the goal of 100 percent renewables by 2025 is still a long way off. The next step, already under construction, is a \$57 million biodigestion project that will provide 50 to 60 percent of the Water Resource Recovery Facility's power.

Three digesters will produce biogas for a turbine-based combined power and heat system connected to the utility power grid. Turbine heat will be captured to keep the digesters at the optimal temperature. Electricity beyond the recovery facility's demand (3.5 MW summer and 2 MW winter) will be available for sale to the utility.

Two of the digesters will be for wastewater treatment biosolids. The third, an anaerobic membrane biological nutrient removal system, will process food



The groundbreaking ceremony for the biodigestion facility was held in December 2017. Mike Lunn, utilities director, is at the far right.

“I’m 100 percent sure we’ll get there. I’m not 100 percent sure as to the process. It will be a combination of strategies.”

MIKE LUNN

waste from sources such as Amway, Coca-Cola and Founders Brewing Co. “We brought in a concentrated waste line for the variety of wastes we would normally surcharge,” Lunn says. “That will reduce the loading we bring to the front of the plant.”

The solids from that digester will be transferred to the other two digesters, while the liquid will go back to the plant headworks. Eventually all the solids will go to dewatering and then to a landfill. Ground was broken for the project in December 2017.

PRESENT AND FUTURE

Grand Rapids already had some experience with renewable power. Solar power is in operation, and the city is evaluating whether and where to install additional solar. A 125-kW solar array is on the roof of the Water and Envi-

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ronmental Services Department building and another 500-kW array, in the planning stages, could help the Water Resource Recovery Facility shave its peak power loads.

In addition, Grand Rapids is evaluating solar power at the filtration plant. City officials hope a solar array there could power normal operations except during the peak summer months.

Geothermal resources are also in operation. The administration building at the Water Resource Recovery Facility uses heat from the effluent stream to heat the building. In addition, renewable natural gas is in the mix. Lunn expects the three new digesters to produce an excess of biogas that can be scrubbed and fed to the natural gas utility system.

ROLE FOR CONSERVATION

Water utilities usually can't generate all the power they need to be 100 percent renewable without reducing consumption. "We have numerous projects to conserve electricity," Lunn says. "The water system is evaluating all their pumps and motors. They just did some improvements to the pumps that move water from Lake Michigan to town. We put variable-frequency drives on the low-lift pumps that greatly reduce their costs."

One way Grand Rapids has invested in renewable energy is through Green Generation, a program from Consumers Energy that allows customers to purchase renewable energy generated in Michigan. "We've been buying green energy blocks for a number of years," Lunn says. "If we want to, we can buy renewable energy credits. They are very inexpensive."

With the combined power and heat project under construction and renewable natural gas on the horizon, Lunn is confident Grand Rapids will reach its goal: "I'm 100 percent sure we'll get there. I'm not 100 percent sure as to the process. It will be a combination of strategies. We're going to reduce consumption, do some energy-efficient things and put in some solar. We'll probably buy some renewable energy credits to offset the balance." tpo



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Joshua Pratt, senior utility plant operator, works at the North Water Treatment Plant in Meridian, Mississippi. The town's two plants both won the 2018 Mississippi Water Treatment Plant of the Year award.

Quality on Cruise Control

TWO WATER PLANTS IN THE MISSISSIPPI CITY OF MERIDIAN OPERATE SMOOTHLY WITH A KNOWLEDGEABLE TEAM BACKED BY SCADA AND A STATE-CERTIFIED LABORATORY

STORY: **David Steinkraus** | PHOTOGRAPHY: **Jeff and Meggan Haller**



Jimmy D. Eckman calls it an operation that almost runs on cruise control.

In reality, the drinking water system in Meridian, Mississippi, succeeds because of a quality team paying constant attention to detail, led by Eckman as chief utility plant operator.

Meridian operates two water plants, named co-winners of the 2018 Water Treatment Plant of the Year award from the Alabama/Mississippi Section of the American Water Works Association. Both plants operate the same way, and both are iron-removal plants. Source water delivers iron at about 3 ppm.

The larger North Plant, built in 1996, has three wells on the property. After the water is pumped up, it flows by gravity through an induced-draft aerator. The plant has a pair of 10 mgd aerators to help oxidize the iron so it begins forming particles. Alum, chlorine and lime are injected before the water flows to plate settlers. Filters are standard gravity-flow sand-anthracite media.

The South Plant was built in 1952; the original 1887 building still stands. Much of it is used for storage, but it also contains the plant's electrical service. Outside the building, a semi-trailer holds a 350-kW emergency generator (Kohler Power Systems) to keep the wells and higher-horsepower equipment running. A 175-kW Kohler Power Systems generator runs the administration building and the head of the plant. Five wells on or near the South Plant property supply 8.5 mgd.

The system has two booster stations (2 mgd and 1.5 mgd). The station on the south can pump to the north side of the city, which is slightly higher

in elevation. Valves in the stations allow gravity flow from the north system to the south if needed. Rarely will one plant be down completely for maintenance. Each plant has two treatment trains, so one can operate while technicians perform maintenance on the other.

MAKING IT WORK

Eckman takes pride in the operations and maintenance team. Stanley Reeves is senior plant operator at South Plant; his team includes operators Tyrone Harbour, Ken Vanderpool and Noah Dooley. The North Plant team includes Joshua Pratt, acting senior utility operator, and Edgar Lynn Pratt, operator.

“We’re really more proactive than reactive. We do our preventive maintenance, and that pretty much catches everything.”

JIMMY D. ECKMAN

The maintenance team includes Thomas Perkins, Ricky King, Angelo Bell and Kimberly Rose, senior maintenance workers; Albert Edmonds, plant technician; and David Culliver, groundskeeper. Destiny Lewis is senior secretary.

The South Plant, being older and more in need of manual operation, is staffed around the clock. It serves as the main dispatch center for Public Works services after hours and handles the digger's hotline. The North Plant was designed to run



North and South Water Treatment Plants

Meridian, Mississippi

www.meridianms.org/residents/utilities/#water

BUILT:
North Plant 1996, South Plant 1952 (structure from 1887)

POPULATION SERVED:
42,000

SERVICE AREA:
45.9 square miles

EMPLOYEES:
13

FLOWS:
10 mgd design per plant, 5 mgd average total both plants

SOURCE WATER:
Groundwater

SYSTEM STORAGE:
12 million gallons

DISTRIBUTION:
431 miles of water mains

ANNUAL BUDGET:
\$1.75 million (operations)

KEY CHALLENGE:
Keeping up with the rules and regulations





The teams at the North and South Water Treatment Plants include, front row, from left: Ty Harbour and Joshua Pratt; middle row: Edgar Lynn Pratt; Destiny Lewis, Ricky King, David Culliver, Kimberly Rose and Noah Dooley; back row: Angelo Bell, Thomas Perkins, Stanley Reeves, Albert Edmonds, Jimmy D. Eckman and Ken Vanderpool.

without an operator on duty; it is staffed eight hours a day Monday through Friday but runs continuously.

A \$1 million upgrade about five years ago that includes a SCADA system (Control Systems, Jackson, Mississippi) enables operators to run both plants from either location. Normally that is done from the South Plant. Operators can increase or decrease water flow, monitor all tank levels, backwash filters and monitor all the alarms by way of SCADA.

EQUIPPED FOR TESTING

Meridian has one of Mississippi's few state-certified labs. "Most people deliver their samples to the local health department," Eckman says. "A courier picks them up and carries them to the state health laboratory in Jackson."

Samples for lead, copper, VOCs and a few other substances still have to go to the state lab. The main advantage of having the lab is the ability to run bacteriological samples in-house, Eckman says. Lab technicians can be hard to come by because municipal jobs can't match the wages private companies pay.

As recently as last February, Meridian had two lab technician slots vacant. To fill lab jobs, the city sometimes hires applicants with environmental science degrees; training and state certification can take place while the person is working. The city also offers periodic internships through the University of West Alabama; some interns become full-time team members.

Meanwhile, the water utility faces the challenge of growth. Near-future plans call for two more wells at the North Plant because most of the demand is on the city's north side, where there are newer subdivisions, golf courses and a shopping center.

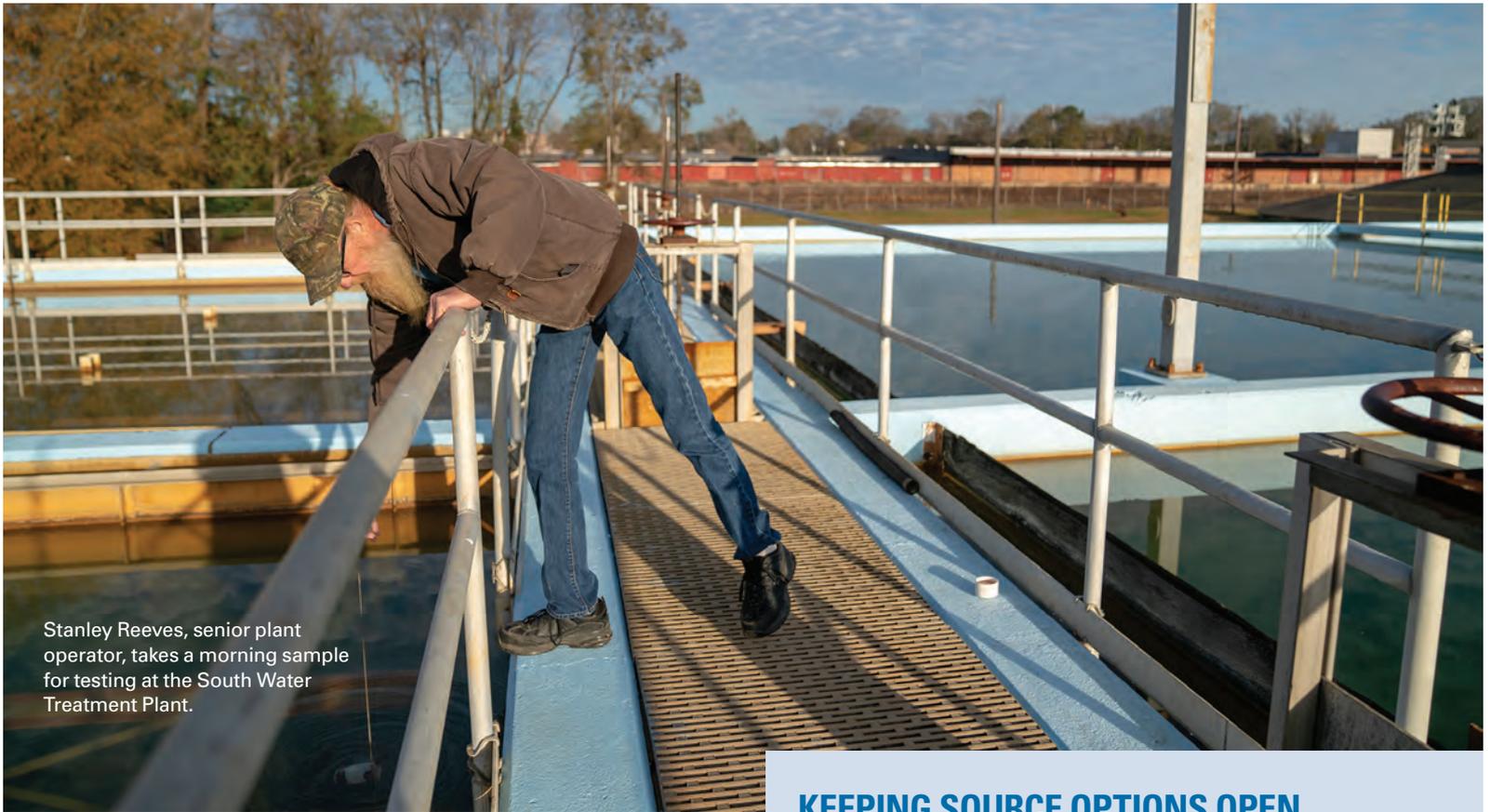
The North Plant produces about 65 percent of Meridian's water and has since the 1990s, when the city took an in-depth look at demand. The plant has a great deal of land around it, purchased by the city to provide space for considerable expansion. "We've reached a point where if one of our wells went down during the summer, we could possibly have a hard time keeping up with the flow needed on the north side of town," Eckman says.

CHALLENGE IN THE GROUND

At the South Plant, the city's drinking water history still stands, both in that 1887 building and what's beneath it. "This was the original site of the water plant, and every line that was put underground is still

there," Eckman says. "We have freshwater lines, wastewater lines, drainlines, gas lines, power lines.

"Sometimes it's a nightmare when we have a leak on the plant grounds because we've got 120-year-old, 130-year-old waterlines still in place. Then we do an upgrade and put new lines in place, and very rarely does anybody remove abandoned pipe underground." He's pretty sure most of the old pipes have been abandoned.



Stanley Reeves, senior plant operator, takes a morning sample for testing at the South Water Treatment Plant.

If there's a small leak, the team can take its time to dig down. Sometimes they dig with a backhoe, but at other times they have to use shovels. During Eckman's 24 years, there have been only three major leaks. One took about 12 hours to isolate because of the caution the crew had to take working through that maze of underground pipes.



Albert Edmonds, plant technician, checks an electrical panel at the South Water Treatment Plant.

KEEPING SOURCE OPTIONS OPEN

Meridian, Mississippi, now draws drinking water from wells, but city leaders have not closed off other options. On the southeast side of the city is the Bonita Lakes reservoir, which used to feed the city's downtown water treatment plant (now called the South Plant).

The intake pipes leading to the South Plant are still in place, says Jimmy D. Eckman, chief utility plant operator. That leaves the possibility of returning to surface water if needed.

That would require some work. The state lists the plant as a Class B facility, and it would have to upgrade to a Class A before switching back to surface water. There also would have to be new chemical induction for the surface water. "Really, it would just take a lot of money, because we have two Class A operators on staff," Eckman says. "That would be myself and Hugh Smith, our Public Works director."

During Eckman's time with the city, plants used a mix of about 80 percent well water and 20 percent surface water. Long ago, the city used surface water only. Later it switched to wells.

"It's really a safer, more economical way of doing it," Eckman says. "But we like to have the alternative to go back to surface water if the need arises."

Bonita Lakes has a 3,000-acre watershed, all owned by the city. Although there's a park, the land has remained undeveloped to protect the water quality. Eckman observes, "We've got 30 miles of hiking, biking and horseback trails, and we do all kinds of events out there throughout the year."



Joshua Pratt works with samples at the North Water Treatment Plant.

“We have the meters that test the water. We have all those fancy gizmos. But the type of manager I am, I like the operators to be able to work without those fancy gizmos.”

JIMMY D. ECKMAN

Keeping up with rules and regulations is another challenge, but the state Health Department has a good process and notifies plants of changes as soon as possible. “The way they look at it, they train you right to begin with, so when they do implement something, you’ll know a whole lot more about how to do it and get it done,” Eckman says.

SMOOTH RUNNING

As for daily operations, “We’re really more proactive than reactive,” Eckman says. “We do our preventive maintenance, and that pretty much catches everything. One thing we teach people when they come to work for us is to look and listen. If it sounds different today than it did yesterday, we need to know about it. I like to teach the operators to look at the color of the water in the process, like the color of water in the settling basin, because that can tell you a lot about what’s working right and what’s not working right.”

Over time, he says, an operator can look at the treatment train and know when the chemicals are right. If the water looks different in an hour, that means something changed. The pH may be too high or too low, or the alum flow may have stopped. The SCADA system provides much of the information operators need, and they watch it, but if they understand the process in a thorough, step-by-step way, they can catch problems much faster, Eckman says.

“We have the meters that test the water. We have all those fancy gizmos. But the type of manager I am, I like the operators to be able to work without those fancy gizmos. Like washing the filters at a plant. I’d rather the operators know every step and how to do it versus pushing a button and letting the plant wash itself.”

“At our South Plant, all of our sampling is done with grab samples on the first portion of the plant, and they do a grab sample every hour. If they go out the next hour and the water does not look right, they’re going to sample it, but they’re going to have an idea of what the problem is before they run that sample.” This may be an old-fashioned way of training, but Eckman prefers not to rely entirely on equipment.



Jimmy D. Eckman, chief utility plant operator

For 14 of the last 16 years, the Meridian plant had a perfect score on the annual state assessment of the utility’s technical, managerial and operational abilities. In one of the two less-than-perfect years, someone in Meridian misread a letter from the state and the team took too few samples.

The other lower score came after the Sept. 11 terrorist attacks when rules changed on the fencing of water tanks. One Meridian tank wasn’t fenced according to the standard. It was a 5.5-million-gallon tank built inside a mountain, and arguably a fence was unnecessary for security. Eckman made that argument, but the state didn’t see it his way.

FUTURE WORK

As of late last year, Meridian was kicking off the first phase of an \$8.5 million upgrade that will replace all the filter media and underdrains at the North Plant. The second phase will do the same at the South Plant. Also included are replacement of valves installed in 1952 when the South Plant was rebuilt and adding the pair of new 2 mgd wells at the North Plant. Money is coming from the Mississippi State Revolving Loan Fund.

Both phases are to be completed by the end of 2020. Meanwhile, the Meridian plants run like a car on cruise control. It’s easy, as long as you keep the car in excellent mechanical condition and a firm hand on the wheel. **tpo**

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Sculptures at the Bosque Garden feature a large central plaza with four reflecting ponds and 40 planter boxes, each containing a single Pacific sunset maple.



A Win-Win Partnership

AN OREGON CITY COMBINES A CONSTRUCTED WETLAND USED TO COOL AND TREAT WASTEWATER EFFLUENT WITH A UNIQUE BOTANICAL GARDEN

By Jeff Smith

The City of Silverton, Oregon, was planning a constructed wetland to solve a stream thermal overload problem involving its Schemmel Lane Wastewater Treatment Plant. The Oregon Association of Nurseries was looking for place to build a botanical garden.

Through collaboration and cooperation, both solved their problems and came out as winners.

Invasive species, such as sweet autumn clematis and English ivy were choking Silver Creek, a 16-mile stream that flows through downtown Silverton and is the receiving stream for the treatment plant, a 2.5 mgd (design) secondary facility with average flows of 2.2 mgd in winter and 0.9 mgd in the summer.

COOLING DOWN

“In 1995, we had a thermal overload problem as established by our total maximum daily loadings and had to get our effluent out of Silver Creek in summer,” says Steve Starnner, water quality supervisor. To solve the problem by further treating and cooling the effluent naturally, the city purchased a 240-acre horse ranch about 1.5 miles from the plant as a site for the wetlands.

“Since the city had the land and the nurserymen’s association needed a botanical garden location with lots of water, it made sense to combine the two,” Starnner says. The world-class botanical garden, known as The Oregon Garden, was designed as an 80-acre educational venue with more than 20 specialty gardens, each focused on a theme.

Among them is a children’s garden that includes animal-shaped bushes

“The Oregon Garden is one of only a few anywhere that reuses wastewater for a water feature.”

STEVE STARNNER

and shrubs, a treehouse and an area similar to a dinosaur dig. A rose garden displays more than 40 varieties arranged by color, and a sensory garden highlights plants and flowers with therapeutic scents, such as lavender, oregano, coneflower and rosemary. A conifer garden displays more than 400 species, including a large collection of dwarf and miniature conifers and varieties of companion plants such as Daphnes, Japanese maples, heathers and heaths.

BRINGING THE WATER

Irrigation for all the gardens is provided through a series of cascaded ponds and strategically located holding tanks. More than 1 mgd of effluent is pumped from the plant through a 16-inch force main with a 60 hp vertical turbine pump (Goulds Water Technology, a Xylem brand). Three complexes at the wetland and gardens, with a combined 25 cells, are gravity-fed and passively provide three final filtration functions.

“The Oregon Garden is one of only a few anywhere that reuses wastewater for a water feature,” Starnner says. Landscaping of the Axis Garden, a pat-

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A view of a portion of the wetlands in the Oregon Garden.

tern of turf lined with trees and bushes that display seasonal colors, includes a waterfall-style fountain at one end and the Oregon Garden Resort hotel and conference center at the other. The 106-room hotel was built in 2006, six years after the garden opened, to boost tourism.

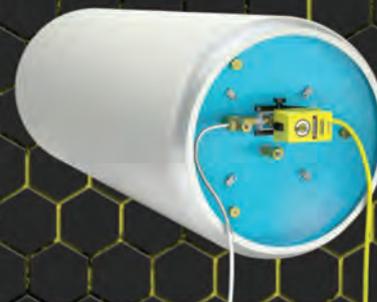
The Schemmel Lane plant received a 2018 Award for Excellence from the WateReuse Association, recognizing Silverton's creation of the wetland to lower discharge temperatures to meet state standards and to further treat wastewater through creation of the garden.

Starner says, "It all just came together at the right time." **tpo**

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At the Bottom of the World

A CALIFORNIA OPERATOR LEAPS AT THE CHANCE TO PLY HER TRADE AT THE WASTEWATER TREATMENT PLANT AT ANTARCTICA'S McMURDO STATION

By Jared Raney

There are plenty of opportunities for adventurous treatment plant operators, but none so much as the McMurdo Station treatment plant in Antarctica.

There is a period during summer when the sun never breaches the horizon and in winter when the sun doesn't set. Temperatures are frigid year-round, and psychological challenges abound. Despite that, Jeanne Sabin, formerly an operator with the Sacramento (California) Regional County Sanitation District, jumped at the opportunity to work there for five months.

Today, she continues her adventurous streak as a Ph.D. student in the University of California, Davis civil and environmental engineering department. As part of her studies, she is working on a pilot project for nutrient recovery in human urine, with the goal of promoting full-cycle wastewater resource recovery. She spoke about her once-in-a-lifetime experience in Antarctica during an interview with *Treatment Plant Operator*.

tpo: Why did you apply for a position in the most isolated place on Earth?

Sabin: I've always been interested in going to Mars, and Antarctica is the closest analog on Earth. That's as close as I'm ever going to get to going to Mars. It was: How can I use my talents to find a way in — to go down to Antarctica in a fairly specific capacity? I didn't want to just wash dishes or something — that's what a lot of people do their first year to get in. But I had the skills and the background, and I was what they were looking for.

tpo: Why were you chosen for this opportunity?

Sabin: I have my bachelor's in biochemistry from the University of California, Santa Barbara. At that point, I had been on the board of a water district for two years. I tend to max out things that I like to do, so I got the Grade 5 certification in two years and went on to the next ladder rung. At that point, I really didn't have much experience being a sole operator, but the Sacramento Regional Wastewater Treatment Plant is a major inland-discharging facility, and I'd been upgraded to senior operator there when I did my interview. So I had some direct management experience.

tpo: What is the team like at McMurdo Station?

Sabin: Everyone at McMurdo Station is pretty near the top of their game in whatever they're doing. If you do something stupid, you're just off the ice, because there are a hundred people who want to have your job. They have three or four people lined up to replace you at the drop of a hat. Not that it was stressful or anything; it was just to make sure that safetywise everything was totally fine. I was just super excited to do it. It's a bunch of people who



Jeanne Sabin

“I've always been interested in going to Mars, and Antarctica is the closest analog on Earth. That's as close as I'm ever going to get to going to Mars.”

JEANNE SABIN

have always wanted to be there. It's many skill sets, but everyone's at a pretty high level. There are dishwashers I met who had their master's degrees, because a thousand people apply for 10 dishwasher positions over the summer.

tpo: What were the biggest challenges, operational and otherwise?

Sabin: Mechanically, everything did fine while I was there. It was more having to overcome what wasn't engineered into the plan. The plant seemed to work well at around 20,000 gpd. The highest flow we had during the summer was 52,524 gpd. We weren't necessarily running to meet discharge requirements — we were running it as best we could. Day to day, we just operated for process control. The challenge was trying to reconcile that there are solids going through and there's a minimal amount that I can do about it.

tpo: What was it like being in such different day-length conditions?

Sabin: It's psychologically intensive. The sun is up the whole time. I saw my last sunset the second or third week there, and I didn't see the sun set below the horizon again until I was flying away. There are really only so many things you could do. A lot of the fun stuff, social stuff, happens during the day. There were 50 or so other people stuck on night shift, so we'd

hang out sometimes. I was super lucky to get a room without a window. I know that sounds not lucky most of the time, but it was great not having to worry about blocking out the sun.

tpo: Antarctic stations are subject to the international Antarctic Treaty. Was obeying those requirements a challenge?

Sabin: What's cool about this plant is it's the largest plant on the continent and it goes above and beyond what's required by the treaty. The only thing that is required for treatment of wastewater is if any permanent base has an average of 30 people or more for the year, they have to grind up their wastewater before it's discharged. The National Science Foundation decided they wanted to be the example. Even though it's not perfect, for being 800 miles from the South Pole it's a pretty good example. So in perspective, I guess, it's great for what it is.

There are things within this plant where they'd get fined a million dollars by California, but there are no requirements other than to grind up your waste, so everything above and beyond that is peachy. There was no space in the collections system at all; there was no wiggle room. If those grinder pumps failed at any point, you would have discharge to the environment, or even discharge through the floor drains of the plant, in 60 seconds, depending on influent flow. We wouldn't get fined, and we wouldn't get fired. It sucks for the environment, but that's what's been happening to the discharge for McMurdo Station since the 1950s. This plant is a thousand times better than whatever was there before, and it's above and beyond what's currently required.

tpo: How does a station this isolated receive supplies for treatment or repairs?

Sabin: You get what you get. For example, we didn't have any way of externally adjusting the alkalinity. Alkalinity really dropped from the influent to the effluent, but there was no way to bolster it in extended aeration. It would have required too much soda ash, and it wasn't feasible to have soda ash feed. There's no reasonable way to transport large volumes.

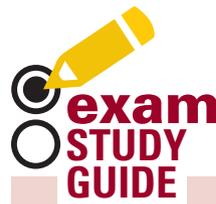
I went down in the first couple weeks of October 2016 and got the turn-over from the winter operator. He'd had a pretty hard run of it when he was taking down the trains during the winter. He found a bunch of corrosion that hadn't been found in previous years. He had spent the whole winter basically patching up pinhole leaks in those trains and then coating the entire trains with epoxy that he had had flown in specially. Once we needed to remove volume from the anaerobic digesters. We put it through a belt press and then onto cargo ships to California for landfill.

tpo: Do you have a favorite part of the experience?

Sabin: It's pretty close to the bottom of the planet, and hardly anyone has ever been here. Without the supply lines for McMurdo Station, people wouldn't be able to live there. It was great, but I don't think I'd do it again. I definitely would recommend it to anybody else, but I don't like getting stuck. I always like to max out something and then choose something different. It was a once-in-a-lifetime experience. It was kind of like a summer camp for adults at the end of nowhere. I guess physically being down there was my favorite part.

tpo: Were you able to experience life outdoors in the Antarctic?

Sabin: There are places you can walk, with rock cairns to mark where you could go out and look over the sea ice. Across it there's this range of mountains. You can literally walk a quarter-mile away and not hear a single other person, any equipment, or even see the buildings of McMurdo Station. You just hear the wind whistling over the ice, and you can see places where not a single person has ever stepped. It was like being completely alone on the planet. And I've never felt like that anywhere before. **tpo**



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WASTEWATER

By Rick Lallish

What type of pump should never be operated or started against a closed valve?

- A. Centrifugal pump
- B. Peripheral pump
- C. Positive displacement pump
- D. Screw lift pump

ANSWER: C. Basic operation and knowledge of pumps and pumping are fundamentals that wastewater operators should understand. Positive displacement pumps are ideally suited for the pumping of solids such as sludges. They are also well-suited for some chemical applications, such as polymers. Due to the tremendous pressure built up by the pump, a positive displacement pump must never be operated against a closed valve or in a dry condition for very long, or else it may rupture and cause damage to the pump, pipes and valves.

DRINKING WATER

By Drew Hoelscher

Which stream of water from a reverse osmosis membrane system is the most hypotonic?

- A. Concentrate
- B. Permeate
- C. Reject
- D. Feedwater

ANSWER: B. Reverse osmosis is a membrane process that can separate water molecules from contaminants. During the process, feedwater is pressurized through the membrane, creating a stream of permeate (recovery water) and a stream of concentrate (reject water). The permeate water is relatively free of contaminants and is sometimes referred to as pure water. The lack of solutes in the permeate is what makes this solution more hypotonic than the hypertonic feedwater and reject water.

ABOUT THE AUTHORS

*Rick Lallish is water pollution control program director and Drew Hoelscher is program director of drinking water operations at the Environmental Resources Training Center of Southern Illinois University Edwardsville. **tpo***

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product spotlight water

Precision regulator adds total control to pneumatic drives

By Craig Mandli

Pneumatic drives are often utilized in water treatment facilities to support filtration processes. Often in filter basins, they assist the cleaning process, as from time to time the basins must be cleared of dirt particles. To do so, they are rinsed with fresh-water and air. The drives move the butterfly valves that prevent groundwater from being let in during the rinsing process.

To assist in that process, **ControlAir** offers the high flow-capacity **Type 7000 Precision Air Pressure Regulator**. It is designed to provide a high level of regulation accuracy and repeatability during variable high flow conditions. Its large port size options and rugged construction make it suitable to be used in a wide range of pneumatic drive systems.

The advantage of pneumatic drive technology is that it is clean, which is essential when dealing with drinking water. The drives are also reliable and can be operated for a very long time. That is extremely important at the waterworks, as any sort of disruption of clean-water service can lead to not only customer complaints, but health and safety concerns as well.

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Screenco Systems Mega Screen 800

The Mega Screen 800 septic receiving station from Screenco Sys-

tems includes 51 square feet of screening area, fed by a 6- or 8-inch inlet with dual-fan spreaders that deflect waste down onto the screen, making the front screen almost self-cleaning. Complete vac tank clean-out is available with the optional side and front splash sheeting. It processes up to 1,000 gpm of wet well or septic waste with an 8-inch cam outlet fitting. The Dual Screen Design is nonmechanical and uses gravity to separate trash from the waste stream. The standard unit features all-aluminum construction with stainless steel, 3/8-inch-gapped bar screens on opposing angles and meets the Ecology 503 Regulations for septic screening. A bolt-on chute assembly allows trash to exit in either direction, and built-in forklift skids make

product spotlight wastewater

Mobile thermal hydrolysis assists in biosolids processing

By Craig Mandli

The conversion of wastewater effluent into Class A biosolids is serving as a solution for more and more forward-thinking wastewater treatment facilities. That process is no longer limited to large facilities, though, as **Lystek International** recently introduced a low-temperature, commercial-scale containerized **Mobile Thermal Hydrolysis Processing unit**. The product's development is a direct response to increasing demand for practical resource recovery solutions, particularly from smaller-scale wastewater treatment plant operators.

"The Lystek Mobile THP extends the opportunity for a wider range of wastewater treatment facilities to participate in the many benefits of thermal hydrolysis with a compact package based on our proven technology," says Rick Mosher, Lystek chief technology officer. "This new technology is part of our plan to continue innovating and providing the market with a range of practical solutions for biosolids and organics management."

The units are the company's smallest commercial system offering to date, and they operate entirely within two vertically stacked 50-foot containers requiring minimal external utilities. They are capable of processing 0.3 dry tons per hour and come complete with dewatering. They use a modular design and extend the proven technology behind the company's in-plant thermal hydrolysis solutions by providing a compact, cost-effective package capable of rapid implementation.

"Capital remains a primary constraint for many small- to medium-sized treatment plants that are also tasked with managing aging infrastructure and the risk of evolving regulations surrounding biosolids management," Mosher says. "Lystek Mobile THP offers a complete, proven solution to respond to these changes

Mobile Thermal
Hydrolysis
Processing unit
from Lystek



in a cost-effective manner, particularly when a full facility upgrade may be premature or not required."

Lystek Mobile THP units are suitable for installation as a permanent solution in smaller-scale facilities, especially where a liquid residual that can be pumped directly to the unit for dewatering and processing is currently being generated. Further, if the generator has an existing low-solids liquid program with storage constraints, the unit can be leveraged to relieve this stress and extend the utility of these assets due to the significant reduction in volume achieved through the technology.

The units can be purchased for long-term use or leased to confirm market demand or address challenges requiring time-sensitive solutions while developing a long-term, full-scale plan.

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The 1800 monitoring system from Sensaphone allows for remote monitoring of environmental changes such as pump status, tank level, pump alarm outputs, power failure and security, that can indicate a malfunc-

tion of critical equipment. The system also detects problems such as temperature changes, humidity fluctuations, water leaks, carbon monoxide and carbon dioxide levels, and smoke. When the system detects a sensor reading has moved out of the preset range, it immediately alerts up to eight people with custom phone calls. One unit can monitor conditions 24/7 for up to eight locations. The internal rechargeable battery backup provides 24 hours of continuous monitoring and alerts in the event of a power outage.

877-373-2700;

www.sensaphone.com tpo

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Odor Control and Disinfection

By Craig Mandli

Biofiltration

AEDGE WATER TECHNOLOGIES BIOTTTA

The biotta biological filtration system from AdEdge Water Technologies leverages nature to offer a sustainable solution for wellhead treatment of inorganic and organic contaminants. Its fixed-bed, dual-stage biotreatment cultivates an environment for microbiological organisms to destroy contaminants or reduce elements to simple unarmful forms. The fixed-bed treatment process consistently addresses contaminants at low levels, intermittent or fixed operation, and the dual bed assimilates a complete packaged biotreatment plant. It has regulatory approval for the reduction of nitrate and perchlorate, and it demonstrates hexavalent chromium, VOCs, iron, manganese and sulfide elimination in a single process. The low-volume discharge is easily managed as a nonhazardous waste stream. **866-823-3343; www.adedgetech.com**



Biotta biological filtration system from AdEdge Water Technologies

EVOQUA WATER TECHNOLOGIES WHISPER BIOFILTER

The WHISPER Biofilter from Evoqua Water Technologies is a one- or two-stage odor control unit designed for quiet operation and high odor removal. Its rotating irrigation system and long-lasting, nondegradable Bioglas Media provide the optimal biological environment

for removal of 99 percent of incoming hydrogen sulfide while effectively reducing other

common odor compounds. It can treat airflows up to 1,100 cfm and hydrogen sulfide concentrations above 100 ppm with diluted air using a variable-speed fan. Units include skid-mounted controls for easy installation and operation and may be deployed at lift stations, headworks, vaults or enclosed areas in the collections system. The company's full service program includes on-site evaluation, installation, operation, service and performance reports organized through five regional service centers. **www.evoqua.com**



WHISPER Biofilter from Evoqua Water Technologies

Chlorination/Dechlorination

ELECTROLYTIC TECHNOLOGIES KLORIGEN

Fully automated Klorigen systems from Electrolytic Technologies safely and cost-effectively generate chlorine and sodium hydroxide from brine for



Klorigen systems from Electrolytic Technologies

on-demand usage, eliminating the hazards of chlorine storage and transportation. The systems allow users to eliminate pressurized chlorine gas from their facilities while retaining the benefits of chlorine disinfection. Alternatively, the chlorine and coproduct sodium hydroxide can be combined in the process to produce high-strength, NSF/ANSI Standard 60-compliant sodium hypochlorite. Systems utilize an inherently safe process and have been recognized by the U.S. Department of Homeland Security as a Qualified Anti-Terrorist Technology. Systems also eliminate the Risk Management Plan reporting required for facilities storing chlorine gas on site. **305-655-2755; www.electrolytictech.com**

FORCE FLOW CHLOR-SCALE AND HALOGEN ECLIPSE

To protect chlorination systems from dangerous leaks, the Halogen Eclipse emergency valve shut-off system instantly closes the container valve when a signal is received from a leak detector, panic button or SCADA. The actuator quickly installs on the tank without the use of any tools and allows manual operation of the valve while in place. During an emergency shutdown event, the system measures the actual torque applied to the valve to ensure that the valve is closed to Chlorine Institute recommended standards and provides remote confirmation that the emergency close operation successfully closed the valve. The Chlor-Scale from Force Flow safely cradles a chlorine ton container while providing critical feed and chemical inventory information. Know in real time exactly how much chlorine has been fed and how much remains in the tank. It can warn of excessive or insufficient feed rates and can be remotely monitored from a PLC or SCADA system. **800-893-6723; www.forceflow.com**



Halogen Eclipse and Chlor-Scale from Force Flow

SCIENCO/FAST - A DIVISION OF BIOMICROBICS SCICHLOR

SciCHLOR from Scienco/FAST - a division of BioMicrobics is a sodium hypochlorite generator designed to give a large span of markets a safe and effective way to disinfect. With salt, water and electricity, the system with multipass SciCELL Electro-Chemical Acti-



SciCHLOR from Scienco/FAST - a division of Bio-Microbics

vation, or ECA, technology will produce an available supply of 10 to 60 pounds chlorine-equivalent/day sizes. Connected to an incoming water source and with multiple operating modes, the brine solution multipasses through the low-voltage DC electrolytic cell to provide a reliable method for the needs of medium to large onsite disinfection applications. Its recirculation method keeps control of desired chlorine concentration while the assembly minimizes maintenance downtime. With an 800 ppm FAC sample taken from the generator, the solution killed 100 percent of the Staphylococcus aureus and E. coli organisms within 30 seconds, according to the maker. **866-652-4539; www.sciencofast.com**

Covers/Domes/Filters

CLEARSPAN FABRIC STRUCTURES GABLE HD BUILDING

The ClearSpan Fabric Structures Gable HD Building has a unique profile that provides extra-tall clearances for operating commercial machinery and



Gable HD Building from ClearSpan Fabric Structures

covering equipment of any size. It offers maximum usable space to ensure room to move and operate. The Gable HD Building can be built with one of many foundation options, including blocks, shipping containers and ClearSpan's Helical Anchoring System, allowing the structure to be built almost anywhere. Each building has a triple-galvanized steel frame and translucent, ripstop fabric cover. **866-643-1010; www.clearspan.com**



Defender Tank Covers from Environetics

ENVIRONETICS DEFENDER TANK COVERS

Defender Tank Covers from Environetics are custom manufactured from industrial-grade materials to fit the profile of a new or existing wastewater treatment tank or potable water tank. They contain volatile organic compounds at their source. Low-profile structurally supported covers minimize emission treatment volume to reduce the cost of air filtration equipment. That can help eliminate the ongoing expense of applying costly odor control chemicals through atomizer and misters. **815-838-8331; www.environeticsinc.com**

INDUSTRIAL & ENVIRONMENTAL CONCEPTS ODOR CONTROL COVERS

Odor Control Covers from Industrial & Environmental Concepts can be designed to be semigas or 100 percent gastight. They are designed with an impermeable flexible membrane to contain odors while still enabling access for equipment maintenance or sampling. The covers are commonly used on sludge/liquid tanks and aerobic and anaerobic systems. The company's Disinfection Covers block penetrating sunlight and are commonly used over chlorine contact chambers. The result is reduced algae and chlorine loss due to volatilization, which improves disinfection and lessens chlorine demand. Both covers are maintenance-free and long-lasting. **952-829-0731; www.ieccovers.com**



Odor Control Covers from Industrial & Environmental Concepts



Level Lodor cover system from JDV Equipment

JDV EQUIPMENT LEVEL LODOR

The Level Lodor cover system from JDV Equipment helps contain odors by covering standard dump containers used for hauling processed material. The design allows for even distribution, increasing the fill percentage without having to manually even out material. Enclosing containers allow outdoor installation without exposing material to the environment or pests. **973-366-6556; www.jdvequipment.com**

PAXXO LONGOPAC FILL

The Longopac Fill continuous bag system from Paxxo can connect to the discharge point of machines used to move, dewater or compact screenings, grit and biosolids. Material is then deposited in a 90-meter-long continuous bag for odor containment and spillage control. The cassette bag is easy to seal, and the material and odors are trapped inside, cutting down development of bacteria and fungus spores. **770-502-0055; www.paxxo.com**



Longopac Fill continuous bag system from Paxxo



SIMPLE SOLUTIONS DISTRIBUTING WOLVERINE MEGA MT-20

Wolverine Mega MT-20 odor filter from Simple Solutions Distributing

The Wolverine Mega MT-20 odor filter from Simple Solutions Distributing provides odor control for airflows up to 20 cfm and can be used on station wet wells, sewer line vents or anywhere a vented air stream is present. Its crossflow design and catalytic activated carbon media

provide years of trouble-free operation. It is available with an optional saturation indicator to let a maintenance crew know when it is time to service the filter, before odor complaints begin. **866-667-8465; www.industrialodorcontrol.com**

Detection Equipment

ENVIROSUITE

EnviroSuite is a platform for predictive odor risk management. It translates complex raw odor data into information that the treatment plant operator can use, simply and on demand. The platform enables facilities to more efficiently manage environmental issues by forecasting and providing early warning of high odor risk periods using a modeling module. It provides real-time analysis of odor impacts, and alerting and diagnosis of process upsets using a monitoring module. Instant diagnosis of the source of a complaint and efficient management of the complaint data is provided using an incident intelligence module. **424-335-1331; www.envirosuite.com**



EnviroSuite environmental management technology

Distillation/Fluoridation Equipment and Microbiological Control

BIOSCIENCE MICROCAT-ANL

MICROCAT-ANL from Bioscience is a liquid blend of preselected, adapted microorganisms for use under microaerophilic, anoxic or anaerobic conditions. It has specialized microbes that reduce sulfides under anaerobic or anoxic conditions to elemental sulfur, which is occluded by the cells, thus suppressing odors. It is formulated for use in sludge, compost, contaminated soils and wastewater to suppress H₂S odors and enhance biodegradation and contaminant removal where oxygen is of limited availability. **800-627-3069; www.bioscienceinc.com**



MICROCAT-ANL from Bioscience

OMI INDUSTRIES ECOSORB

Ecosorb from OMI Industries goes beyond simple masking agents to fully neutralize odors in wastewater treatment. A safe, natural solution, it operates as a plant-based emulsion. It's often diluted with water to form droplets that are then applied via atomization using an odor control system. Once dispersed, this mix captures malodor molecules to fully neutralize the odor. It remains airborne until the droplet saturates and falls to the ground. It helps solve malodor prob-

lems in wastewater treatment through a combination of odor-control chemistry distributed through a specially designed feed system. A broad-spectrum odor control product, it is scientifically formulated to react with odorous gases. Application areas can include headworks, clarifiers, sedimentation basins, lift stations, lagoons, biosolids treatment, industrial wastewater and wastewater septage dumping. **800-662-6367; www.omi-industries.com**



Ecosorb odor control system from OMI Industries

SURCO PORTABLE SANITATION PRODUCTS ENZ-O-MATIC

The Enz-O-Matic biological organic waste degrader and odor eliminator from Surco Portable Sanitation Products includes a high concentration of nonpathogenic, live bacteria cultures that rapidly degrade organic wastes with a blend of surfactants and odor counteractant fragrance.

It is nonpolluting, contains no acids or toxins, and is certified salmonella-free. It contains over 200 billion live bacteria cultures per gallon, according to the manufacturer.

The bacteria count doubles every 20 to 30 minutes to provide continuous enzyme production. Enzymes digest and liquefy grease, blood, urine, vomit, feces, sewage and other organic substances, neutralizing odors on contact. It can be used for drainlines, septic tanks and septic spills. **412-789-8683; www.surco.com**



Enz-O-Matic waste degrader from Surco Portable Sanitation Products

Ozonation Equipment/System

DE NORA WATER TECHNOLOGIES CAPITAL CONTROLS OZONE GENERATORS

Capital Controls ozone generators from De Nora Water Technologies maximize ozone concentration while minimizing power consumption. 03-SAFEGUARD technology offers modular fuse or electronic control for flexibility and maintenance advantages. The robust mechanical design of the dielectric is easy to maintain, increasing uptime. Containerized plug-and-play pilots are available and standard components on all systems make aftersales support easy and quick. **215-997-4000; www.denora.com**



Capital Controls ozone generators from De Nora Water Technologies

UV Disinfection Equipment

SALCOR 3G UV WASTEWATER DISINFECTION UNIT

The 3G UV Wastewater Disinfection Unit from SALCOR is used for residential, commercial and municipal applications, and it is UL-certified NEMA 6P flood-proof and NSF/Washington State Protocol six-month tested (with 21 upstream treatment systems). It inactivates bacteria/virus pathogens, including superbugs. Rated at 9,000-gpd gravity flow, it is meant as a reliable building block for large water recovery/reuse systems, according to the maker. When installed in 12-unit parallel/series arrays with ABS pipe fittings, systems can disinfect more than 100,000 gpd. Gravity flow equalizes without distribution boxes. Each unit has a foul-resistant Teflon lamp covering, two-year long-life lamp with efficient installation, minimal annual maintenance and energy use of less than 40 watts. **760-731-0745; www.salcor.world**



3G UV Wastewater Disinfection Unit from SALCOR

WEDECO - A XYLEM BRAND DURON



Duron UV system from WEDECO - a Xylem Brand

The Duron UV system from WEDECO - a Xylem Brand helps meet the disinfection needs of midsized to large wastewater treatment sites. To maximize disinfection efficiency and hydraulic performance, it uses staggered 600-watt Ecoray lamps at a 45-degree angle. Simple to install and operate and validated for a diverse range of water characters, it can be designed to meet any site's specific disinfection requirements. No lifting device is required and maintenance is made easy with fully automatic UV module lifting. Energy savings come from providing the required dose based on integrated OptiDose control, which is based on real-time lamp aging, fouling and water parameters. It provides closed-loop monitoring of UV intensity, UV transmittance and flow rate to quickly adapt to water-quality changes. **855-995-4261; www.xylem.com tpo**

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By Craig Mandli

Biohybrid filters alleviate odor concerns with force main upgrade

Problem

Odor control often is not incorporated into plant design and is considered only after residents and business owners complain. Managers of the Lake Wildwood Wastewater Treatment Plant in Penn Valley, California, planned a sewer force main upgrade and anticipated the need for odor control and corrosion protection.

Solution

Working with stakeholders, **Anua** recommended two **Airashell Biohybrid Filters**, one at the new lift station and one at the plant headworks. The unit uses recycled seashells as treatment media. The biohybrid filter treatment process provides high performance with virtually hands-off operation.



RESULT:

The filters were commissioned in January 2018. Both filters are providing suitable odor treatment and corrosion protection. "It has been working smoothly for us in this first year of operation," says Brad Rist, operator III. "Being that our district is so spread out and our staffing minimal, the Airashell units fit our needs perfectly." **800-787-2356; www.anuainternational.com**

System helps eliminate hydrogen sulfide odors at pump station

Problem

High hydrogen sulfide levels at the Forest Hills Pump Station in Pikeville, Kentucky, were creating a nuisance odor and a possible health risk. The station is at a major intersection and across the street from a high school and football stadium. Operators had tried various chemicals and other odor controls with limited success.

Solution

The operators tried a **Phantom odor control system** from **Anue Water Technologies** that uses sidestream wastewater to draw in concentrated oxygen and ozone. The aerated/ozonated stream is delivered back to the wet well through well washing systems, uniformly transferring the oxygen and ozone for FOG and odor/corrosion control.



RESULT:

The hydrogen sulfide levels dropped to 9 ppm after the first day of operation and to zero during the second day. **760-727-2683; www.anuewater.com**

Primary clarifier odor controlled using oxygenation

Problem

The Trinity River Authority of Texas serves a population of 3.5 million in the Dallas-Fort Worth area. In 2003, the authority completed a comprehensive evaluation of structural and chemical odor control options as part of a Stage VII Odor Control Improvement Program at the Central Regional Wastewater System. One of the goals was to reduce odorous emissions at the primary clarifiers. With 150 mgd channeling into the system, a comprehensive treatment was needed.

Solution

Two **ECO₂ SuperOxygenation Systems** from **ECO Oxygen Technologies**, designed in conjunction with Alan Plummer Associates, were installed to dissolve 13,800 pounds of pure oxygen into a wastewater sidestream, elevate dissolved oxygen in the influent to a minimum of 11 mg/L at the headworks, thus maintaining aerobic conditions to the primaries without compromising solids settling. The systems effectively remove odor and hydrogen sulfide before the wastewater reaches the plant headworks.



RESULT:

Since startup of operation in 2006, the system has maintained positive dissolved oxygen levels, effectively eliminating hydrogen sulfide release and reducing the BOD load downstream, meeting all design criteria. **317-706-6484; www.eco2tech.com**

Granular activated carbon system provides solution to combat algal toxins

Problem

The town of Owasco, New York, needed an emergency solution to remove algal toxins from Owasco Lake, which provides drinking water to the town and surrounding areas.

Solution

The town installed a **Calgon Carbon Model 10 system** with two 10-foot-diameter pressure vessels containing 40,000 pounds of granular activated carbon. GAC protects against algal toxins while addressing other critical challenges, such as carcinogenic disinfection byproducts, volatile organic compounds, endocrine-disrupting compounds and many others.



RESULT:

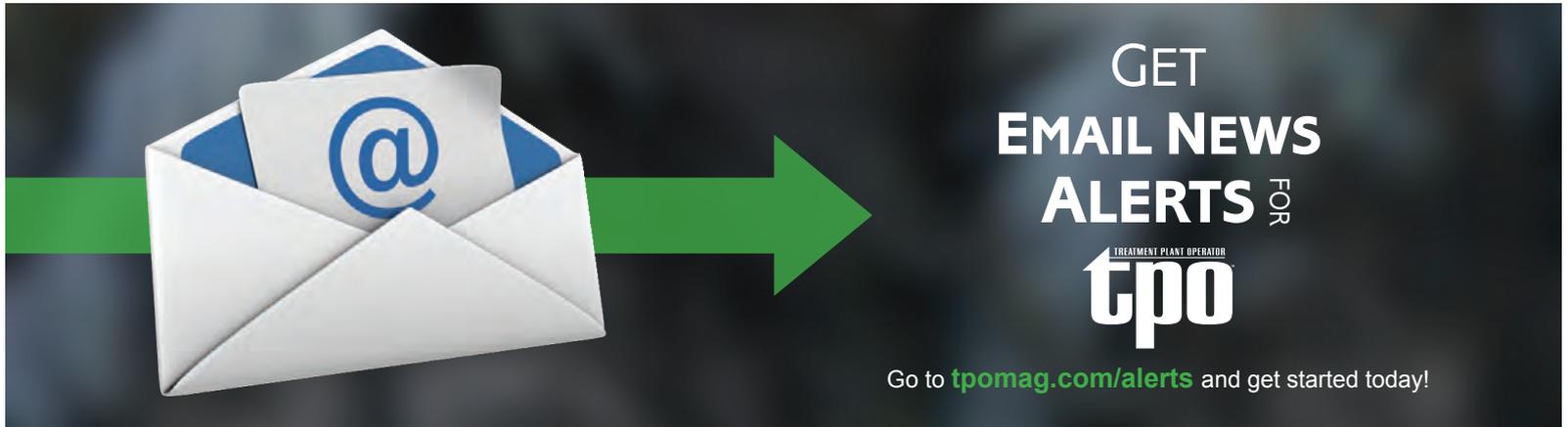
After the system was installed, the town experienced another less severe algal bloom. This time, because of the Model 10 GAC system, no algal toxins were detected in the drinking water. **800-422-7266; www.calgoncarbon.com**

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Mixer helps alleviate odor concerns

Problem

The Seabrook (Texas) Wastewater Treatment Center lies close to many waterfront properties and so needs to limit odors. “Try as we might, moisture had gradually crept into the mixer, leading to a complete burnout, so we needed to find a good, sturdy replacement,” says Rafael Gonzales, site superintendent.

Solution

A **submersible mixer** from **Landia** addressed the problem. “When the air has been turned off in our digester for the dewatering process, we use a Landia gear-driven mixer for several hours to slowly mix everything back up without creating unnecessary odors,” Gonzales says. “This is very important when the digester is thick, and it also depends on how long we’ve been waiting for the dewatering contractor to arrive. Sometimes the sludge has been sitting there longer than we would have liked.” The Landia mixer weighs about 235 pounds, about half the weight of the previous mixer. It uses a 12 hp motor; the old mixer’s motor was 15 hp.



RESULT:

“We run the mixer for an hour to two hours per day with no problems at all, and for its performance and reliability, we can see that it’s just right for the application,” Gonzalez says. “The mixing pattern is good, and with an adjustable guide pipe, we can also use it during dewatering to push the solids over in the right direction.” 919-466-0603; www.landiainc.com

Expansion and upgrade of ozone disinfection system leads to cost savings

Problem

The Southwest Clean Water Plant in Springfield, Missouri, has used ozone to disinfect secondary wastewater since 1978. By 2008 the annual ozone maintenance cost approached \$100,000.

Solution

The city replaced the high-energy turbine mixers with a lower-energy, more efficient sidestream **ozone injection system** from **Mazzei Injector Co.** It uses sidestream Venturi Aeration injectors for primary ozone contact, followed by basin nozzle manifolds for secondary gas contact into the basins’ bulk wastewater flow. The design included a structural modification of the basin inlets to allow the retrofit to contact all of the basin’s wastewater flow. The dual inlet gates at the front of each contactor are enclosed in a concrete structure that funnels wastewater into a narrow tunnel to allow confined-space gas mixing.



RESULT:

Plant data comparing the energy cost of the ozone dissolution system with the turbine mixing design showed that the retrofit reduced the energy cost of ozone contact by an average of 69.2 percent under all plant flow conditions. An ozone transfer efficiency of 92.1 percent was achieved using an applied ozone dosage of 2.5 mg/L of 6 percent weight ozone. 661-363-6500; www.mazzei.net

(continued)

Aeration tank odor eliminated using pure oxygen injection

Problem

A Midwest meat-processing plant's wastewater pretreatment facility produced an odor linked to insufficient dissolved oxygen in the first of three aeration tanks. Hydrogen peroxide had been used to control odor, but there were concerns about the cost and effectiveness. The addition of new aeration equipment was constrained by the structural cover of the aeration tank.



Solution

Praxair demonstrated that odor could be eliminated through restoration of aerobic conditions in the first aeration tank. The shortfall in oxygen transfer rate could be met through injection of pure oxygen into the recirculating waterline of the jet aeration system of the first aeration tank. A demonstration showed that dissolved oxygen levels above 0.5 mg/L could be maintained for about half of the day, and the sulfide odor was eliminated.

RESULT:

The cost of adding pure oxygen was less than the previous approach to addressing odor. The plant expected operating cost savings of 74 percent. **800-772-9247; www.praxair.com**

Ozone boosts performance at water recycling facility

Problem

The West Basin Municipal Water District's Edward C. Little Water Recycling Facility in El Segundo, California, has a plan to supply five different designer effluent streams to meet the needs of five end users. Water uses are to include industrial process water, landscape irrigation and groundwater recharge.

Solution

The district developed a treatment train using high-rate clarification, microfiltration, reverse osmosis, UV disinfection, advanced oxidation process and **BioFOR biological treatment** from **SUEZ Water Technologies & Solutions**. To meet the efficiency and flow rate requirements, ozonation was used to increase membrane flux. SUEZ designed and supplied an **ozonia ozone system** with a total ozone production capacity of 2,000 pounds per day to membrane pretreatment.



RESULT:

The ozone technology allowed the plant to optimize the process train, maximize efficiency and meet customers' demands. The technology helps reduce organic fouling and increase microfiltration membrane flux. **www.suezwatertechnologies.com**

Ion exchange system helps deliver quality water

Problem

The water treatment plant in Pembroke Pines, Florida, was producing water with high levels of total organic carbon and color. It had traditionally used chlorine to oxidize the organic matter. The aggressive chlorination caused the formation of trihalomethane and haloacetic acid.

Solution

Calvin, Giordano & Associates, a regulatory compliance consulting firm, proposed removal of organic matter using strong base anion exchange. The treatment process consists of four 12-foot-diameter ion-exchange vessels containing 45 inches of strong base anion exchange resin and support gravel. Water is pumped directly from the wells through the **Organix ion exchange system** from **Tonka Water, a U.S. Water Brand**, to storage and the distribution system. The ion exchange vessels were designed with a domed plate underdrain that uniformly distributes flow and allows for painting below the underdrain. Uniform flow reduces headloss across the underdrain system and reduces system operating pressure. The ability to paint below the underdrain prevents corrosion and ultimately extends vessel life.



RESULT:

The treatment process has been highly efficient in delivering high-quality water, as indicated by 95 percent color removal, 67 percent TOC removal and 67 percent THM reduction. **763-559-2837; www.tonkawater.com tpo**

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industry news

Franklin Electric welcomes new sales leader

Franklin Electric welcomed Ryan Johnson as the new vice president, sales U.S./Canada for the North America Water Systems Business Unit. He will manage all aspects of sales activities for the U.S. and Canadian markets. Johnson has 20 years' industry experience in motors, sales and management, spending his entire career with Regal Beloit and General Electric. His background includes expertise in marketing, Six Sigma, operations and in every aspect of the sales process, from direct field sales experience to sales management leadership.



Ryan Johnson

Xylem offering online aftermarket sales for Sanitaire brand

Xylem announced it extended its online sales platform to enable customers to place online orders for Sanitaire aeration replacement parts for fine-bubble aeration in wastewater treatment. For Sanitaire's online aftermarket sales, Xylem is leveraging an existing e-commerce platform hosted on its YSI brand's website. The platform highlights Xylem's goals of continually enhancing its customer service offering and making aftermarket purchasing quick and easy.

DSI announces Gary Patterson as new manager

DSI announced Gary Patterson was named municipal market manger. He started his career at DSI in 2012 as the regional sales engineer for a portion of the Midwest. Patterson then became the technical specialist of the newly formed DSI Dynamatic's Pumps, Fan and Compressor group. He holds a bachelor's degree in electrical engineering from Michigan Technological University, where he pursued the power option, specializing in rotating equipment and electrical power generation, transmission and distribution. tpo



Gary Patterson

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The **Orange County (California) Sanitation District's Newhope-Placentia Trunk Sewer Replacement Project** was named Wastewater Treatment Project of the Year by the American Society of Civil Engineers. The \$70 million project replaced almost 7 miles of sewer pipeline in Fullerton and Anaheim to increase capacity.

Mike Flynn, Winchester (Kentucky) Municipal Utilities general manager, retired after 25 years.

Dustin Geatches was named town manager for Shelburn, Indiana. Geatches, the town's contracted wastewater operator since 2017, merged that position into his new duties.

The Florida Department of Environmental Protection presented a Plant Operations Excellence Award to the **Polk County Utilities Division – Southwest Regional Wastewater Treatment Plant**.

The Rhode Island Narragansett Bay Commission employees **Nora Lough**, biologist; **Michael Spring**, maintenance manager; and **David Aucoin**, safety compliance coordinator, received awards for excellence. Lough received the Wastewater Trainer of the Year award from the U.S. Environmental Protection Agency Region 1. Spring received the Alfred E. Peloquin Award from the New England Water Environment Association for service contributing to excellence in plant operations. Aucoin received the Operator Safety Award from the New England Water Environment Association.

David Viers, Greer Commission of Public Works employee, received the Wastewater Operator of the Year award from the Water Environment Association of South Carolina, Blue Ridge Foothills District.

The Illinois Association of Water Pollution Control Operators presented these awards:

- Operator of the Year: **Dan Hughes**, Carol Stream
- Group 1 Plant of the Year: **Bloomington and Normal Water Reclamation District**, Southeast Facility
- Group 2 Plant of the Year: **City of Robinson**
- Group 3 Plant of the Year: **City of Oregon**
- Group 4 Plant of the Year: **Village of Energy**
- Industrial Plant of the Year: **Olin Corp.**, East Alton
- Clarence Klassen Outstanding Service Award: **Doug Armstrong**, Village of Addison.

Filiberto Aguirre, Las Cruces Utilities operator, received an Outstanding Achievement Award from the New Mexico Water and Wastewater Association.

The **Hollister Water Reclamation Facility** received the Safety Plant of the Year award from the Monterey Bay section of the California Water Environment Association.

Paula Ely of the Great Barrington (Massachusetts) Wastewater Treatment Facility received a 2018 Regional Wastewater Treatment Plant Operator of the Year Excellence award from the U.S. EPA New England office.

Farron Hall, Alamosa utilities superintendent, earned the 2018 Manager of the Year award from the Colorado Rural Water Association.

events

June 2-5

New England Water Environment Association Spring Meeting and Exhibit, Marriott's Wentworth by the Sea, New Castle, New Hampshire. Visit www.newea.org.

June 4-7

Water Environment Federation Collection Systems Conference, Indiana Convention Center, Indianapolis. Visit www.wef.org.

June 9-12

American Water Works Association ACE19 Conference, Colorado Convention Center, Denver. Visit www.awwa.org.

June 10-12

New York Water Environment Association Spring Technical Conference, The Hilton, Saratoga Springs, New York. Visit www.nywea.org.

June 23-26

Michigan Water Environment Association Annual Conference, Boyne Mountain Resort, Boyne Falls, Michigan. Visit www.mi-wea.org.

June 24-27

Ohio Water Environment Association Technical Conference & Expo, Sawmill Creek Resort, Huron, Ohio. Visit www.ohiowea.org.

The **Annapolis Water Treatment Plant** received a Judge's Choice Award for sustainability in the built environment and was one of nine finalists for a 2019 U.S. Green Building Council Maryland Chapter Wintergreen Award.

Brenda Adelman received a Water Quality Stewardship Award from the North Coast Regional Water Quality Control Board for effectiveness in protecting the Russian River watershed in California.

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TFD system
Tube Failure Detection
NSF
Standard 61
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M-3 PERISTALTIC METERING PUMP

BUILT RUGGED ENOUGH TO HANDLE THE MOST DEMANDING MUNICIPAL WATER AND WASTEWATER TREATMENT ENVIRONMENTS.

PRECISION TURNDOWN	✓ 10,000:1 with High Resolution Motor Speed Adjustment
VARIABLE FLOW RATE	✓ .0002 to 33.3 GPH (.0007 to 126 LPH)
INPUT	✓ 4-20mA, 0-10Vdc, and Pulse inputs for remote external or batch control and 0-30 VDC contact closure remote start/stop
OUTPUT	✓ Scalable 4-20mA or Pulse, one 250V/3A relay and three 115V/1A contact closures assignable to monitor various pump functions
DEPENDABLE	✓ Equipped with Multi-Tube Heavy Duty Pump Head Tubing for up to 4X Longer Service Life
PATENTED	✓ Exclusive Built-in Tube Failure Detection System

THE ALL NEW MS-6 ULTIMATE CHEMICAL FEED SENSOR

MEASURING CHEMICAL FEED IS A CRITICAL FACTOR IN WATER AND WASTEWATER TREATMENT.

ACCURATELY MEASURES THE CHEMICAL FEED OF METERING AND DOSING PUMPS BY USING THE LATEST ULTRASONIC TECHNOLOGY.

PATENT PENDING DESIGN	✓ The Broadest Flow Range on the Market
VARIABLE FLOW RATE	✓ From 10 to 10,000 ml/min (0.158-158.5 GPH)
LOW PRESSURE DROP	✓ Less than 1 PSI
PVDF AND PEEK WETTED COMPONENTS	✓ Can Handle Harsh and Corrosive Chemicals Common in the Treatment of Water & Wastewater
INLINE PIPE FITTINGS	✓ Allow for Quick and Easy Sensor Installation
ACCURATE AND AFFORDABLE	✓ Unlike Anything the Industry Has Ever Seen.



NSF
Standard 61
IP66
NEMA 4X
WASH DOWN

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