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Wastewater Systems Director
Lebanon, Pa.

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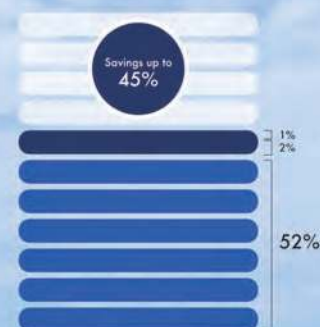
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Thailand: PREMIUM www.premium.co.th / premium@premium.co.th (For Eng)

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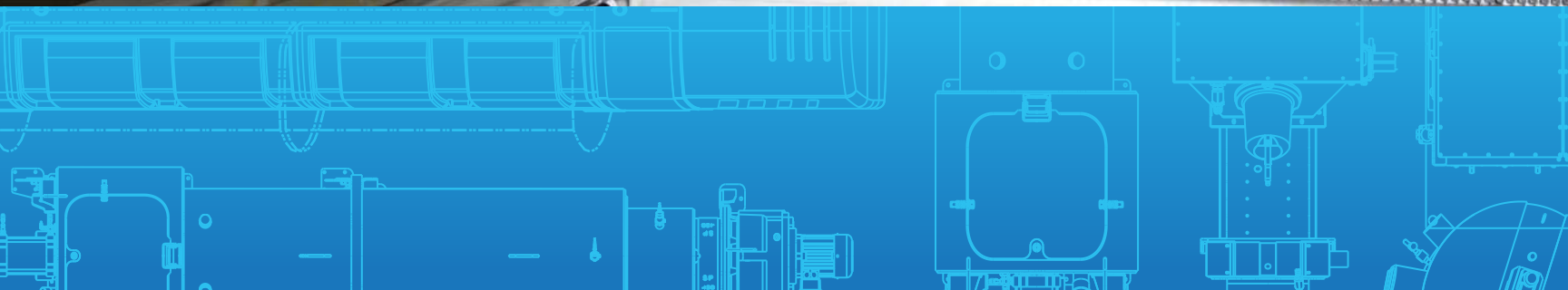
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let's be clear

At the End of the Pipe

AMONG THE TOUGHEST CHALLENGES IN AN OPERATOR'S LIFE IS LACKING CONTROL OVER WHAT'S REGULATED AND HOW TO TREAT FOR IT

By Ted J. Rulseh, Editor



When new pollutants start showing up in our waterways, clean-water plants often find themselves in the spotlight.

A new or emerging pollutant is detected in the water or in the tissues of fish downstream from the plants, and suddenly those plants are looked at (by some) as the source. In reality, the guilty chemical came from homes or businesses or both, through the collections system, and into the plant, which was neither designed nor required to treat for it.

Clean-water plants face the disadvantage of being at the end of the pipe, at the mercy of what comes in and, more important, at the mercy of regulators who decide what is and isn't a pollutant that the plants need to remove, and how efficiently they have to remove it. This doesn't just apply to new pollutants — witness what has happened to effluent limits on phosphorus in the past decade or so.

My purpose here isn't to cast aspersions on the regulatory community. It's to highlight the challenges that treatment plants face as new pollutants are discovered and as technology enables detection of substances at lower and lower concentrations.

WHEN IS IT A PROBLEM?

Just when plants have a good handle on the traditional wastewater components — BOD, TSS, nitrogen, phosphorus — along come plastic microbeads. Pharmaceuticals. Fragrances. Insecticides. Endocrine-active compounds. And the one everybody seems to be talking about these days: per- and poly-fluoroalkyl substances, or PFAS.

This month's In My Words article takes a look at PFAS and their impact. State regulators are already taking notice. The Michigan Department of Environmental Quality last year launched an industrial pretreatment initiative aimed at PFAS. The agency noted that conventional treatment doesn't effectively remove PFAS, which then would pass to through lakes, streams, and groundwater and into biosolids.

In Maine last March, the Department of Environmental Protection imposed a moratorium on land application of biosolids and biosolids com-

Issues like PFAS argue strongly for intervention from the state and federal levels to help find and fund appropriate treatment for these emerging contaminants.



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posts out of concern over PFAS, which are chemicals used in fire retardants and various other products since the 1950s and lately have been linked to cancer, liver damage and other health issues.

LOSS OF CONTROL

Now consider the impact of that moratorium, issued in the very earliest days of spring, on clean-water plants with biosolids ready to go out to the farms? At the time I wrote this, it wasn't clear whether the moratorium would be short-lived or the state would make some provision for these plants. If not, then the biosolids in all likelihood were headed for landfills, at great expense.

This is just one illustration of what can happen as research zeroes in on the effects of even low-level chemical exposure, and as our ability to detect and measure chemicals continues to improve.

Last month's issue contained an article in which the National Association of Clean Water Agencies argued for more federal government funding for water and wastewater treatment and infrastructure, especially as regulations proliferate and become stricter.

FACILITIES NEED HELP

Issues like PFAS argue strongly for intervention from the state and federal levels to help find and fund appropriate treatment for these emerging contaminants. There's also a need for research to assess accurately whether these substances actually pose threats, and under what circumstances.

The local clean-water plant can't control what comes down the pipe, other than through targeted industrial pretreatment programs. The utilities that own those plants, and the customers of those utilities, shouldn't be held solely responsible for the cost of solving the problems. **tpo**

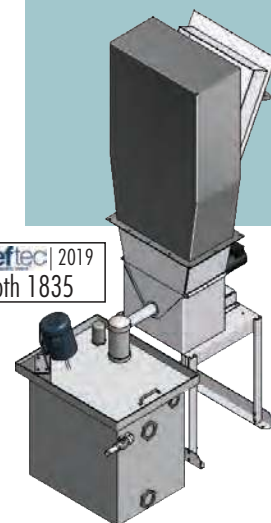
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DISCUSSING THE ISSUES

The Year of Clean Drinking Water

Nearly 100 people packed a room at the Memorial Union on the University of Wisconsin-Madison campus recently, overlooking the world's best-studied lake — Lake Mendota. They were there to talk about Wisconsin's water in a year that Gov. Tony Evers has declared the Year of Clean Drinking Water. Topics included climate change, algae blooms, and per- and poly-fluorinated substances.

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LIMITED UPGRADE FUNDS

Controlling Phosphorus Discharges

In this online exclusive video, Greg Moser, superintendent of the Slinger (Wisconsin) Wastewater Treatment Plant, gives viewers a detailed look at wastewater treatment operations and talks about the challenges his crew has faced getting its phosphorus discharges under control. Faced with a \$6 million upgrade cost to reach a new .075 mg/L phosphorus limit, the facility's operators took classes to learn what they could do to help lower phosphorus levels.

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DIAMOND IN THE FOG

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Trained in the Trenches

CROSS-TRAINING IN OPERATIONS HELPED JORDAN DAMEREL BRING MORE EMPATHY AND DEEPER KNOWLEDGE TO HIS ROLE AS DIRECTOR OF ENGINEERING FOR A CALIFORNIA AGENCY

STORY: **Jim Force** | PHOTOGRAPHY: **Collin Chappelle**

As Jordan Damerel cranked the hand wheel of the heavy gate on the bar screen so his operations teammates could maintain it, it occurred to him that an electric actuator would be so much easier, and well worth the cost, if only the designers had included one in their design.

“Especially when I realized that I’d soon have to go to the other end and close another gate,” he recalls.

That heavy lift was just one of the hands-on lessons Damerel learned when he joined the Fairfield-Suisun Sewer District in California four years ago. He started as an environmental engineer and transitioned to director of engineering one year ago.

During the 2 1/2 years in between, he cross-trained in operations, spending one day a week as an operator in training, learning about the plant and the collections system and how it was operated and maintained.

THROUGH THE RANKS

Damerel, a California native, received his undergraduate degree in civil and environmental engineering from the University of California, Berkeley, and he then attained his master’s degree in environmental engineering from the University of Illinois at Urbana-Champaign. He began his career as a consultant, designing pump stations and water and wastewater plants. In 2015, he joined the Fairfield-Suisun district: “I was eager to get involved with the agency side of things.”



The Fairfield-Suisun Sewer District treatment plant is on a large and verdant plot of land.

As director of engineering, his responsibilities include the district’s 23.7 mgd (design) biological wastewater treatment plant and the 75-mile long collections system with 13 pump stations. He oversees the utility’s major maintenance project and asset management programs, in addition to a capital improvement program focused on plant expansion and rehabilitation and replacement of sewer lines. He has a staff of six and manages a budget of about \$10 million.

The idea to immerse him in operations and maintenance came from district management. “They had a model, based on success of the previous engineer who had worked with operations,” Damerel says. “They suggested it to me.”

“In this industry, anytime you have the opportunity to try something different or diversify your experience, especially hands-on experience, you should take it.”

JORDAN DAMEREL

RESOURCE EFFICIENT

The Fairfield-Suisun Sewer District serves the central Solano County (California) communities of Fairfield and Suisun City, as well as Travis Air Force Base, about 75 miles northeast of San Francisco.

The treatment plant is rated at 23.7 mgd and handles 12 mgd on average. The extra capacity was added during a major expansion in 2008-09, just before the downturn in the economy. “Today, that extra capacity gives us some flexibility,” says Jordan Damerel, director of engineering. “We can take a basin or two offline for repairs or maintenance.”

The treatment process is advanced secondary, with trickling filters and activated sludge. Treated water passes through sand/anthracite filters with a plastic underdrain (Leopold - a Xylem Brand). The water is then UV disinfected (WEDECO - a Xylem Brand). “That gives us an effluent suitable for irrigation,” Damerel says. Most of the treated water flows into Suisun Marsh and then to San Francisco Bay. A portion is used as utility water. The plant also provides water for irrigation at a local turf farm.

“We also have a partnership with the local irrigation district to provide water to flood duck ponds,” Damerel says.

Biosolids are first dewatered by an FKC screw press to about 16% solids, then provided to a Lystek Organic Material Recovery Center on the treatment plant site. Lystek converts the solids to a liquid Class A fertilizer product. The district has been managing its biosolids that way under a long-term agreement signed in 2016. The Lystek facility has more capacity than the district can fulfill, so solids from six other agencies are trucked to it.

The material has been used mainly on alfalfa and safflower fields, and the district is supporting Lystek to develop the agricultural fertilizer market. Another major project is to rehabilitate mechanical equipment for the anaerobic digesters. That includes upgrade of the mixing system, replacement of the emergency boiler for heating, and improvements to the temperature controls, solids piping and pumping, and biogas sampling and treatment systems.

Other projects include an \$11 million replacement of aeration blowers with four APG-Neuros high-speed turbo blowers, a major plant electrical upgrade, and a process to plan digester gas production and use into the future.

Jordan Damerel,
Fairfield-Suisun Sewer District
Fairfield, California

POSITION:
Director of engineering
EXPERIENCE:
12 years in consulting and plant engineering

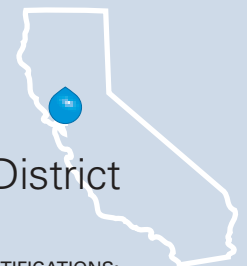
DUTIES:
Oversee the engineering department

EDUCATION:
Bachelor's degree, civil and environmental engineering; master's degree, environmental engineering

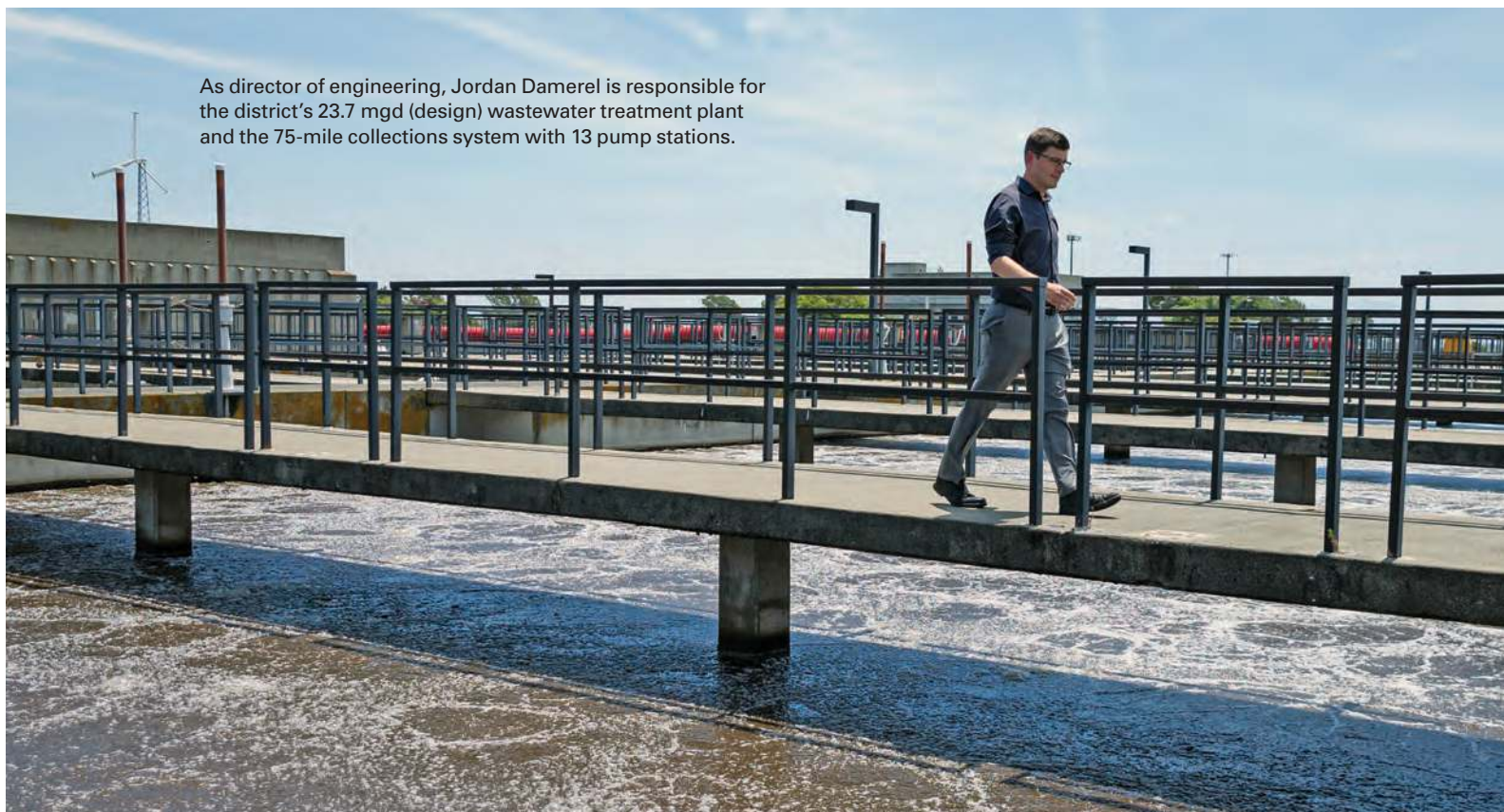
CERTIFICATIONS:
Registered Professional Civil Engineer, Project Management Professional

AWARDS:
2018 Emerging Leader, California Water Environment Association

GOALS:
“Do my part to protect the public and the environment through technologically advanced and cost-effective solutions.”



As director of engineering, Jordan Damerel is responsible for the district's 23.7 mgd (design) wastewater treatment plant and the 75-mile collections system with 13 pump stations.



From left, operators Gary Crawford, Chris O'Connor and Nurel Ramadan monitor the plant from the control center.

NO IVORY TOWER

While Damerel spends most of his time on engineering projects, the O&M cross-training gave him invaluable hands-on experience. "I spent the day with the operations group as an operator-in-training," he recalls. "From our operators, I learned the intricacies of how our plant ran. It was a great way to learn how everything worked, all the way down to piping and valves.

"I got a much better understanding of things that needed to be considered by engineering. I'd say that within the first week, I noted a dozen things

“From our operators, I learned the intricacies of how our plant ran. It was a great way to learn how everything worked, all the way down to piping and valves.”

JORDAN DAMEREL

that seemed obvious to operators but that I, as a design engineer, should have reconsidered. These are things we don't necessarily think about."

Damerel admits there was an adjustment period. "At the beginning, I wasn't quite sure how much I could help, what I could help with or how I could bring value. At the same time, the operators were not exactly sure of what I could do or was willing to do. I was like 'Hey, I'm your operator-in-training; tell me what to do.' We had to discover what each of us knew and realize what value each of us could bring to the relationship."

That changed quickly. The bar screen project was only one of Damerel's many experiences, which included emptying basements full of sludge, climbing into wet wells and pumping stations, and even cleaning the Vactor truck. "It wasn't the most enjoyable work I've ever done," he says. "But it was good to see what the staff has to do. After the first month or two, the operators realized I was willing to help, and we developed a more personal connection."

ASSET APPRECIATION

Asset management is a big part of Damerel's job, and he strongly believes that his time in the field has helped him understand the district's facility needs. "If we've got a project coming up, I have a better understanding of the assets we have and what we need to address," he says. "I'm better able to explain to the operations groups what we are planning and ask questions about what works and what doesn't."

His operations training has facilitated communications: "It's an informal setting where those conversations happen. I'm not sure they would come up in a more formal meeting. You might not necessarily hear about a failing pump or process inefficiency."

Damerel's experience across operational groups no doubt contributed to his unfailing commitment to organizational communications and transparency. "Jordan manages the district's capital improvement and asset management programs, and he's constantly working toward more straightforward and transparent planning processes that allow greater input and buy-in from O&M and engineering staff," says Meg Herston, an environmental compliance engineer with the district who nominated Damerel for a California Water Environment Association Emerging Leader Award last year (which he won).

HIGH PRAISE

"Jordan's knowledge, combined with his humility, adaptability, and willingness to seek input and feedback, has made him incredibly influential," Herston says. It's also a major reason the district has been successful on so many projects in recent years. They include collaborations with AECOM on a Nereda granular activated sludge nutrient removal pilot plant, as well as the district's public-private partnership with Lystek International on a regional biosolids processing and reuse facility.

Damerel also prepared the analysis and justification that allowed the district to be awarded \$4 million in principal forgiveness from the U.S. EPA Green Project Reserve, reducing a State Revolving Fund loan for its ongoing blower replacement project to \$7 million.

While specific projects like these are important, Damerel gets an even bigger kick out of the collaboration that makes them possible. "My favorite work is what we do to bridge gaps between operations, maintenance and engineering — collaborating on running the plant better, improving efficiency, saving on money and power, and generating more renewables," he says. "The key to success is to break down the silos between departments and make that happen. We do that well here, and it's a fun place to work."

OUT OF THE OFFICE

With all that's going on at work, Damerel finds time to cheer for the Oakland Athletics, read, hike and explore new places. He also teaches math and wastewater courses through Solano Community College and is the chair of the Bay Area Consortium for Water and Wastewater Education. The consortium provides free classes and networking opportunities for students interested in the water industry; many of the district's staff members and interns have been educated through the program.

"I enjoy it," Damerel says. "It's really fun to see students get excited about wastewater."

It's just another connection he's formed with those who operate the treatment plants.

Would he recommend such a hands-on, operations-oriented approach to others in the municipal wastewater field?

"Absolutely. In this industry, anytime you have the opportunity to try something different or diversify your experience, especially hands-on experience, you should take it. It can only benefit your agency and you personally." **tpo**

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Kids at the Chatham-Kent & Lambton (Ontario) Children's Water Festival take part in hands-on activities to learn about the value of water.

10 Years and Counting

A CHILDREN'S WATER FESTIVAL IN ONTARIO HAS HELPED TURN STUDENTS' FOCUS TOWARD THE VALUE OF WATER AND HAS LED SOME INTO WATER-RELATED CAREERS

By Sandra Buettner

An annual event that lasts a decade has to be doing something right. This year, the Chatham-Kent & Lambton (Ontario) Children's Water Festival is celebrating its 10th year of educating children on water and the environment. Over the years, about 14,000 children and 2,400 teachers and parent chaperones have attended, and some 3,000 high school students have volunteered their time to help.

Chatham-Kent and Lambton are surrounded by Lake Erie, Lake Huron and other waterways, making water and the environment a central focus in the region. The festival was created to deliver water education to fourth and fifth graders in all area schools and home-schooled children. This year's event will run Oct. 2-5.

HANDS-ON ACTIVITIES

During the three-day festival, 1,800 youngsters, with teachers and chaperones, will descend on the grounds and take part in some 40 water-themed activities. Before the event, most teachers review the activities and pick 12 to 15 that pertain to what the kids are studying.

All activities are linked to the Ontario school curricula for science and technology, social studies, the environment, mathematics and physical edu-

“After the children come back from the event, they take what they learned home and apply it. Down the road, maybe they'll become municipal or provincial leaders.”

DON HECTOR

cation. The festival focuses on water science, water technology, water conservation, water protection and water attitude.

The event is held on a 6-acre site next to a 2-acre pond at the C.M. Wilson Conservation Area just south of Chatham-Kent. Children arrive on buses by 9:30 a.m. Activities include:

- A demonstration of conventional and low-flow showerheads. The kids put on raincoats and enter shower stalls with buckets to catch the water from each head. They observe the different amounts each bucket collects.
- A simulated stream table water display with sand and mud. The students see and learn how water flows through the artificial landscape.

(continued)

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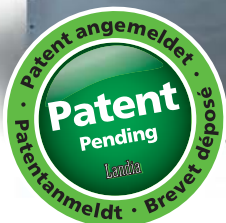
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ABOVE: Kids put on raincoats and enter shower stalls to observe the difference between conventional and low-flow showerheads. RIGHT: Kids at the water festival learn about Great Lakes fishes and the invasive species that can disrupt the ecosystems. LOWER: Festival activities include learning about aquatic pond life.



teachers and service group members help as volunteers. Many college and high school students who attended the festival during grade school come back to help with the activities.

To celebrate the festival's 10-year milestone, the organizing committee is adding a fourth day, Saturday, Oct. 5, that will be open to the public. "We hope it will open up some new minds on what we're doing," Hector says.

FESTIVAL FEEDBACK

Students, teachers and volunteers laud the festival's impact. Hector notes that one fourth-grade attendee went on to become valedictorian of her eighth grade class. In her graduation address, she talked about the fun she had at the festival, the connections she made and how it influenced her.

Another attendee returned as a volunteer when he got to high school and then got involved in a water program at his municipality. He was later influential in procuring funding for the festival. Hector has heard other feedback from children who changed their focus on what they wanted to study in college after attending the Children's Water Festival (www.ckwaterfest.com). tpo

What's Your Story?

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

- A Pioneer Way of Life exhibit that shows how people long ago retrieved water from wells before they had indoor plumbing. It also shows how pioneers used scrub boards with buckets of water to do laundry.

Another popular event, Where It Goes When I Go, includes a model of a wastewater treatment plant. Students start out sitting on a mock toilet seat, then go down a slide, past various stations and move through the plant. The youngsters observe the five processes in the cleaning of the water. Volunteers at each station describe the processes.

The students break for a short lunch and then move on to more activities. At 1:30 p.m., the kids board the buses for the trip home.

Don Hector, festival coordinator, observes, "After the children come back from the event, they take what they learned home and apply it. Down the road, maybe they'll become municipal or provincial leaders of influence and take the water message forward."

POWER IN NUMBERS

A festival of this size takes a lot of helping hands to execute. Besides the 600 students who attend each day, more than 150 parents, retired



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The 4G Wetlands Project shown while under construction in 2016.

Naturally Beneficial

WETLANDS CREATED TO HELP MANAGE RECLAIMED WATER ALSO HELP RESTORE DAMAGED NATURAL WETLANDS AND RECHARGE AN AQUIFER THAT SUPPLIES DRINKING WATER

By Steve Lund

Pasco County, Florida, is putting reclaimed water to use in a new way that makes the regional drinking water supply more sustainable and repairs some damage done by past wellfield withdrawals.

The Florida county, which more than 20 years ago committed to reuse 100% of its reclaimed water, built a 176-acre wetland on a cattle ranch to receive excess reclaimed water from five wastewater treatment plants.

Although much of the water is used for irrigation and industrial processes, about 10 mgd was being returned to the aquifer through rapid-rate infiltration basin systems, or RRIBS. County officials thought there must be a better way to handle that water, and ultimately, they built one. Known as the 4G Wetlands Project, it was built at the 4G Ranch, about 35 miles north of Tampa.

DAMAGE UNDONE

“One goal of this project was to take water that was just being infiltrated into the ground and do something good with it,” says Jeff Harris, Pasco County senior environmental scientist. And project manager. “We suffered through decades and decades of environmental harm that was at least in part from wellfield withdrawals. It dried up a lot of lakes and wetlands.”

The 4G Wetlands Project did a lot more than restore dried up wetlands. “It’s a water project, it’s an ecological project, and it’s a reclaimed water management project,” Harris says. The project consists of 15 ponds (wetland cells) of various sizes and shapes that occupy about 133 acres. The entire site,

including access roads, buffer zones and berms, covers 176 acres.

The reclaimed water comes in through a 24-inch pipe connected to the Pasco County Master Reuse System, which includes a 500-million-gallon reclaimed water reservoir. The water goes through a manifold with 15 flow-control valves and is distributed to the wetland cells through 8-inch pipes.

Floating solar-powered sensors on the ponds transmit water-level data to a control panel at the manifold, so the water can be automatically piped to where it is needed most. The wetlands require less maintenance than the RRIBS.

“I’ve often said in presentations that it’s the most dynamic reclaimed water system in the country, maybe in the world,” Harris says. “It’s fed by five treatment plants. It’s advanced secondary treatment, so the nutrients are still in it. That is perfect for golf courses and lawns. It’s completely looped, so we can move water from one part of the county all the way to the other side. It’s a very dynamic system — hundreds and hundreds of miles of pipeline.”

RECHARGING THE AQUIFER

The ponds are constructed with shallow, deep and transitional areas. They were planted with native vegetation appropriate to the water levels. There are some wet prairies near the tops of the berms and on islands; some areas are dry enough for cypress trees. The water levels are managed to mimic the seasonal hydrological cycle.

“The wetland is located in a watershed upstream of a public supply well-field,” Harris says. “The water that infiltrates slowly through that wetland

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ultimately ends up in the Upper Floridan Aquifer and moves downstream toward the wellfield. It provides for a more sustainable water supply." The wetland was designed to allow infiltration of up to 5 mgd.

While relatively high nitrogen levels in reclaimed water are desirable for irrigation, that is not the case when the water is going back to the aquifer. The wetland solves that problem, too. It naturally denitrifies the water.

"It's a fantastic biological process," Harris says. "In the root zone of the plants in the wetland, bacteria eat all that stuff up. Sometimes it can be con-

around each pond. The berms are about 4 feet above grade level and are 10 feet wide and flat on top.

"We built a wetland on an upland, as funny as that sounds," Harris says. In addition to the wetlands created, the project lifted the surficial aquifer, to the benefit of hundreds of acres of nearby wetlands that had been degraded from wellfield withdrawals. The 4G Ranch still has cattle, but they don't walk through the ponds. The berms are protected by split-rail PVC fencing with hog fencing between the rails to exclude cattle and feral hogs. "We don't want animals in there destroying berms," Harris says.

“I’ve often said in presentations that it’s the most dynamic reclaimed water system in the country, maybe in the world.”

JEFF HARRIS

verted to atmospheric nitrogen through plants. As the water percolates down through those soils, the bacteria eat it up. By the time it gets to even the surficial water table, it's almost background nitrogen level. That's the intent."

CAREFUL SELECTION

The site was chosen after a long, careful search. "We rated hundreds of parcels," Harris says. "We narrowed it down to the ones that would work, and we approached those property owners. At the 4G Ranch, the owner understood the need, and he wanted to partner with the county. It was his desire to bring back some of the lakes on his property.

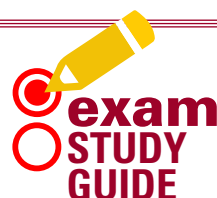
"It was dry before we came out and built the project. It had been dry for decades. There were two dry lake beds. Cattle could get from one side of the ranch to the other without having to walk around the lakes. In times of drought, the ranch owner would have to dig huge burrow pits just to water his cattle."

It was dry enough that operating earthmoving equipment on the site wasn't a problem. Soil was scraped up from the pond beds to make berms

MODEL FOR FUTURE

Pasco County officials expect this \$14 million project to be a model for future projects because of the public-private partnership and the multiple benefits: wildlife habitat, a more sustainable water supply, ecological restoration and improved management of reclaimed water. In May 2017, the project was named Reuse Project of the Year by the Florida Water Environment Association.

"We built true natural wetlands," Harris says. "They're beautiful. We host tours. We bring public agencies out. Soon we'll be taking school kids out to show them what ecology looks like and how we can leverage technology and engineering to reform nature." *tpo*



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Eyes on the Prize

A METICULOUS FOCUS ON PROCESS AND MAINTENANCE KEEPS A NEBRASKA PLANT IN COMPLIANCE AND THE OFFICE WALLS LINED WITH PLAQUES FOR EXCELLENCE AWARDS

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Shane Monahan**



The staff at the Norfolk Water Pollution Control Plant includes, from left, Twyla Hurlburt, secretary; Jesse Smith, operator; Marsha Louthan, chemical technician; Lonnie Tucker, plant supervisor; Kevin Endorf and Travis Kollath, operators; Zach Behnke, maintenance; and Tom Schwedhelm, operator.



The Nebraska city of Norfolk is home to 24,000 people, but the Water Pollution Control Plant treats a BOD loading typical of a population four to six times that size.

That's because the plant receives wastewater from several major industries, most notably two dairy processors. The Norfolk team handles it all just fine with a consistent focus on the process, aided by extensive lab testing that includes microbiological examination.

Todd Boling, wastewater superintendent, leads a nine-member team that keeps the equipment in top shape and the facilities clean and neat. Besides consistently meeting its permit — no violations since the early 1990s — the plant has been repeatedly recognized for excellence. In 2018 alone, it received the:

- Nebraska Water Environment Association Scott Wilbur Outstanding Facility Award for medium-sized plants (14th consecutive year)
- Nebraska Water Environment Association Gold Safety Award (14th consecutive year)
- Water Environment Federation George W. Burke Jr. Facility Safety Award.

Boling says simply, "We're proud of what we do, and the staff works hard at it."

SEQUENTIAL UPGRADES

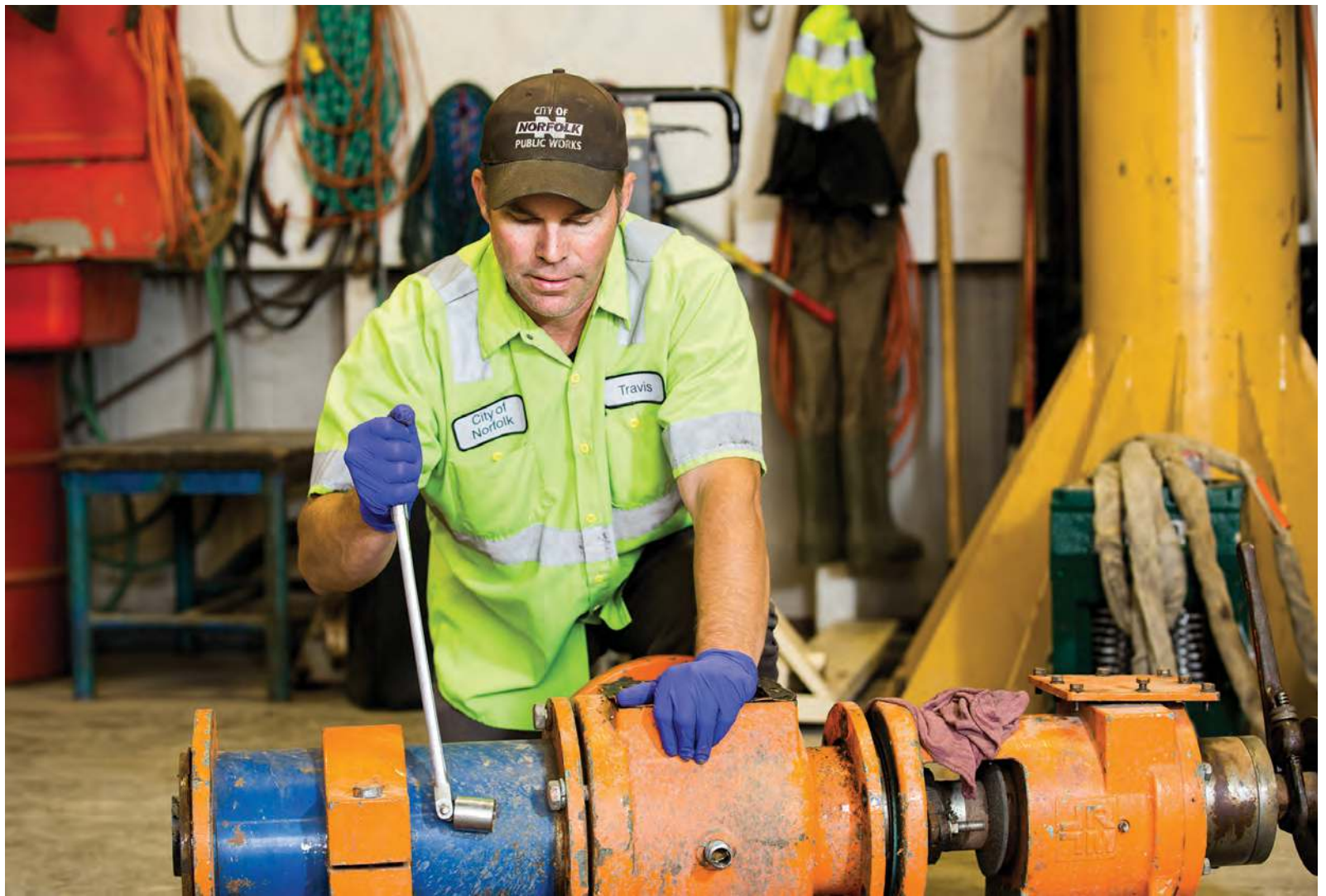
The original Norfolk plant, built in 1960, consisted of just two primary clarifiers. It was upgraded to an activated sludge process in 1980. The current sequencing batch reactor (Aqua-Aerobic Systems) was added in 1994. Four years later, the old activated sludge train was taken offline, after a meat-packing plant closed down.

There have been several upgrades along the way. In 2003, the plant added a TrojanUV3000 UV disinfection system. "We went away from chlorine to UV because the state Department of Environmental Quality couldn't put chlorine residual into the Elkhorn River anymore," Boling says. In 2007, influent grinders were removed and quarter-inch bar screen (Vulcan Industries) was added.

After a flood in 2010 collapsed two of three influent clay sewer lines, a single 54-inch HOBAS Pipe USA concrete influent pipe was installed. "In 2012, we upgraded our SBR blowers to high-speed turbos (Howden)," Boling says. "In 2015 we added a Vulcan Industries grit wash system. We went from 30 tons a month of sloppy material to 3 tons a month of clean sand and gravel."

“It's a top priority of mine to make sure there is up and down communication so that everyone knows what's going on. There are no hidden agendas.”

TODD BOLING



Travis Kollath services a pump (Moyno products by NOV).

SBR PROCESS

Wastewater enters through the influent screen; six lift pumps (Pentair - Fairbanks Nijhuis) deliver it to a Parshall flume that measures flow. The wastewater then goes through two grit collectors followed by three preaeration basins to freshen the wastewater.



Half of the flow goes to the largest of three primary clarifiers and from there to a roughing trickling filter and on to the SBR. The other half goes to two smaller primary clarifiers original to the plant, then to another roughing trickling filter and on to the SBR. UV disinfection is the final step before discharge to the Elkhorn River.

All solids pass through two gravity thickeners (WesTech Engineering) that raise the solids content from 1% to 4% before delivery to an aerated holding tank. Then two belt filter presses (including one from Komline-Sanderson) dewater the material to 22% solids.

Lime kiln dust is added to raise the pH to 12.0 for two hours and to 11.5 for an additional 22 hours to satisfy federal standard for Class B biosolids. Average production is 4.5 tons of biosolids per day. The material is land-applied by plant staff using two high-flotation trucks equipped with Knight ProTwin side-discharge spreaders (Kuhn North America). The city has 2,500 acres of cropland permitted for application, all within a 10-mile radius of the plant.

DEALING WITH INDUSTRY

Norfolk, in northeastern Nebraska, is an industrial community, home to a steel plant, a rubber hose manufacturer, a bottling facility for soft drinks and flavored waters, and a plant that dehydrates meat products for ramen noodles.

Jesse Smith monitors operations on the plant's SCADA system display.

(continued)

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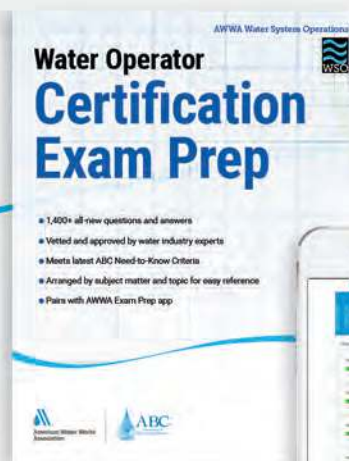
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FLOWS:
5.7 mgd design, 3.5 mgd average

RECEIVING WATER:
Elkhorn River

TREATMENT LEVEL:
Secondary

TREATMENT PROCESS:
Sequencing batch reactor

BIOSOLIDS:
Land-applied

ANNUAL BUDGET:
\$2.5 million (operations)

The industries that contribute the most to the Water Pollution Control Plant are an ice cream and milk products producer and a company that dehydrates organic milk into powder. These plants send wastewater containing 7,000 to 10,000 mg/L of BOD. “We don’t require them to pretreat,” Boling says. “We sample them every week in order to bill them.”

“Sixty percent of our loading is industrial and is largely high BOD. The primary clarifiers and the roughing trickling filters knock the BOD down substantially, and then the SBR takes it the rest of the way. We upgraded the trickling filters in 2016 with new two-arm rotating distributors. They remove 70% of the BOD.” One filter has fiberglass media (Brentwood Industries), and the other uses stacked redwood pallet as media.

HIGH-QUALITY TEAM

The Water Pollution Control Plant’s performance is built on process rigor. Boling, a Grade 4 (highest) operator, and Marsha Louthan, chemical technician, Grade 2, make the ongoing operational changes. “Marsha does a great job of monitoring the bugs and making sure they’re happy,” Boling says.

“She runs all the industrial samples in the lab: CBOD, COD, TSS, pH, TKN. For plant processes, we run the influent samples. We have an intermediate sampler for what is going into the SBR and then a final effluent sampler that she runs analysis on for permit purposes. We also run settleometers and look under the microscope.

“In the SBR, sensors feed back to the SCADA system and tell us the DO and TSS levels in the mixed liquor. Marsha runs the samples and makes comparisons to ensure the sensors are accurate.” Dissolved oxygen is on automatic feedback with the blowers, and the TSS level is used to automatically adjust wasting to the mixed liquor suspended solids setpoint (2,250 mg/L).

Boling is proud of a multitasking operations team, which includes Lonnie Tucker, plant supervisor (Grade 3 license); Kevin Endorf, Jesse Smith,

Tom Schwedhelm and Travis Kollath, operators (all Grade 2); Zach Behnke, maintenance worker; and Twyla Hurlburt, secretary. The collections system is maintained by the Water and Sewer Department, headed by Dennis Watts.

KEEPING IT RUNNING

New team members at Norfolk usually come from farm backgrounds and have a variety of mechanical skills. They start by learning basic plant maintenance. “The senior staff members train them how to do all the planned maintenance and the overhauls of pumps and other equipment,” Boling says. “They drive the trucks to spread the biosolids on farm ground. They dewater it with the belt presses.

“The rest of the staff — every morning we do a walk-around to make sure all the equipment is running. Then we do the maintenance and the painting and cleaning as necessary. We have a computerized maintenance management system (eMaint from Fluke) that spits out PM work orders every week for team members to complete.”

(continued)

TESTED UNDER PRESSURE

The true measure of a plant team comes in an emergency. For the team in Norfolk, Nebraska, that was the 2010 flood of the Elkhorn River, the plant’s receiving stream and a Missouri River tributary.

Heavy rains fell in early June in an area 50 to 100 miles upstream, and that gradually but significantly raised the river’s level at Norfolk. “We knew the flood was coming, so we prepared to have staff on board,” says Todd Boling, wastewater superintendent.

“As the river came up, we found out that the flows were increasing on the influent side of the plant. Two of our three clay sewer lines had collapsed, so river water was entering the influent stream. That forced us to run the plant manually 24/7 from June 10 to July 3 while we put the Band-Aids on. We were pumping 15 mgd through the plant and still meeting our permit limits.

“We couldn’t pump the water out to the river because it was so high that the water would basically come around back to us.” The floodwater didn’t enter any buildings or any clarifiers or other tankage, but high levels persisted for several days.

“We hired a local company that does lagoon cleaning,” Boling says. “Once we got things situated, they were able to take that 15 million gallons and with large pumps and long, thick hoses send it downstream to get it away from the plant.”

During the flood, the plant team members rotated shifts to ensure staffing around the clock. Equipment maintenance was critical as river sand entered through the broken pipes and caused issues with pumps and other equipment.

“The grit collectors were filling up so they had to hand-scoop them out into a dump truck and get that evacuated,” Boling says. “Then our influent screen and wet press got plugged with sand as well. We had to take that equipment apart, get the sand out and start it up again.

“The team did an excellent job of keeping the equipment running and the plant in compliance. I was expecting to submit a noncompliance because of the way things were going, but when we did all the testing, we were putting out clean water within the permit limits.”



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Marsha Louthan runs a broad range of lab tests and analyses that include microscopy.

The SBR is highly automated with programmable logic controllers that feed back to the SCADA system. Boling and some colleagues have earned degrees in the electro-mechanical program at Northeast Community College.

The plant is staffed during the day shift; operators rotate on-call duty during nights and weekends. “Because of excellent plant maintenance and housekeeping, they only get called out 10 times a year after hours on average,” Boling says. Staff members can use tablets to monitor the SCADA system and answer alarms from home.

STRESSING SAFETY

Safety is a long-standing priority for the Norfolk team. “We haven’t had any lost-time accidents in 15 years,” Boling says. “Safety is a mindset, and it comes back to housekeeping and a well-maintained plant where everything is clean, there are no trip hazards and the walkways are free and clear.

“We have tailgate sessions in the morning where we talk about ladders, hand-tool safety, electrical safety and other topics. Our Fire Department provides annual training on bloodborne pathogens, fire extinguishers, first aid and CPR. We have training to make sure our people wear the personal protective equipment that’s required.”

To keep everything running smoothly, Boling strives to create a positive work environment. “Good communication is the big thing,” he says. “It’s a top priority of mine to make sure there is up and down communication so that everyone knows what’s going on. There are no hidden agendas.

“I don’t want to be the only one who knows how to do things. Everybody needs to know a little bit about everything.” In morning meetings, team



Norfolk Water Pollution Control Plant PERMIT AND PERFORMANCE			
	INFLUENT	EFFLUENT	PERMIT
CBOD	588 mg/L	8.6 mg/L	25 mg/L
TSS	407 mg/L	10 mg/L	30 mg/L
Ammonia	27 mg/L	1.45 mg/L winter 6.54 mg/L spring 0.25 mg/L summer	20.3 mg/L winter 36.5 mg/L spring 8.5 mg/L summer

“Sixty percent of our loading is industrial and is largely high BOD. The primary clarifiers and the roughing trickling filters knock the BOD down substantially, and then the SBR takes it the rest of the way.”

TODD BOLING

members discuss what is in store for the day so each person knows what the others are doing. In addition, Boling gives the staff a bigger picture by communicating what is happening in the Public Works Department.

INDUSTRY CONNECTIONS

Boling came to his role in Norfolk with a farm background and two years of experience as a master plumber. He started with the city in the water department, and seven years later, in 1988, he switched to wastewater side. He became wastewater superintendent in 1995.

Last year he received a WEF Service Award. Besides being active in the Nebraska Water Environment Association, he has represented Nebraska as a WEF delegate and served for six years as a WEF delegate at large. He has chaired the House of Delegates Nominating Committee and has served on the WEF National Nominating Committee.

“You network with a lot of people who have similar concerns about how to manage people, operate your plant and take care of equipment,” Boling says. “You also meet people who may have experience with the same issues you’re dealing with. That is of great value.”

It has certainly helped Boling and his team keep the Norfolk plant in the topmost tier of clean-water facilities in Nebraska. **tpo**

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A New Twist on Biosolids Processing

A RESEARCH PROGRAM YIELDS A BIOLOGICAL HYDROLYSIS SOLUTION THAT IMPROVES ANAEROBIC DIGESTER PERFORMANCE, DELIVERS CLASS A PRODUCT AND REDUCES COSTS

By Michael Theodoulou

Higher-quality biosolids that meet U.S. EPA Class A criteria can be reused nearly without limitations as a fertilizer to promote productive soils and stimulate plant growth.

Anaerobic digestion upgrades that enable clean-water plants to produce Class A material can offer multiple benefits, such as reducing the volume of biosolids so less product needs to be managed and transported.

One such upgrade is biological hydrolysis technology, which has been used for preconditioning sludge since 2002, mainly in the U.K. The technology can be installed as a retrofit ahead of existing anaerobic digesters to enhance digestion efficiency.

Beginning in 2016, SUEZ Water Technologies & Solutions began a program to alter the biological hydrolysis process to further optimize digester performance and produce a Class A product. The goal was to create an alternative to thermal hydrolysis — and other technologies that yield Class A biosolids — that would achieve similar performance for a lower capital investment and using less sophisticated equipment.

BOOSTING THE RATE

It is widely accepted that hydrolysis is the rate-limiting step of anaerobic digestion. To adequately stabilize sludge, extended hydraulic retention times are commonly designed into the digester volume.

Biological hydrolysis increases digester capacity by two to three times by reducing the required retention time and providing optimum conditions to maximize the hydrolysis rate.

Biological hydrolysis addresses this rate-limiting step by adding six serial reactor vessels in front of the digesters. It increases digester capacity by two to three times by reducing the required retention time and providing optimum conditions to maximize the hydrolysis rate. The process also helps boost biogas yield and reduces biosolids volume.

The most recent biological hydrolysis solution includes a design hold time of five hours and a pasteurization step that elevates the temperature to 131 degrees F in the last three reactors. While this achieves an “enhanced biosolids” designation in the U.K., it does not meet EPA Class A requirements.

UPPING THE ANTE

To achieve the Class A designation, the next step was to target the EPA 40 CFR Part 503 rule, specifically Alternative 1: Thermally Treated Biosol-



The hydrolysis process yields Class A biosolids that can be sold as fertilizer.

ids. This is one of six defined alternatives for achieving Class A; it sets a requirement based on hold time at a certain temperature.

Adapting biological hydrolysis technology to meet Alternative 1 required a hold time of 24 hours at solids content less than 7% and 63.1 hours for solids content above 7%, based on the 131 degrees F hold temperature in the last three reactors. Although both scenarios were far above the five-hour design hold time, the six-pack of tank reactors provided a platform for altering process conditions to meet Alternative 1 without changing the physical characteristics or the size of the system.

VALIDATING THE DESIGN

At first glance, it would appear relatively straightforward to redesign the biological hydrolysis technology into a Class A solution: By adjusting the pasteurization temperature, the process flow could be configured to match or exceed the time-temperature requirements.

But because the core purpose of biological hydrolysis is to increase digester effective capacity and efficiency, a new Class A hydrolysis process would have to prove there was no detrimental effect on overall performance.

To that end, a performance model was developed to compare biological hydrolysis digestion combined with mesophilic anaerobic digestion against conventional mesophilic digestion alone. The model showed that adding biological hydrolysis enhanced digester performance by reducing volatile solids when compared to pure mesophilic digestion. Next, the performance model was validated by comparing it against full-scale operating data from eight active biological hydrolysis plants, establishing a performance benchmark.

STEPPING UP TO SCALE

The next step was to demonstrate the process at full scale by constructing a system with a six-tank biological hydrolysis system and mesophilic anaerobic digestion tank at the City of Guelph Wastewater Treatment Plant in Ontario. The demonstration system was built next to an existing mesophilic anaerobic digestion facility, enabling easy performance comparison.

Results showed that the demonstration system, operating at a digester retention time of 12 days, reduced volatile solids by 52%, whereas in the anaerobic digestion facility, the volatile solids reduction was 46% at a digester retention time of 22 days.

This documented a significant improvement in the overall digestion process by adding biological hydrolysis, even with a different digester retention time. When the demonstration system performance was adjusted to a 20-day retention time, the resulting volatile solids reduction was 58% — a 26% improvement in digester performance. In addition, demonstration system



Biological hydrolysis increases hydrolysis efficiency by adding six serial reactor vessels in front of an anaerobic digestion system.

operated in a scenario consistent with the Class A time-temperature requirements of EPA Alternative 1.

Besides meeting the time-temperature requirements, the biosolids must be below prescribed pathogen concentrations to qualify as Class A. Testing revealed that the biosolids conformed to fecal coliform limits and that *Salmonella* was nondetectable.

FINALIZING A COMMERCIAL SOLUTION


The Class A hydrolysis solution has now been commercialized, and as of May, the first two projects using the revised biological hydrolysis technology were being finalized. To enhance the effectiveness of Class A hydrolysis, a thermal drying technology can be added to further reduce biosolids volume and boost savings on biosolids management and transport.

ABOUT THE AUTHOR

Michael Theodoulou (michael.theodoulou@suez.com) is a senior product manager with SUEZ Water Technologies & Solutions. tpo

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In Control of Their Destiny

THE CITY OF LEBANON AUTHORITY'S BIOSOLIDS PROGRAM PRODUCES HIGH-QUALITY CLASS A MATERIAL WITH AN INDIRECT-HEATED DRYING SYSTEM

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Kevin Blackburn**

For decades, the City of Lebanon Authority in Pennsylvania applied Class B biosolids to cropland in liquid or cake form. But in recent times, the authority found itself at the mercy of weather, community attitudes, storage constraints and other factors complicating the biosolids program.

So, in 2014, the district started up a drying process to yield Class A biosolids. It produces material at 94% to 95% solids, suitable for multiple uses including farm and landscape fertilizer and landfill soil reclamation. At present, an agricultural service company takes essentially all the material in bulk, ending the challenge of marketing and distribution.

It's a clean, neat, efficient solution that put to rest a variety of issues related to Class B land application. "Hauling Class B material to farmers' fields was very labor intensive," says Frank DiScuillo Jr., wastewater systems director.

"During biosolids hauling season in spring and fall, we would have crews going 24 hours a day, six and sometimes seven days a week. It was a lot of manpower and a lot of tired people. Now we have much more control over when we run. We have storage. It takes one person on day shift and one on night shift to operate the building."

The program's quality has been noticed in the industry around the state: The authority received a 2018 Beneficial Use of Biosolids Award from the



The City of Lebanon Authority's indirect drying process yields a high-quality Class A biosolids product.

Pennsylvania Water Environment Association (category for plants larger than 5 mgd).

MAJOR UPGRADE

Lebanon, in central Pennsylvania, is home to about 70,000 people and a modest amount of industry, largely dairy and food processors. The Lebanon Authority, separate from the city, handles water and wastewater services.

The wastewater treatment plant (8 mgd design, 5.3 mgd average) uses primary clarification and trickling filter BOD removal, followed by a modified Ludzack-Ettinger secondary process with nitrification and denitrification. After final clarification, the effluent receives denitrification filtration and UV disinfection before discharge to Quittapahilla Creek.

The Class A biosolids process was part of a \$55 million comprehensive plant upgrade started in 2011 and finished three years later. The plant received a new SCADA system, new Ozonia UV disinfection system (SUEZ) and 2.5 MW diesel emergency generator (MTU Onsite Energy) with capacity to operate the entire plant.

The upgrade changed the process to include denitrification. "We had always nitrified, but we didn't denitrify," DiScuillo says. "We now use IFAS (integrated fixed-film activated sludge) media in our bioreactors. Without that, we would have had to build four additional aeration tanks to accom-



An aerial view of the Lebanon Wastewater Treatment Plant.

“For any hiccups we had with the controls or equipment, Komline-Sanderson was quick to respond, either by telephone or by actually showing up here.”

FRANK DISCUILLO JR.



Frank DiScullo Jr., wastewater systems director, pulls a biosolids sample from the end of the drying process for visual inspection.

City of Lebanon (Pennsylvania) Authority Biosolids Program

www.lebanonauthority.org

FOUNDED:
1935

POPULATION SERVED:
70,000

FACILITY FLOWS:
8.0 mgd design, 5.3 mgd average

BIOSOLIDS PROCESS:
Indirect heat drying

BIOSOLIDS VOLUME:
850 dry tons/year

BIOSOLIDS USE:
Given away in bulk for fertilizer

plish nitrification and denitrification in the same tanks.” The upgrade also included deep-bed sand denitrification filters.

The new biosolids building, including the structure, two centrifuges and the dryer (Komline-Sanderson) cost \$11.7 million, of which a Pennsylvania Commonwealth Financing Authority grant covered \$5.5 million.

CHANGING TIMES

The biosolids program has evolved slowly. “In the 1970s we used an old oil tanker to land-apply biosolids,” says Tom Demler, biosolids and industrial pretreatment coordinator. “Then we moved up to an Ag-Gator vehicle with subsurface injection.” After the plant acquired a belt filter press, the authority shifted to liquid and dry manure spreaders for application.

As the community grew and biosolids production increased, the Class B program became burdensome. “We did everything ourselves — the trucking, the spreading, all the calculations and site permitting,” says Cora Shenk, compliance manager.

“We were at the mercy of weather. More neighbors were complaining. Once we got to talk to them, it was OK, but we anticipated more problems coming down the road. Biosolids haulers from other areas were coming into our area, and we had to contend with that, too.”

Storage of biosolids at the plant was problematic, as well. After installing the belt filter press, the authority built a cake storage facility on a concrete slab with a single side and a roof. At times, that facility became full to overflowing. Biosolids would spill onto the asphalt outside; if it rained, the staff had to place hay bales to keep runoff out of the stormwater system.

“We always anticipated going the next step to Class A, where there would be fewer restrictions on the use of the product,” Shenk says. “The question was how to get there.” Composting was rejected for the space and labor required and an uncertain supply of city yard and leaf waste. A small pilot test of lime stabilization proved unsatisfactory.

MAKING THE CHOICE

In 2007, aided by the Gannett Fleming engineering firm and engineer Fred Updegraff, the Lebanon team began visiting treatment facilities to evaluate biosolids dryer technologies. The search soon focused on an indirect drying system from Komline-Sanderson.

The team visited Derry Township and Pottstown, both in Pennsylvania and using the Komline-Sanderson dryer. “When we started to design our building, we flew to a Komline-Sanderson installation in Mason, Ohio,” Shenk says. “Our facility resembles theirs quite a bit.”

As the drying system moved toward completion, Komline-Sanderson trained the Lebanon plant operations team. Company technicians operated the building for the first two weeks, staying on site around the clock. “For any hiccups we had with the controls or equipment, Komline-Sanderson was quick to respond, either by telephone or by actually showing up here,” DiScuillo says.

RUNNING THE PROCESS

The biosolids production process starts in a two-stage, high-rate anaerobic digestion process. In the plant upgrade, floating domes on the 2-million-gallon primary and secondary digesters were replaced. The primary digester received a fixed-dome cover and a linear-motion mixer (Ovivo USA). The secondary digester received a Dystor double-membrane gas holding system (Evoqua Water Technologies) that holds about 240,000 cubic feet of biogas. The gas is used for building and digester heating and to heat the thermal oil used in the biosolids dryer.

From the secondary digester, material at 1.5% to 3% solids is delivered to the centrifuges, which raise the solids content to 21% to 22% and discharge cake into a live hopper where augers keep the material fluidized. A pair of variable-speed progressive cavity pumps (SEEPEx) then deliver the cake to the dryer at a rate manually controlled by a certified operator according to the solids concentration and temperature.

Frank DiScuillo Jr. and Cora Shenk, compliance officer, shown on the top of a digester with the biosolids drying building and product silo in the background.



“Hauling Class B material to farmers’ fields was very labor intensive. ... Now we have much more control over when we run.”

FRANK DISCUILLO JR.



Members of the team at the Lebanon treatment plant include, from left, Jim Lymaster, Dustin Gingrich, Andrew Seibert, Tom Lesher, Mike Behm, Frank DiScuillo Jr., Cora Shenk, Jason Schubert, Tom Demler and Jonathan Brandau.

(continued)

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The paddle dryer can process 2.75 wet tons per hour. Thermal oil flows through two hollow counter-rotating paddles and the dryer shell at temperatures from 300 to 400 degrees F, boiling water out of the biosolids cake. The finished granular material is cooled and then delivered to a storage silo.

KEEPING IT RUNNING

The drying process is highly automated, requiring minimal operator interaction. The dryer operates seven to 10 days per month, running around the clock. Demler works in the biosolids building Monday through Friday from 7 a.m. to 3 p.m. The remaining hours are covered by plant operators on rotating 12-hour shifts.

Team members in addition to Demler who support the biosolids program are Gary Hammer, maintenance manager; his assistant Eric Shearer; certified operators Brian Sherman, Dustin Gingrich, Tom Vonderhey, Jason Schubert, John Schubert, Tim Long, Bill Rhine, Steve Miller, Chris Battistelli and Pat Mullen; mechanics Jim Lymaster, Andrew Seibert and Mike Behm; and Tom Leshner, electrician.

The end product, called CoLA-GRO and with an NPK analysis of 4-2-0, at first found quick acceptance among farmers. The authority delivered it at no charge, but after about a year, it discontinued that practice. At that point, farmers' interest waned; many were not equipped to haul the material themselves.

"Then the local landfill contacted us," DiScuillo recalls. "They were looking for nutrients to apply to their retired cells to help grow grass again. They were picking up 80% to 90% of the biosolids for soil reclamation." Later, landscapers began taking some of the product.

Finally, agricultural service provider Campbell Crops stepped in. The company had been using another community's dried biosolids but preferred CoLA-GRO for its lower dust content and easier spreading. "They currently take all of our product," DiScuillo says.

Looking back, the Lebanon team is pleased with the transition to drying technology. DiScuillo observes: "We are very grateful that our authority board allowed us to go with Class A biosolids." There's no feeling quite like being in control. **tpo**

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Alisha Watson, laboratory supervisor, performs an alkalinity test in the lab.

CoLA-GRO'S CUSTOMER

Campbell Crops has found an attractive fertilizer product in CoLA-GRO dried biosolids from the City of Lebanon (Pennsylvania) Authority.

The company provides agronomic sales and services in three Pennsylvania counties from its home base in Berrysburg. Its product offerings include seed, crop-protection chemicals, and liquid and dry fertilizers, delivered to farms. Services include crop consulting and scouting, soil sampling and nutrient management, along with custom planting, spraying, spreading, tillage and harvesting.

The company applies CoLA-GRO to corn and hay ground using a lime spreader that broadcasts the material about 25 feet to each side. Jonathan Campbell, company founder, says the product has appeal beyond its nutrient value and the fact that he receives it at no charge.

"My wife and I are dairy and steer farmers, so we view human manure the way we view animal manure. Why wouldn't you want to put the nutrients back where they came from?"

"We also want a product with some amount of handling characteristics that's going to spread fairly uniformly. That's something the system at Lebanon has done well. They have a really advanced setup. They've been able to make a product that's nice and granular, handles well and has a reasonably high analysis."

He notes that the state Department of Agriculture treats Class A biosolids such as CoLA-GRO as fertilizers, which unlike manures do not require farmers to create nutrient management plans. "In addition, you have a heat-treated product that's 99.99% pathogen-free," Campbell says. "That gives it a leg up above manure as well."

Then there are farmers who prefer the product to manure because it eliminates odors.

Campbell concludes, "It's really neat being a part of Lebanon's program. Frank DiScuillo Jr. and his team are top-quality operators. I'm fortunate to have a relationship with them."

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1. Digestate or centrate is pumped to an air stripper where carbon dioxide is removed to raise the pH.
2. The NuReSys technology is tailored to deal with each facility's phosphate-related issues.
3. A NuReSys system tank is shown tucked between buildings. The purposes of the process include controlling the clogging of pipes, pumps and centrifuges with struvite.

What the Doctor Orders

PHOSPHATE RECOVERY TECHNOLOGY OFFERED BY SCHWING BIOSSET
CAN BE TAILORED TO MEET EACH FACILITY'S SPECIFIC OPERATING CHALLENGES

By Ted J. Rulseh

Resource recovery is a major trend in wastewater treatment — to the task of cleaning water, facility teams are adding the capture of energy and nutrients.

One increasingly popular type of technology is the capture of phosphorus as struvite, which has market value as a fertilizer additive. One entry in that sector is Schwing Bioset, which offers a phosphate and nitrogen recovery technology under license from Belgium-based NuReSys.

The offering is unique in that it is not necessarily designed to extract revenue from nutrient capture, although that option is available. The process is designed to be tailored to each facility's objectives in dealing with phosphate-related issues.

Besides nutrient recovery, the process has the benefits of preventing buildup of struvite scale in treatment equipment and improving dewaterability in biosolids. Wim Moerman, chief technology officer for NuReSys, and Chuck Wanstrom, director of new business development with Schwing Bioset, talked about the technology in an interview with *Treatment Plant Operator*.

tpo: What led to the creation of this technology?

Moerman: We received an inquiry from an industrial client who was having issues with struvite clogging up his facility's pipework. This condition is common in waters that are high in phosphate after anaerobic treatment. We saw an opportunity to control the process so as to prevent the clogging and get a valuable side product that could be used as a fertilizer.

tpo: How does the NuReSys process differ from other phosphorus recovery technologies on the market?

Moerman: Our clear distinction is that our business model is not necessarily focused on capturing and selling a product. For us, the focus is first of all to control phosphate-related issues. Even if struvite had no fertilizer properties at all, we would still offer this technology, because other features related to struvite control are much bigger economic drivers.

tpo: What would some of those other economic drivers be?

Moerman: One is controlling the clogging of pipes, pumps and centrifuges. Another is improving the process of biological phosphorus removal, or bio-P. Facilities that operate with bio-P do a very good job of absorbing phosphate into the sludge, but a significant part of that is released again during digestion. The return of biosolids filtrate or centrate to the headworks creates an internal phosphorus loop that can diminish the capacity of the plant. But if you put a struvite unit in between, you can break that loop and get better performance on bio-P without having to expand the treatment plant.

tpo: Can a customer who installs a NuReSys process without nutrient recovery capability add that process later?

Moerman: Yes. Our system is quite modular, so if at any time they want to start nutrient recovery, they can do that with the simple add-on of a cyclone and grit washer.

tpo: How does this NuReSys process work?

Moerman: We have a two-stage process. First digestate or centrate is pumped to an air stripper where carbon dioxide is removed to raise the pH to the desired level. Overflow from that stage proceeds to a crystallizer where

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a reagent, commonly magnesium chloride, is added according to the phosphate content of the wastewater stream. In this continuously stirred tank reactor, the magnesium reacts with orthophosphate ions and nitrogen, allowing struvite crystals to form and grow. Struvite prills are removed from the crystallizer bottom.

tpo: Are there specific advantages to a two-stage rather than single-stage process?

Wanstrom: The advantage of using two tanks is first of all that we can have more stable process control because we reduce the number of variables to monitor in each tank. Second, the equipment size is smaller. In the smaller first tank where we control pH, we have lower air and pressure requirements, so we can reduce the power demand from the blowers.

tpo: At what points in the wastewater treatment process can this technology be placed?

Moerman: We can apply our process on water as centrate or filtrate, or on digested sludge. Because we have a stirred crystallizer tank, we can simply adapt the tank size and stirring capacity to work on the water phase or a stickier digestate. On the digestate side, we also offer a hybrid solution. By locating the air stripper in the digestate line, we can manipulate the pH to form microcrystals of struvite with the magnesium that is naturally present. This controlled precipitation prevents accumulation in areas that would cause downtime and maintenance costs.

tpo: What impact does the NuReSys process have on biosolids?

Moerman: In digestate applications, there is potential to increase the dry solids content of the biosolids cake, which can be a major financial advantage. Our experience is that if you see, for example, a 3% gain in dry solids content, half is from the improved dewaterability of the material and half is because you've converted soluble compounds into solid struvite.

tpo: In nutrient recovery applications, how do you assess the value of the struvite?

Moerman: Although struvite has excellent fertilizer properties, it isn't a very good fertilizer by itself, in that it contains equal amounts of nitrogen, phosphorus and magnesium. These are all essential plant nutrients, but they need to be in the right proportion to ensure good growth of crops. We believe struvite should be blended with other fertilizers to get the optimum product mix.

tpo: What types of treatment plants are the best candidates for this technology?

Moerman: If you have a municipal plant operating in bio-P mode, that is where struvite technology is practically a no-brainer in terms of the benefits you can get from it. If the phosphate concentration is high enough, it's beneficial to transform it into struvite, which has an added value.

tpo: How many NuReSys systems are in operation now?

Moerman: In Europe we have eight larger systems, and we are finalizing a ninth large one in Germany.

Wanstrom: We have our first order in the U.S. at the Tres Rios Water Reclamation Facility in Tucson, Arizona, and we're now going through engineering submittals.

tpo: What is your general approach when responding to inquiries from prospects?

Wanstrom: Let's look at each individual plant. What problems are they having? How can we solve them? With the flexibility of our design, we can configure a system in a way that resolves the phosphate or struvite issue. We sit down and define a problem they want to solve and then adapt the technology to do that. **tpo**

Flushing on Autopilot

AUTOMATIC FLUSHING UNITS HELP SAVE LABOR, IMPROVE WATER QUALITY AND PREVENT GROWTH OF PATHOGENS IN A LOUISIANA PARISH WATER DISTRIBUTION SYSTEM

By Mark Magda

In 2005, Hurricane Katrina caused devastation to St. Bernard Parish, southeast of New Orleans, and cut its population from 67,000 to 45,000. With spotty redevelopment and more water capacity than is needed for today's residents, the parish has paid close attention to maintaining drinking water quality.

The Louisiana Department of Health and Hospitals notified the water department that there had been two deaths (one in 2011, another in 2013) related to *Naegleria fowleri*, colloquially known as the brain-eating amoeba in the parish. This free-living, bacteria-eating amoeba is found in warm, unchlorinated freshwater such as ponds, lakes, rivers and hot springs. If contracted by humans, it can cause a deadly infection in the brain. (In the first case, the amoeba was found at a residence and not in the distribution system.)

Jacob Groby, parish superintendent of quality control, worked with the health department to collect water samples from more than 100 points in the distribution network. While the parish had been vigilant in monitoring water quality, officials determined that the sampling protocols were no longer adequate, as some areas reported lower-than-acceptable levels of chlorine and higher levels of ammonia, which can be conducive to biofilm growth.

To help ensure the safety of its water supply, the parish accelerated its water sampling program and installed flushing stations at strategic points in the distribution system that enable automated flushing based on a water-demand model.

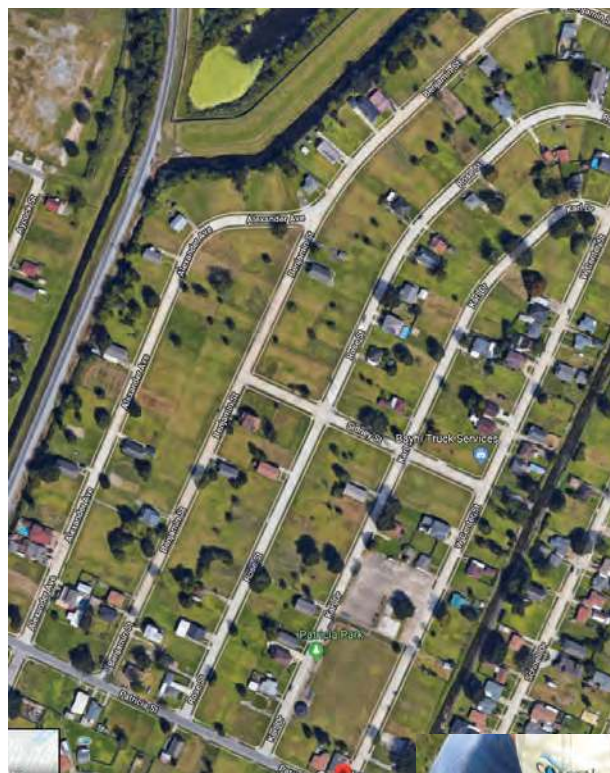
MULTIPARAMETER TESTING

Testing for *Naegleria fowleri* requires analysis in specialized labs such as the Centers for Disease Control and Prevention and the Biological Consulting Services. In addition, monitoring of other factors that exert pressure on water quality need to be checked and addressed.

For example, the parish does additional testing in low-population sections of the distribution system for total chlorine, monochlorine, free ammonia, nitrite, pH, dissolved oxygen and temperature using a Hach SL1000 portable parallel analyzer. Nitrate levels are monitored with a portable Hach Colorimeter II filter photometer.

These units provide quick in-the-field analysis. In addition, each sample is tested for adenosine triphosphate, or ATP. By tracking trends and not just daily results, water operators can change water conditions before they become a problem.

"Because our problem is unique to a surface water system, we had no prior cases to fall back on for experience," Groby says. "We had to rethink the age and time of water in our system. The only logical way to do that is to cause the water to move through the system, identifying the point just before we lose the chlorine residual, causing an increase in nitrification that is favorable for bacteria."



ABOVE: St. Bernard Parish, Louisiana, lost significant population as a result of Hurricane Katrina. This aerial photo shows the spotty residential redevelopment. RIGHT: A technician programs the flushing cycle on one of the Hydro-Guard TAPS units.



FLUSHING TECHNOLOGY

To move water through the system, the parish installed 50 Hydro-Guard TAPS flushing stations, each with a custom 50 mm (2-inch) Singer valve that optimizes flushing for the pipe size, providing the correct velocity to pull freshwater into each zone. This, coupled with a pressure-sus-

taining feature, scours and cleans the pipes, reducing corrosion and improving water quality.

To mitigate the visual impact of an industrial device in front of a home, a valve box is used to conceal and protect the flushing unit. Each location has a custom-poured slab with the discharge tied directly into the subsurface drainage system, helping to avoid unsightly or hazardous conditions. Each unit includes a water sampling port so that on-site clarity can be observed and samples can be taken easily without disrupting the process.

Due to depopulation of the parish, the distribution system has too much water to routinely turn over in 24 hours, as it did before Katrina. With spotty redevelopment, operators cannot turn off sections of the system. Instead, they need to determine where the water flows and how long it takes to get there, in order to effect a flow-pattern change.

To do this, operators have 2,000 reference points for pressure calculations that measure the mean C-factor of residual pressure loss to determine water usage. This allows operators to reduce flushing and water loss in areas when usage is high.

MODELING DEMAND

The parish developed a water-demand model that helps fine-tune flushing times. Daily data is compared with historical data to optimize decision-making. When chlorine (1.0 ppm minimum) begins to fall off, nitrite rises (0.4 to 0.5 ppm maximum) and ATP rises higher than a 10.0 count; a warning point is reached that triggers automatic flushing or heightened testing for the identified section. Once flushing is required, velocity measurement and gallons flushed are recorded for future modeling.

The parish has designed a flush cycle to create a wave action to force-flush 27 miles of the distribution system as needed. "The programming is easy," Groby says. "The hard part is deciding how to set them so that we can

use them in the best manner possible. This is where our water-demand modeling proves valuable."

With regulated flush cycles and perfected velocity at each installation point, freshwater is effectively drawn into areas where water quality falls below acceptable levels. Flushing of every dead end in the system is vital to ensuring the removal of poor water.

The pressure-sustaining feature ensures that minimum upstream pressure is maintained for system needs and that fire flow is available if needed. The programming allows the parish to activate flushing at any

“By using these flushing units, we have been able to use our greatly reduced personnel in a more efficient manner and save on our limited utility resources.”

JACOB GROBY

time; the best time is at night when the demand is low.

This prevents cloudy water, low pressure and standing water complaints associated with conventional high-volume daytime flushing. It also enables distribution of the discharged water over several hours, if necessary, by programming the units to activate for shorter multiple durations throughout the day. "By using these flushing units, we have been able to use our greatly reduced personnel in a more efficient manner and save on our limited utility resources," Groby says.

MODERNIZED PRACTICES

Groby, an advocate of safe water delivery and a speaker on the topic at industry events, observes, "All southern water systems that experience high temperatures (72 degrees F or higher) should be routinely flushing their systems and using the new testing tools for all water-quality indicators to ensure a consistent level of protection and maintain fresher water."

While it is common knowledge that routine flushing is important to maintaining freshwater in a distribution system, outdated practices can cause large losses of water and require many labor hours if performed manually.



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The Hydro-Guard TAPS automated flushing unit uses less water to get the job done and is easily programmable to minimize labor and do much of the work during low-demand night hours. Groby observes, "Our distribution system has shown a marked improvement on most factors, with improved chlorine residuals, lower total trihalomethane and haloacetic acid values, and reduced consumer complaints."

ABOUT THE AUTHOR

Mark Magda (mmagda@muellerwp.com) is global sales manager for Mueller Water Products. **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

The Las Gallinas Valley Reclamation Ponds.

Double Duty

A COMPLEX OF PONDS AND WETLANDS AROUND A CALIFORNIA CLEAN-WATER PLANT PROVIDES A TREATMENT STEP FOR REUSE WATER AND HABITAT FOR BIRDS AND WILDLIFE

By Jeff Smith

Nearly three-fourths of the 400 acres that contain the Las Gallinas (California) Valley Sanitary District's secondary wastewater treatment plant provide habitat for wildlife, recreation for residents and a location for final treatment of reuse water.

A 10-acre saltwater marsh, 40 acres of storage ponds, 20 acres of irrigated landscaping, a 20-acre wildlife marsh and 200 acres of irrigated pasture create the multipurpose area between the 18 mgd (design) treatment facility and its outfall, Miller Creek, which leads to the San Francisco Bay.

Driven by the need to meet a nondischarge mandate between May and November, the district, in San Rafael, constructed the reclamation area over seven years. The project expanded the plant capacity by 2.9 mgd and gave operators a functional option during that time of year.

MULTIPLE TEXTURES

An ideal habitat and refuge for wildlife and birds was created with shoreline textures such as rocky segments, shallowly inundated areas for marsh plants, transitional areas with drier upland vegetation, and islands populated with trees and brush. The Audubon Society has cataloged more than 250 species of migratory and nonmigratory birds. Raptors, white-tailed kites, plovers, sandpipers, ducks and geese are just some of the birds that visit.

"It's a really popular destination for bird-watchers," says Mel Liebmann, plant manager. "And we've got otters, coyotes, black-tailed deer and lots of other wildlife that call this place home."

Five miles of public walking trails and gravel roads meander along the levee banks and berms of the pond areas and provide unobstructed views of the wetlands, San Pablo Bay and distant hills and mountain peaks.

EASY TO ENTER

Public access during daylight requires no permits or sign-ins. Benches provide rest stops for hikers and bikers. Parking is provided near the entrance; restrooms and recycling cans are nearby. The trails connect to more than 350 miles of the planned 500-mile Bay Trail, a recreational corridor that will encircle San Francisco Bay and San Pablo Bay when completed.

During nondischarge months, a farmer uses some effluent to irrigate a leased organic hay pasture. Some is stored in the ponds to accelerate evaporation and to supplement flow when recycled water demand peaks. The balance is pumped to neighboring water districts for landscape irrigation, car washes and other uses. At completion of a major upgrade, recycled water capacity will increase from 1.4 mgd to 5.4 mgd.

“It’s a really popular destination for bird-watchers. And we’ve got otters, coyotes, black-tailed deer and lots of other wildlife that call this place home.”

MEL LIEBMANN

"We treat a portion of our effluent to Title 22 tertiary standards with ultrafiltration membrane filters and UV disinfection," says Joshua Binder, operations and maintenance supervisor. "Then we pump it a little more than 5 miles to the North Marin Water District."

Two 75 hp Weir Floway vertical turbine pumps (one lead and one standby) deliver the effluent through a 12-inch pipe to a 500,000-gallon storage tank. The pumps are controlled by a submersible pressure transducer in the distribution wet well and an ultrasonic level transmitter in the receiving reservoir. Once the recycled water storage tank reaches full capacity, the pumps shut down.

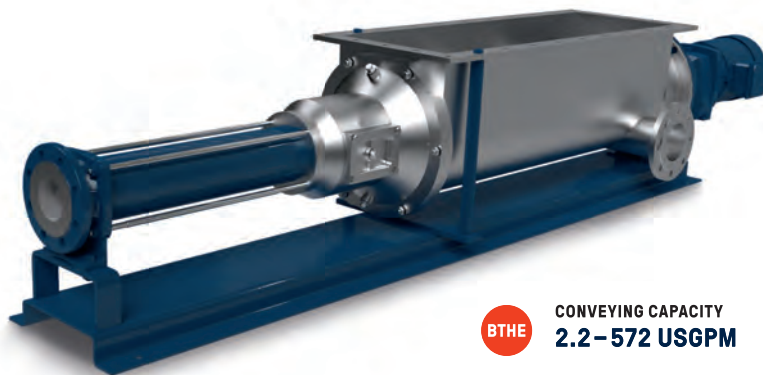
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The staff at the Las Gallinas Sanitary District includes, from left, Brian Exberger, Norman Rogers, Ralph Loveless, Greg Pease, Chris Gill, Mike Cortez, Rob Fernandes, Bob Buchholz, Chris Campbell, Joshua Binder, Kristina Kempf, Teri Lerch, Irene Huang, Manuel Cardenas, Mel Liebmann, Mike Prinz, Robert Ruiz and Sahar Golshani.



SUSTAINABLE ENERGY

Alternative fuels and affordable technologies save energy and help the district meet its goal of energy independence. A biogas energy recovery system provides fuel for some district vehicles. Two photovoltaic systems generate 850,000 kWh per year for plant use.

Vegetation maintenance of the wetland includes removal of invasive plants, such as water primrose, bulrush and other overgrown floating weeds. A recent project dredged a small portion of Miller Creek to protect the plant's outfall from sediment buildup. The affected levee banks have since been planted with a mix of native species to stabilize the slope and add habitat.

Community outreach and education are important parts to the district, Liebmann says. Tours of the facility are promoted to advise the public on

environmental and health issues related to sewers and wastewater treatment. School outreach includes field trips, class presentations and activities to promote special events, such as Wetlands Day.

A booth display at business conferences is significant, too. The district takes part in the Public Education Committee, a group of five county wastewater agencies that plan, promote and coordinate educational activities. **tpo**













Share Your Ideas

TPO welcomes news about interesting features of your facility's grounds, signage or buildings for future articles in the PlantScapes column. **Send your ideas to editor @tpomag.com or call 877-953-3301.**

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		✓	✓		✓	✓	✓							Grit Pumps
			✓				✓						✓	Chopper Pumps, Hydraulic Mixing Systems
		✓	✓		✓									

Tapping a New Well

AN ILLINOIS CITY STRUGGLED TO FIND QUALIFIED WATER TREATMENT PLANT TEAM MEMBERS. AN APPRENTICESHIP PROGRAM HAS HAD A MAJOR IMPACT.

By Sandra Buettner

The Illinois city of Evanston developed an apprenticeship program in 2009 to train applicants for its water treatment facility because it was difficult to find qualified workers.

"We were having a challenge finding people who were knowledgeable in water main and sewer main repair and had experience working in a water treatment facility," says David Stoneback, Public Works director. "We also noticed that applicants did not have the education and training in the skills they needed for these positions."

The apprentice program has been successful: 60% of those completing the program are now employed by Evanston or neighboring cities, most of them in Evanston.

LEARN AND EARN

The Evanston Water Treatment Plant on the shore of Lake Michigan can supply up to 108 mgd of drinking water. The service area includes Evanston and five other communities near Chicago, with a combined population 365,000. The water distribution system includes 157 miles of water main.

Applicants for the Water Worker I apprentice program must have a high school degree or GED and be at least 18 years old. They also must have a good driving record, obtain a commercial driver's license and be residents of Evanston.

The city employs a prescreening process using Kenexa Prove It software that tests the applicants on math, logical reasoning and communication skills. If they pass, they go through an interview process and must take a physical test that includes practical tasks such as opening valves, carrying cinder blocks and shoveling stones.

Once they complete those requirements, they train in four areas, rotating between distribution, sewers, pumping and filtration. They work in each area for six months for a total apprenticeship period of two years. During that time, they work along-



Pictured are three current apprentices in Evanston, Illinois, and the seven apprentices who have found full-time positions with the city. Front, from left, Dante Henley, Curtis Evans, Pablo Sarinana, Joe Wilks, Adan Carrillo and Mark McIntosh; back row, Miguel Garduno, Eric Liddell and Kevin Villigas, the current apprentices; and Bryan Evans.



Mark McIntosh came to the internship program with a background in the construction industry and has quickly worked his way up to crew leader.

side crews while supervisors monitor and review their performance. Hourly pay is \$11 for Level 1, \$13 for Level 2 and \$15 for Level 3.

Upon completing the program, apprentices may apply for openings at the water treatment plant. Most apply for water worker I, II and III jobs and for Public Works maintenance worker I and II. The majority are hired at the water worker I level.

TRAIN TO RETAIN

Evanston has a residency requirement for apprentices for two reasons. "First, our priority is to keep our residents, and therefore our tax base, employed in good jobs," Stoneback says. "Second, it gives us the luxury of training our workers in a qualified, proper way on the equipment and processes at our facility."

Newly minted apprentices are not guaranteed a job in Evanston, and they are free to apply for positions in other communities. Some have gone on to work in neighboring cities but have returned when an opening at the Evanston water plant became available.

"We also require our apprentices to obtain their CDL for use in the distribution and sewer areas," Stoneback says. "That also makes them more desirable and hireable when they are pursuing positions outside the city. It's

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Depend on the Leader

“One star apprentice, Mark McIntosh, who already was a seasoned worker in the construction industry, went through the program. ... Upon completion, he was hired as a water worker III. After only five years, he became a crew leader, just one step away from supervisor.”

DAVID STONEBACK

a leg up for them. The more advantages and skills they have, the more it will ensure that they secure a job at our water plant or in a neighboring community.”

SUCCESS STORIES

The apprentice program is promoted through the city website and public outreach. City workers go to group meetings, churches and high schools to spread the word. A city advocate employee gets the word out to a variety of organizations.

“One star apprentice, Mark McIntosh, who already was a seasoned worker in the construction industry, went through the program,” Stoneback says. “Due to his construction experience, he caught on fast and completed the program, performing great work. Upon completion, he was hired as a water worker III. After only five years, he became a crew leader, just one step away from supervisor.”

Based on the program’s success, the city has created a new apprentice program, Water Plant Operator, that takes just 12 months to complete. Additionally, the Public Works department has established an apprentice program that mirrors the Water Worker I two-year program. **tpo**



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WAYNE RAMEY TURNED A SUCCESSFUL CAREER IN OPERATION INTO A BUSINESS PROVIDING CONTRACT OPERATIONS TO TREATMENT FACILITIES ACROSS COLORADO

STORY: **Steve Frank**

PHOTOGRAPHY: **Carl Scofield**

A major turning point in Wayne Ramey's career came at his department Christmas party in 1988. His boss, the Public Works director, asked him if he wanted to be superintendent of the 1.9 mgd wastewater treatment plant in Louisville, Colorado.

He was nervous about taking the job. He wasn't sure his crew would support him because he'd just earned his Class A (highest) wastewater operator license earlier that year. And he'd only started at Louisville in March 1987.

The crew said they'd back him, so he took the job. He had learned computer skills from a teammate, and he had learned to run the lab tests for process control and NPDES permit-required analysis for the state. "I became very proficient in the lab," Ramey recalls.

Since then, he has become proficient in many things related to the clean-water profession. As owner of Ramey Environmental Compliance, he multiplies his expertise through operations and maintenance contracts with water and wastewater plants all over Colorado. His field crew brings more than 40 years of experience to bear for clients.

COLORADO DREAMING

Robert Wayne Ramey grew up in Blue Ash, Ohio, a suburb of Cincinnati. He graduated from high school in 1974 and joined his brother in Arizona to work construction on the Central Ari-

Wayne Ramey



The crew at Ramey Environmental Company's Main Northern location includes, from left, Debbie Price, Cassie Ali, Bob Ehlers, Miki Drieth, Linda Ramey, Lisbeth Reign, Scott Eilert, Big Carl, Mike Murphy, Wayne Ramey, Wayne Cast, Cathy Montoya, Lanette Feist, Sherry Cass, Dave Kasper and Randy Meyer.

zona Project. Hired in October 1976, he got laid off in May 1978. So he put his belongings in his 1967 Chevy Impala SS and headed for Denver.

He got a job at a Denver chemical plant in 1979, where he was exposed to his first laboratory work. He heard about the new water and wastewater school that had started at nearby Red Rocks Community College and signed up for night classes. In October 1983, he earned both his Colorado Water Works operator and wastewater operator D licenses. He applied at plants all around Denver, but nobody was hiring D operators without experience.

"I figured I would have to go to a smaller town to get experience," he says. In the meantime, he had made it to Colorado, which had been his goal when he left Ohio: "I wanted to be in Colorado because I wanted to fish and hike."

He and his wife, Linda, moved to Cedaredge in the western part of the state in 1985. "The mayor interviewed me at our home in Denver and hired me," he says. He worked at the water treatment plant and the wastewater plant (a lagoon system) and as an emergency medical technician for the town.

MORE EXPERIENCE

The water treatment plant introduced Ramey to water as a career. He spent a lot of time repairing the pipes that brought source water to the plant and doing other maintenance and repairs. While he liked that work, he wanted to do more with wastewater, and he realized he would have to move again to get more experience.

He earned his wastewater C license in Cedaredge. In March 1987, Louisville hired him as an operator trainee at the wastewater treatment plant. Soon after he became superintendent in 1988, his boss, Tom Phare, Public Works director, walked in one afternoon holding a power bill for \$8,000. Ramey reminded him that the plant had undergone a recent upgrade and had added new 200 hp (nonturbo) blowers that used substantially more power than the old 50 hp blowers.

"Those new blowers drove the power bill from \$2,000 a month up to the \$8,000 a month; he was unhappy about," Ramey says. His boss said power costs had to come down. Ramey thought a minute, then walked over and turned the blowers off. Two hours later, he turned them back on. Walking around the plant, he saw no damage or upset conditions.

He began experimenting with blower cycling: two hours on, two hours off. He continued that routine for about two months and then tried a four-hour shutdown interval, keeping performance data and charting the results.



The crew at the West office/shop in Arvada includes, from left, Ted Greenman, Charles Jones, Darrin Dill, Jeff LeBeck, Ismael Gomez and Dave Moore.

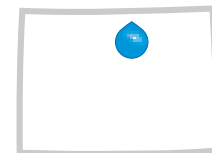
Wayne Ramey Frederick, Colorado

POSITION:
President and owner, Ramey
Environmental Compliance

EXPERIENCE:
35 years in water/wastewater
industry

CERTIFICATIONS:
Class A water, wastewater and
industrial wastewater operator;
Grade IV collections; Grade IV
distribution operator

EDUCATION:
Graduate, Red Rocks Community
College water/wastewater
operator course



MEMBERSHIPS:
Water Environment Federation,
Rocky Mountain Water Environ-
ment Association, American
Water Works Association, Rocky
Mountain Section AWWA,
Colorado Rural Water Associa-
tion, Colorado Special Districts
Association

GOALS:
Never let "good enough" be the
standard; provide the best service
cost-effectively

Wayne Ramey believes in lifelong learning. He takes a hands-on approach to dealing with issues at customers' facilities.

“I didn't pick a trout to be in my company's logo by accident. The trout is there because trout are pollutant sensitive, and we have to work hard to keep their environment healthy.”

WAYNE RAMEY

“That worked fine, too,” he says. “I was still getting *Nocardia*, but my clarifier was clearer. I was also wasting less sludge.” Still, the power demand charge was higher than he wanted.

“If you use a lot of juice at once, you get nailed,” he says. Eventually, though, the power bill came down as he learned how often to run the blowers and not to energize any other equipment while starting them. He talked to the blower manufacturer and found he could stop and restart the blowers up to six times a day without damaging them. That's when he and the crew designed their first homemade SCADA system.

He had an electrician wire in timers to shut the blowers down and restart them automatically on a schedule. If the blowers failed to restart, he got an alarm. He lived close enough to the plant to come in and manually restart them. They also installed dissolved oxygen and ORP meters and tracked the process through R:BASE data management software.

After a year of monitoring manually, they installed soft starts on the blowers and used the data to turn the blowers on and off based on the meter inputs. “The plant ran well, and we got good permit compliance numbers,” Ramey says.

GETTING CONNECTED

As he grew in the profession, Ramey became more involved with professional wastewater organizations including what is now the Rocky Mountain Water Environment Association. He attended classes offered through the Professional Wastewater Operators Division and presented papers on his blower cycling experiment at the association's annual conference.

Regulators and fellow operators showed great interest. He assumed leadership of the Professional Wastewater Operators Division in 1992 and became a member of the Rocky Mountain Water Environment Association executive committee. He was president of the association for 2000-01. Along the way, he received the Select Society of Sanitary Sludge Shovelers award and the Water Environment Federation's William D. Hatfield and Arthur Sidney Bedell awards.

In 1991, a Colorado Department of Public Health and Environment field engineer asked him to submit an application for his plant to U.S. EPA Region 8 nominating it for the Outstanding Operations and Maintenance Award. “We didn't win, but we got noticed,” Ramey says. “I was determined we'd win the next year.”

In 1992, the Louisville plant won the Region 8 Excellence Award and the national EPA Outstanding Operations and Maintenance Award for a small, advanced facility. Through the years, Ramey built a team of dedicated operators and reduced operating costs. The results showed.

ONWARD AND UPWARD

By 1994, it was time to move again, and his next stop was a few miles away in Broomfield, as Wastewater Treatment Division superintendent. He began by getting the staff to do things they hadn't done before. “I pointed to an aeration basin and asked how long since it had been cleaned,” he says. “Nobody knew. So I told them to take it out of service and clean it.” His point was to get team members to stretch themselves. The aeration basin had accumulated a 4-foot depth of shells from dead snails that had sloughed off the trickling filter.



LUCKY BOY

If you talk with Wayne Ramey for more than 15 or 20 minutes, you'll likely hear a fishing story. “We were so lucky growing up,” Ramey says. “My uncle Joe taught my brother and me how to fish.”

He recalls one day at school when he and his brother Buck heard their names called on the loudspeaker. He thought, “Oh, gosh, what did I do now?” He and Buck went to the office and there stood Joe, who told the principal he was there to take them to a dental appointment their mother had forgotten about.

They followed him out to the car, and when they saw their bedrolls and fishing gear in the back, they knew they were in for fun. Uncle Joe taught them what fish were running and where and at what times of the year. “We'd build a fishing camp up on the riverbank,” Ramey says. “We'd fish all day and eat bologna sandwiches for dinner.”

His love of the outdoors eventually brought him to Colorado: He wanted to be outdoors to hike and fish. He and his wife, Linda, have hiked all over Colorado and other places in the West. “This is what I wanted. I've taught my sons, Tony and Joe, to love it, too.”

In 1998, the city's industrial pretreatment program won first place in the EPA national competition. In 1999 Ramey was promoted to deputy Public Works director.

While superintendent at Broomfield, Ramey met Bob Alberts, who then operated the wastewater treatment plant in Fort Lupton and held operations contracts with several other small Colorado facilities. The chance meeting began a partnership in which the two did contract water and wastewater operations in Colorado.



Mike Murphy takes an effluent sample to check the pH in the UV disinfection treatment phase (TrojanUV3000Plus).

Ramey formed Ramey Environmental Compliance in 1997 while still working for Broomfield. In August 2001, he resigned to run his company full time. He had to borrow from his sons' college fund to get his business going. They said that was OK, as long as he spent more time with them.

STRESS ON TRAINING

In the early days of operating his business, he says, "Fear of failure was a huge motivator." He plowed profits back into the business and hired qualified people to keep moving the company forward. An important part of having qualified people is training staff. What would normally be a one-day training event is held on two days. Half the field staff comes the first day and the other half come the second, so there's always coverage for clients.

The training covers much more than just what one might expect to see on an operator's exam. Ramey will hire an electrical contractor, for exam-

ple, to provide electrical training so field staff can safely perform basic tasks involving electricity. The company might provide confined-space-entry training.

The emphasis on training is more than just words. The company pays field staff based on qualifications: An operator with a Class A water and a Class A wastewater license earns more than one with Class A and Class B licenses. "We award two scholarships each year to help operators advance their skills and qualifications," Ramey notes. The scholarships can be used to attend a water or wastewater fundamentals school or an advanced school, depending on the employee's current license level.

GOING TO MARKET

Ramey tracks operations and maintenance work by computer so he can show his clients who did what work when and what services they're getting for their money. His trucks all have a GPS so he can use the data to track costs, price service proposals and schedule maintenance. "Nothing in Colorado is next door to anything else," he says.

He has adapted his marketing to his working conditions. The firm exhibits at events such as annual meetings of the Colorado Rural Water Association, the Special Districts Association of Colorado, the Colorado Municipal League, the Rocky Mountain Section of the American Water Works Association and the Rocky Mountain Water Environment Association.

"The little chocolate toilets we give out there are a big hit," Ramey says. "They help get people to stop and talk with us." He chats with attendees, gives them his business card and a chocolate toilet, and maybe he'll get a call six months later. He also advertises in association magazines, but his most effective marketing is when someone calls and asks what he thinks about a certain problem.

"I'll go see them, see what their problem is, and I usually don't charge them," he says. Sometimes he can fix the problem on the spot; other times it takes more time, effort and money. He has even made free "house calls" with a piece of major equipment like a vacuum truck. Because he puts effort into establishing trust and understanding clients' issues, a contract often results later on.

"Sometimes they just need advice or reassurance, sometimes they need us to train their people to do something, and sometimes they need us to come in and take control of a situation they can't handle themselves," Ramey says.

With 13 double A operators and 45 employees, Ramey Environmental Compliance is large enough to take on most challenges, although Ramey says, "It's not how big you are but how good you are that counts." The company has won numerous awards for the facilities it operates. In 2018, Ramey was named a Water Environment Federation Fellow: "It feels great to be counted among our profession's giants."

ALWAYS LEARNING

Ramey believes in constantly learning new things, and he gets his hands dirty while doing it. When something goes wrong at a client's facility, Ramey grabs a less experienced operator and says, "Come on, let's go learn something." Sometimes he may bring two people when only one is needed so both can be exposed to something less-experienced employees haven't seen. He believes these are good ways for less-experienced people to learn something new, get the job done and grow their confidence and abilities.

"I didn't pick a trout to be in my company's logo by accident," Ramey says. "The trout is there because trout are pollutant sensitive, and we have to work hard to keep their environment healthy. The trout represents what we have to strive for in our job of producing good drinking water, cleaning wastewater and running effective collections and distribution systems. My whole thing is water and wastewater."

I'm a get-it-done kind of guy." **tpo**

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PFOS: What Are the Risks?

SUBSTANCES USED IN STAIN REPELLENTS, FIREFIGHTING CHEMICALS AND OTHER PRODUCTS ARE RAISING CONCERNS ABOUT THE SAFETY OF LAND-APPLYING BIOSOLIDS

By Jim Force

Yes. No. Maybe. Depends on the circumstances. Requires more research. Like so many questions about contaminants in the environment, the issue of perfluorooctane sulfonate, or PFOS, in biosolids raises both concerns and unanswered questions. The concern is whether PFOS, which makes its way into biosolids by way of wastewater treatment, could be taken up by crops grown in biosolids-augmented soils.

PFOS has been used for years as a stain repellent in carpet and clothing, and in firefighting foams and industrial processes. Like other contaminants, PFOS often ends up in wastewater and ultimately in biosolids.

It's an emerging issue that has led at least two states to develop regulations halting biosolids land application. In March, the Maine Department of Environmental Protection issued a moratorium on the practice. In response, Ned Beecher, executive director of the North East Biosolids & Residuals Association, states, "Research and data to date do not indicate that PFOS in typical biosolids is a concern for drinking-water quality or human health."

Similar restrictions, if adopted around the country, could have a serious impact on biosolids management, since an estimated 60% of municipal biosolids are land-applied. At the same time, industry professionals are urging caution. A webinar by the Water Environment Federation pointed out that PFOS in the environment is declining as manufacturers limit or eliminate its use. The presentation suggested that well-managed soil may be the best destination for PFOS, as it can be broken down in the natural cycle.

One researcher following this issue is Matt Simcik, Ph.D., an associate professor in the Division of Environmental Health Sciences at the University of Minnesota. His research broadly focuses on how and why organic pollutants end up in the air and water, especially in the Great Lakes region. His areas of expertise include the fate and transport of trace organic pollutants, especially per- and polyfluoroalkyl substances, or PFAS.

He shared his perspectives on PFOS in an interview with *Treatment Plant Operator*. The magazine welcomes other information and viewpoints on this subject from scientists, industry professionals and others with expertise.

tpo: Let's sort out the acronyms — PFAS, PFOS and others.

Simcik: Originally, folks referred to perfluorochemicals, or PFCs. Now the accepted term is PFAS, which means per- and polyfluoroalkyl substances. It's a catchall term. PFOS is specific to perfluorooctane sulfonate, the most commonly detected of the PFAS in the environment.

“When products like clothing in which PFOS is present are washed, the contaminant ends up in the waste stream.”

MATT SIMCIK, PH.D.

tpo: Where do these contaminants come from, and how do they get into sewers?

Simcik: They were used extensively in products such as stain and water protectants, nonstick cookware, food wrappers and coated paper. When products like clothing in which PFOS is present are washed, the contaminant ends up in the waste stream. Furthermore, because everyone has these in their systems from environmental exposure, we eliminate them through feces and urine.

tpo: How prevalent are these substances in the environment?

Simcik: They are what we call ubiquitous, meaning they are everywhere.

tpo: What are the potential health impacts of these substances?

Simcik: That is not my area of study, but not many effects have been found in workers exposed to the manufacture of these compounds. Many studies have linked PFAS to cancer, decreased efficacy of vaccines and attention deficit hyperactivity disorder. My greatest health concern is on developing fetuses. We know these compounds affect the lipid levels in our blood. Lipids are very important in fetal development.

tpo: Describe the concerns that wastewater and biosolids operations have or should have about these substances.

Simcik: These compounds are not as hydrophobic as contaminants operators may be used to, such as PCBs (polychlorinated biphenyls). In other words, they don't stick to particles. They like to go back and forth between the dissolved and particulate phases. The greatest issue with biosolids is land application. These compounds have been shown to accumulate in crops grown on fields where biosolids have been applied. Another concern is leaching to groundwater and ultimately to drinking water.

tpo: Some states are passing regulations affecting these compounds. Are they warranted?

Simcik: I think so. These compounds never break down. Anything that persistent is of concern.

tpo: If biosolids are not land-applied, what is the best way to manage the material?

Simcik: Landfills are not the answer because the compounds end up in the leachate, and that can no longer be spread on land or stored in basins. It has to be re-treated at a wastewater plant, and nobody wants that. Incinerators may be a good solution. We often refer to these compounds as chemical rebar because they don't break down. Successful destruction is temperature dependent.

tpo: Since there are very few incinerators still operating and if landfills are not the best solution, how can land application be made safer?

Simcik: We've been working on remediation techniques that we're going

to try applying to wastewater treatment. We're collaborating with the Metropolitan Wastewater Treatment Plant in St. Paul, adding cationic polymers as coagulants to see if we can get the compounds to stick to the solids phase. We're using a slip stream, adding polymer coagulants before the final clarifiers. The goal is to eliminate the compounds from the effluent and drive them into the sludge, where they will be irreversibly bound and not available for uptake.

tpo: Do you have any indications of results?

Simcik: We're still a long ways from understanding the issue. When you work with PFCs, you find out that they're really weird. They can come down and then they can burp back up. Our next step will be to add the polymer to the activated sludge basin ahead of the final clarifier and see if the coagulants will bind with the PFAS and end up in the sludge. It appears from our lab work that we may be able to make them irreversibly bound to the biosolids and not available for leaching or uptake.

tpo: What is your expectation for future developments?

Simcik: Because municipal wastewater treatment plants are a bottleneck in the distribution of these compounds, they are one of the best places to remove them from circulation. We can't eliminate them from the broader environment. If we can drive them into biosolids and keep them from becoming available to plants or groundwater, that would be the best of both worlds. The ultimate goal is to destroy them, but that is very difficult. Saving that, the next best thing is to tie them up where they can't do any harm. **tpo**

“The goal is to eliminate the compounds from the effluent and drive them into the sludge, where they will be irreversibly bound and not available for uptake.”

MATT SIMCIK, PH.D.

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WEF comments on PFAS and biosolids

The Water Environment Federation issued a statement in May about concerns related to PFAS and land application of biosolids.

“For the past several years, concerns about PFAS (per- and polyfluoroalkyl substances) have been a high-profile issue for the water sector, media and public. PFAS are a group of man-made chemicals that includes PFOA, PFOS and GenX. PFAS have been manufactured and used in a variety of industries, and although they have been phased out for many applications, they are still persistent in the environment. There is evidence that exposure to PFAS can lead to adverse human health effects, although much more research is needed.

“Concerns about PFAS have primarily focused on its presence in drinking water. However, some attention is turning to biosolids. There are rare cases where heavy industrial discharges of PFAS have impacted biosolids, and state environmental agencies are beginning to evaluate regulations for biosolids. WEF wants its members to be aware of these concerns, know that WEF is being proactive, and utilize facts and science-based communications resources as needed.”

WEF's position

Biosolids production recovers valuable nutrients, organic matter and energy from treated wastewater — it is a safe and innovative

process that lowers costs for consumers, improves our environment, conserves natural resources and supports our nation's agricultural communities.

WEF is closely following concerns about PFAS and continuing to rely on the current science to inform its response. That science shows no significant health risk from human exposure to biosolids and that contamination of surface water or groundwater from biosolids is very unlikely. WEF urges federal and state regulators to focus on stopping these chemicals at their source through appropriate controls on industrial and other uses — before they enter the sewer system or the environment — and to consider the impacts of new policies or laws on utilities. WEF is committed to understanding more about PFAS and supports further research.

WEF is working closely with the National Association of Clean Water Agencies, The Water Research Foundation, WEF Member Associations and regional biosolids organizations to track concerns, provide facts and science, and support an appropriate regulatory response. WEF is also in communication with the U.S. EPA about biosolids.

WEF plans to continue to expand biosolids advocacy, communications, and research, and offering more resources for the water sector. For more information, contact Patrick Dube, biosolids program manager, at pdube@wef.org or Travis Loop, senior director of Communications and Public Outreach, at tloop@wef.org; or visit www.wef.org and search “PFAS.”

Headworks and Biosolids Management

By Craig Mandli

Biosolids Handling/Hauling/Disposal/Application

BOERGER BLUELINE ROTARY LOBE PUMP

The BLUEline Rotary Lobe Pump from Boerger is a self-priming, valveless, positive displacement pump used to convey viscous and abrasive materials. There are 21 pump models in six series with pulsation-free operation, fully reversible rotation, dry-run capabilities and flow rates up to 7,500 gpm. The pumps are stable and wear-resistant with a maintenance-in-place design that allows for all wetted parts to be easily replaced through the front cover without the removal of pipe or drive systems. **612-435-7300; www.boerger.com**



BLUEline Rotary Lobe Pump from Boerger



Robuschi RB-DV rotary lobe blower from Gardner Denver

GARDNER DENVER ROBUSCHI RB-DV

The Robuschi RB-DV deep-vacuum rotary lobe blower from Gardner Denver is capable of running continuously at 27 inches Hg, with free airflow ranges from 494 to 6,676 cfm. Its air injection mechanism offers a cooler running, more fuel-efficient blower. Its design offers high overhung load capacity, meaning it will be up to the task of handling the frame flex and forces when positioning the truck. With no wearing parts and dry operating technology, it is easy on the maintenance bill. **866-428-4890; www.gardnerdenver.com/robuschi**

HYDRA-TECH PUMPS S6VAL

The S6VAL 6-inch hydraulic submersible wastewater pump from Hydra-Tech Pumps is lightweight, compact and designed to pass large solids and stringy materials. The top-discharge pump is designed to fit through a 21-inch manhole to be convenient to use for sewer bypass jobs. It handles hydraulic inputs up to 30 gpm at pressures to 3,000 psi and will continue to move water at heads up to 70 feet. Beyond water, it can handle semisolids measuring up to 5 inches. The pump volute is cast aluminum, and the impeller is stainless steel. The lighter aluminum aids in preventing lifting problems and injuries. Combined with HT50 to HT75 power units, it is capable of flows up to 1,600 gpm. **570-645-3779; www.hydra-tech.com**



S6VAL submersible wastewater pump from Hydra-Tech Pumps



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**

KATIONX CORP. KCD-X

KCD-X is a six-in-one lift station treatment that is non-toxic and environmentally safe, giving it an NFPA rating of 0/1/0/0. It removes odors, eliminates toxic gases, conditions and loosens sludge mats, controls corrosion, pre-conditions treatment plant influent, and maintains microbial health in treatment facilities. It can also be used to kill odor and consolidate surface spills resulting from lift station overflows. It has proven effective where tough mats and persistent sewage smells cause local government embarrassment and frustration driven by community complaints. **863-937-3040; www.kationx.com**



KCD-X from Kationx Corp.



Longopac Fill continuous bag system from Paxxo

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**

Biosolids Heater/Dryer/Thickener

SUEZ WATER TECHNOLOGIES & SOLUTIONS STC SYSTEM

The STC System low-temperature thermal dryer from SUEZ Water Technologies & Solutions enables an operator to reduce biosolids and recover a resource as fertilizer or fuel, using an energy-efficient belt dryer. It is fully automatic and offers efficient odor control and easy operation and maintenance. It is intrinsically safe, thanks to low temperature and dust-free operation. The efficient and flexible unit uses hot water from 158 to 194 degrees F and can be fully supplied by waste heat, with a wide range of primary heat sources possible. It produces Class A biosolids at 90% dry solids, to be recycled as fertilizer or as solid fuel. **www.suezwatertechnologies.com**



STC System dryer from SUEZ Water Technologies & Solutions

Centrifuge/Separator

CENTRISYS/CNP CENTRIFUGE

Centrifuges from Centrisys/CNP apply 3,000 g (G-force) to dewater solids while accelerating the liquid end sedimentation of fine particles, resulting in drier solids and cleaner discharge water, which may reduce disposal costs. With a hydraulic back drive system, a centrifuge delivers high torque and low horsepower to reduce moisture in an energy-efficient manner. The three-phase centrifuge divides feed into solids, water and FOG from the grease trap or other biodiesel production sources. Inside the centrifuge, lighter oil separates from the water and discharges through an adjustable nozzle, while the heavier solids dewater and discharge from the opposite end. Centrifuges are available with flow rates of 5 to 700 gpm and can be a stationary skid-mounted unit or a mobile trailer. **262-654-6006; www.centrisys.com**



Centrifuges from Centrisys/CNP

Chemical/Polymer Feeding Equipment



ADIN CO2 injection system from AdEdge Water Technologies

ADEGE WATER TECHNOLOGIES ADIN CO2

The ADIN CO2 injection system from AdEdge Water Technologies is an alternative to other methods of alkalinity control and pH reduction. It's ideal for the reduction of alkalinity prior to primary treatment components for optimizing contaminant

removal. The system uses carbon dioxide gas, which when released in water, forms carbonic acid — a weak acid

that immediately reacts with alkalis to reduce pH. As a gas, carbon dioxide is inert, noncorrosive and easy to store. With the use of the included monitoring equipment and injector, the control panel can be used in several different configurations to reduce pH. The automatic systems use a pH probe downstream of the system to regulate the amount of carbon dioxide being injected into the water. An injector and mixer are provided with all systems for optimal injection. A manifold and regulators are provided for carbon dioxide cylinders. **866-323-3343; www.adedgetechnologies.com**

CLEAN WATERS POLY-SOLV 02

Designed for flushing liquid/emulsion polymer blending units, the Poly-Solv 02 polymer blending unit system flush from Clean Waters is a blend of mineral oils, detergents and surfactants that helps keep a blending unit performing at peak capacity. Over time polymer will leave deposits in blending units' internal components. These deposits will inhibit pumping and mixing, reducing the effectiveness of the polymer and costing you more money. Benefits of incorporating this system flush into a blending unit preventive maintenance program include reduced maintenance, less downtime, more effective polymer mixing (reducing polymer consumption), easier startup and fewer pumping issues. It also lubricates and extends the life of wear items in polymer feed pumps. **315-482-3787; www.cleanwaters.us**



Poly-Solv 02 system flush from Clean Waters

FORCE FLOW TOTE BIN SCALE

The Tote Bin Scale from Force Flow allows plant operators to accurately monitor the amount of polymer being fed from IBC-type totes for dewatering. Simply place the tote on the platform and monitoring begins, as there is nothing to install inside the tote. Monitoring systems prevent costly overfeed conditions and enable the documentation of the actual amount fed, which keeps the plant in compliance with federal and state reporting requirements. Users can remotely monitor from SCADA or PLC. The unit is available with the SOLO G2 digital display or with the advanced Wizard 4000 Chemical Inventory Monitoring System. **800-893-6723; www.forceflow.com**



Tote Bin Scale from Force Flow

PULSAFEEDER PULSABLEND

PULSABlend polymer makedown systems from Pulsafeeder are available in three control options — automatic, manual or dry contact. All systems feature a three-step static blending system that provides dilution without harming the polymer chains. With a wide range of dilution utilizing three different water flow rates to choose from (0 to 5, 5 to 10, and 10-plus gpm), they are custom-sized



PULSABlend polymer makedown systems from Pulsafeeder

to provide activation of all types of polymers, without the sometimes-damaging effects of motor-

ized mixing devices. Five neat polymer pump flow rates ensure the right makedown for any application. They include an autofill calibration column, an adjustable flowmeter and a neat polymer back pressure regulator to maintain a consistent, repeatable final product. **800-333-6677; www.pulsatron.com**

Composting Equipment

ROTO-MIX MODEL 1220-20

The Roto-Mix 1220-20 horizontal rotary compost mixer has a large mixing capacity of 1,220 cubic feet and can hold a maximum load of up to 40,000 pounds. It is designed to thoroughly mix materials to ensure rapid decomposition and to produce quality compost. This rotary compost mixer, equipped with the GeneRation II Staged Rotor Mixer, will uniformly blend materials in a tumbling action that does not pack material and helps introduce air into the mix. The rotor lifts the material past the wedging point of the lower side auger, resulting in an aerated mixture while lowering power requirements. Total movement of material in the mixing chamber eliminates dead spots that are common in conventional auger mixers. Optional conveyors allow for the discharge and distribution of mixed nutrients with microorganisms into static compost piles or windrows. It is available in truck, trailer or stationary units. This size of mixer works well with large-volume composting operations. **620-225-1142; www.rotomix.com**



1220-20 compost mixer from Roto-Mix

(continued)

Dewatering Equipment

IN THE ROUND DEWATERING HORIZONTAL DRUM

The horizontal biosolids dewatering system from In The Round Dewatering has a stainless steel drum with perforated plastic tile lining. The drum is mounted on a roll-off frame for easy transport and unloading. Water trays allow containment of discharge water. An 18,000- to 25,000-gallon batch is mixed with polymer before being filtered in the rotating drum, driven by a 1/2 hp variable-speed electric motor with a heavy-duty chain and sprocket. The turning eliminates crusting and wet pockets to produce uniform, consistent results. The dewatered material dumps easily, and the drum is self-cleaning. **317-539-7304; www.itrdewatering.com**



Dewatering system from In The Round Dewatering



Sludge King dewatering container from Park Process

PARK PROCESS SLUDGE KING

The Sludge King dewatering container from Park Process includes radiused, edged filter screens providing extra filter area and eliminating 90-degree angles that can trap cake when dumping. Between the bottom ends of the wall filters and middle wall filters, Cake Away thick plastic

panels are installed to fill the void in the container bottom where water could collect. A nonstick surface promotes easier dumping of cake from the container. Two center-wall filter panels offer additional filter area, translating into drier cakes and faster dewatering times. The inlet manifold has individually controlled ports for distributing the incoming flow equally to each side of the center-wall filters. Units are offered in five capacities. **855-511-7275; www.parkprocess.com**

Grit Handling/Removal/Hauling

SMITH & LOVELESS PISTA VIO

The PISTA VIO grit removal system from Smith & Loveless provides application flexibility and grit removal efficiencies with a design that allows for full variability of the inlet and outlet channels. This type of grit removal system provides the ability to design the inlet and outlet channels at any variable angle up to the full 360 degrees of the chamber. Designers can flexibly arrange the system to fit existing sites or maximize space during construction on new sites. This baffle system, in addition to providing application flexibility, also offers superior grit removal efficiency. It offers a hydraulic vortex grit chamber design that utilizes a baffle system to create the vortex action that removes 95% of grit down to 100 microns. Its effluent flume design minimizes the harmful weir effect that can contribute to grit bypass. **800-898-9122; www.smithandloveless.com**



PISTA VIO grit removal system from Smith & Loveless

Headworks

WALKER PROCESS EQUIPMENT, A DIV. OF McNISH CORP., VERTICAL SHAFT MECHANICAL MIXER

The Walker Process Equipment, A Div. of McNish Corp., vertical shaft mechanical mixer provides a low-energy solution for thorough and effective mixing in an anaerobic digester. Each agitator is custom designed for the application and the specific geometry of the digester tank. The dual impeller arrangement is designed to optimize the most effective glide ratio at the lowest power usage and the highest pumping capacity. Features include a leveling base, low-power consumption compared to pumped systems, high turnover and controlled downward pumping to achieve whole volume mixing. The dual impellers are fabricated from stainless steel and attached to a carbon steel shaft that is clad and sealed in stainless steel to provide the strength of carbon steel and the corrosion resistance of stainless steel. This system comes complete with full electrical controls. **630-892-7921; www.walker-process.com**



Mixer from Walker Process Equipment, A Div. of McNish Corp.

Septage Receiving Stations

JWC ENVIRONMENTAL HONEY MONSTER

The Honey Monster septage receiving station and FOG receiving system from JWC Environmental quickly screens and processes septage, grease, FOG or sludge from haul trucks. The combination of grinding, solids removal, washing and dewatering allows a typical septage truck to unload in 5 to 15 minutes. The hauler just connects their camlock hose to the septage acceptance station and starts the flow. Septage waste will pass through a SRS3000 Rock Trap before the Muffin Monster grinder shreds the rags, clothes, trash and debris commonly found in septage waste.



Honey Monster septage receiving station from JWC Environmental

Ultrasonic level sensors work with the system's PLC to modulate the plug valve and regulate the flow. An auger screw and perforated screening remove unwanted debris. Trash is washed, fully compacted and dewatered for disposal. The station is completely enclosed to ensure safety and vector control and contain foul odors. **949-833-3888; www.jwce.com**

SCREENCO SYSTEMS MEGA SCREEN 800

The Mega Screen 800 septic receiving station from Screenco Systems 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.



Mega Screen 800 septic receiving station from Screenco Systems

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 the unit portable, allowing for setup virtually anywhere. **208-790-8770; www.screencosystems.com**

Screening Systems

ENVIRO-CARE SAVI - GVS PERFORATED PLATE MULTIRAKE SCREEN

In the SAVI - GVS Perforated Plate Multi-Rake Screen from Enviro-Care, bars are replaced by a stainless steel perforated plate to achieve higher debris capture. Multiple wipers remove the debris from the perforated plate and transport the screening material to discharge. This screen can be mounted at 90 degrees for deep narrow channels and pump stations. It is also available in tank for pumped flow. The low-maintenance design makes it suitable for remote locations. The perforated plate is particularly suitable for removing wipes from the flow. Larger debris builds a mat on the surface of the perforated plate. The mat further enhances capture by attracting smaller material. **815-636-8306; www.enviro-care.com**



SAVI - GVS Perforated Plate Multi-Rake Screen from Enviro-Care

WESTECH ENGINEERING CLEANFLO MONOSCREEN

The CleanFlo Monoscreen from WesTech Engineering provides a screenings capture ratio of 82.5%, improving upon the traditional filter step screen design by using a progressive step profile and dual motion to build a stronger woven mat of material on the face of the unit. Combining these two features allows it to achieve a 50% increased capture performance over the traditional step screen technology. This screen is highly efficient and easy to maintain, with a cost-effective design that maximizes screenings capture while minimizing maintenance. The durable drive system uses few moving parts with no chains or submerged bearings to minimize maintenance. In addition, its low-profile design allows easy access and inspection. **801-265-1000; www.westech-inc.com tpo**



CleanFlo Monoscreen from WesTech Engineering

tpo + VEOLIA
present the webinar:
"The Use of IFAS/MBBR and ANITA Mox Technologies to Facilitate Biological Nutrient Removal (BNR) of Nitrogen and Phosphorus - The Tale of Two Case Studies"

August 29 at 11:00 AM EST

Register at <http://bit.ly/2JpMCSq>

Contact usmunicipal@veolia.com with any questions

DESCRIPTION:

Many facilities have difficulties in finding simple, efficient and cost effective biological wastewater technologies that can enable them to achieve their nutrient removal goals without new construction or with just the smallest possible footprint. This webinar presents two case studies on how the media based IFAS and deammonification processes helped two plants achieve total nitrogen removal limits in two distinct ways.

SPEAKERS:



Greg Stack
Utilities Manager
City of Dickinson, ND



Edyta Stec-Uddin, PE CWP
Senior Engineer Capital Planning
Metro Wastewater Reclamation District, Denver, CO



Larry Li
AnoxKaldnes Product Manager
Veolia Water Technologies, Cary, NC



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By Craig Mandli

Screw press efficient in dewatering membrane bioreactor biosolids

Problem

The Decatur (Arkansas) Wastewater Treatment Plant's dewatering technology was undersized and inefficient. With the added demands of a plant upgrade, the operations staff struggled to meet dewatering requirements.

Solution

The design-build team and owner selected an **FSP 802 screw press** from **Schwing Bioiset** to replace the existing equipment. The new equipment was installed in the same building with primarily service connection modifications. The press started operating in November 2018.

RESULT:

Biosolids have improved from 13% to 17% solids, reducing the amount of cake hauled. The solids capture rate has improved from less than 80% to 95%, reducing the return load to the plant. Polymer usage is now at 18 pounds active per dry ton — well below the previous consumption rate. Dewatering capacity has more than doubled. It now takes 6.5 hours instead of two days to load a 25-ton trailer. **715-247-3433; www.schwingbioset.com**



Receiving station helps ready plant for increased influent load

Problem

Legislation for septic tanks in Florida may lead to increased septage volume at Indian River County's Residuals Dewatering (Biosolids) Facility. Moves are afoot to require inspection and pumping of septic tanks every three to five years.

Solution

The county chose a fully automated **Raptor Septage Complete Plant** from **Lakeside Equipment**. The compact, self-contained unit compacts and dewateres screenings to 40% solids. An overnight self-cleaning cycle stops the buildup of grit in the bottom of the unit. The system is preengineered, and all-stainless-steel construction resists corrosion.

RESULT:

Far more grit and rags are captured than anticipated. A 4-cubic-yard container is filled daily. There have been no equipment issues, and only basic daily maintenance is required. **630-837-5640; www.lakeside-equipment.com**



Compact mobile belt press handles large job

Problem

At the Grand Chute-Menasha (Wisconsin) West Wastewater Treatment Facility, dewatering equipment was to be offline during construction. The facility needed to process at least 150 gpm of biosolids at 3.2% solids. The facility's leader believed a 2.0-meter mobile belt press was needed, but none were available.

Solution

Bright Technologies, Division of Sebright Products, supplied a 1.7-meter extended length (XL) **mobile belt press**, recommended the optimum polymer, suggested equipment placement to maximize efficiency and limit labor, trained the operators and offered process assistance.



RESULT:

In 16 weeks the press processed 2.5-million gallons of biosolids at 200 gpm, produced material at 30% solids and operated at a loading rate of 2,000 lbs/hr/meter. Temporary dewatering took place only two days per week for less than eight hours per day, minimizing labor. **800-253-0532; www.brightbeltpress.com**

Low-maintenance bar screen stops rag buildup at pump station

Problem

The Coweta (Georgia) Water & Sewerage Authority saw its influent pump station fouling with rags and other debris, requiring frequent manual removal in a hazardous environment. The fouling also caused frequent equipment failure and costly pump repair and replacement.

Solution

The authority chose a **Screentec low-maintenance bar screen** from **Aqualitec** to mitigate fouling. Compact and durable, it was installed in a 10-foot-wide-by-35-foot-deep manhole upstream of the influent pump. It automatically filters debris, lifts it to ground level and deposits it in a container. There are no below-grade moving parts to clean or service, and the system requires minimal upkeep.

RESULT:

After four years, the pump station is free of debris. Aside from occasional above-grade parts lubrication, no human intervention is required. **855-650-2214; www.aqualitec.com**





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Fairfield-Suisun Sewer District wastewater treatment plant in California replaced four aging blowers with four APG-Neuros NX350 high speed turbo blowers to improve energy efficiency

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www.apg-neuros.com

Food manufacturer converts wastewater into sustainable resource

Problem

Growing Ohio-based company JTM makes meat products, baked goods, frozen goods and ready-to-eat meals for multiple sectors nationally. The company completed a 190,000-square-foot plant expansion to double manufacturing capacity.

Solution

To keep up with growth sustainably, JTM installed the **Tricanter** from **Flottweg Separation Technology** to process its wastewater. The three-phase centrifuge system separates wastewater into grease, water and solids that can be disposed of or reused cost-effectively.



RESULT:

The system yields drier solids that be landfilled at one-tenth the cost of sending wet solids to a wastewater treatment plant. Jerry Cramer, a consultant with STS Process Technology, which oversees all of JTM's water requirements, observes, "Part of the justification for the Tricanter is the savings that we accomplish by not hauling the water off as wastewater and allowing the remaining wastewater to be clean enough to send to the city plant." 859-448-2331; www.flottweg.net

Press unit helps streamline FOG receiving

Problem

Napa (California) Sanitation District struggled with a bucket-type screening system for its FOG receiving and injection system. Debris was captured by the strainer, which clogged frequently; manual unclogging was unpleasant, hazardous work.

Solution

The **Strainpress** from **HUBER Technology** streamlined operations by removing debris efficiently and automatically. It presses liquid through a screening zone where the coarse material is retained on a cylindrical screen. The debris is then stripped off by a coaxial screw and pushed through to the press zone, where the material is compacted and dewatered. The screw operates when sensors detect a differential pressure caused by screen surface blinding.



RESULT:

The device helped the district optimize the FOG receiving and injection system by improving operations, protecting downstream components and enhancing the production of a revenue-generating asset. 704-990-2053; www.huber-technology.com

(continued)

Pressure relief valve negates backfire concerns during biogas production

Problem

The West Point Wastewater Treatment Plant in Seattle uses digester gas to run raw sewage pump engines and generate heat. Twin 3,127 hp internal-combustion engines power to a pair of 2.3 MW generators to produce electricity for the plant and process and space heating. During the engine-mapping phase, a backfire occurred because of an air-fuel mixture developing in the exhaust during startup.

Solution

HOERBIGER Safety Solutions suggested the **EVM ATEX**-compliant flameless **pressure relief valve** designed for intake and exhaust systems. The relief valve consists of a circular relief vent with stainless steel flame arrestors and a reclosable spring-loaded valve plate with seal. If an internal ignition of unburned fuel occurs, the pressure wave causes the valve plate to open and send the ignited fuel through the flame arrestors, extinguishing it and cooling the combustion gases. The device can be used indoors in locations where other equipment may be situated or personnel are working and where conventional venting devices would not be permitted.



RESULT:

The units have operated with no issues at the treatment plant. Some power produced by the cogeneration plant is purchased by Seattle City Light, providing \$1.4 million in revenue per year. **855-793-8407; www.hoerbiger.com**

System helps reduce hydrogen sulfide concentration

Problem

High hydrogen sulfide was present in the Nonaville Road lift station and wastewater treatment plant in Mount Juliet, Tennessee. The 7,900-foot, 10-inch force main averaged 175,000 gpd at 90.9 psi.

Solution

The city chose the **FORSe 5 Odor and Corrosion System (Anue Water Technologies)** in place of chemical addition, which was not solving the problem. The goal was to reduce the hydrogen sulfide vapor phase weekly average to less than 50 ppm, with dissolved oxygen at 1 to 8 mg/L.



RESULT:

In a pilot test, the average drop in hydrogen sulfide was 20 to 30 ppm within the first three days. After a full system was installed, the average level was 1 ppm. The system has saved thousands of dollars per year in chemical expenses. **760-727-2683; www.anuewater.com**

Depackaging system helps facility increase treatment capacity

Problem

The Hermitage (Pennsylvania) Municipal Authority upgraded its solids-handling facility to increase treatment capacity and to boost biogas generation for a combined heat and power system. This led to a solids management plan to address high-strength co-digestion of organic wastes and production of Class A biosolids for fertilizer. A hammermill depackaging unit installed during the upgrade was labor-intensive.

Solution

The facility included a staging area to receive packaged organic food waste from various sources. **Veolia Water Technologies' Ecrusor depackaging system** was installed in parallel with the hammermill to extract organics. The process can now receive packaged material as is, minimizing operator labor. The depackaging method involves perforation of packaging while pressing organics from within the packaging to reduce contamination of bioslurry. Further screening of the organics ensures that zero contaminants enter downstream processes.



RESULT:

The system increased capacity tenfold, reducing labor. The project gives the authority a source of revenue, a place for the community to divert organics for beneficial reuse, and increased biogas production. **312-552-2887; www.veoliawaterna.com**

Biosolids composting reduces costs

Problem

The City of Battle Creek, Michigan, needed to reduce transportation costs for dewatered biosolids and develop a compost product.

Solution

The facility selected a **Sustainable Generation SG Mobile System** using **GORE Cover**, which is distributed in North America by the Sustainable Generation, to validate assumptions for mix recipe, process performance, odor control and compost quality. The company provided equipment, installation support, operator training and technical guidance.



RESULT:

A process demonstration yielded an exceptional-quality Class A biosolids compost at low cost. The demonstration data was then used to configure a full-scale compost facility. **303-699-1585; www.sustainable-generation.com**

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Progressive cavity pumps enable accurate chemical metering

Problem

The 47.3 mgd West Palm Beach (Florida) Water Treatment Plant saw unsatisfactory results and frequent, difficult maintenance from its diaphragm pumps for chemical metering.

Solution

The city upgraded to **SEEPEx progressive cavity pumps**, installing four intelligent metering pumps with variable-frequency drives for hypochlorite, three similar pumps for ammonia, and 10 standard progressive cavity pumps for polymer, caustic, ferric and alum.



RESULT:

The facility has seen easier and less frequent maintenance and more accurate chemical metering. The pumps can withstand the power disruptions that often hit the facility. The city has used progressive cavity pumps in other situations such as in wet outdoor environments to dose low levels of chlorine for algae control and to help mix polymer tanks at a dewatering press. **937-864-7150; www.seepex.com**

Turnkey services save time and money on headworks screen replacement

Problem

A Florida wastewater treatment plant experienced issues with two new screens purchased to accommodate an expansion. Due to carryover problems and corrosion on chains, pins and bushings, the screens were rebuilt twice within five years and were continually problematic.

Solution

Based on the product support and quality received from **Parkson Corp.** and the **Aqua Guard in-channel screen** at the original plant, the city again worked with Parkson Corp. The company assisted with a specification to demolish the old screens and supply and install the new screens.



RESULT:

The turnkey service saved the city time and resources. The two new Aqua Guard (perforated plate) screens have operated since 2017 with increased capture rates, lower headloss and low maintenance. **888-727-5766; www.parkson.com tpo**



Aqua-Aerobic Systems AquaStorm cloth filtration system

The AquaStorm cloth media filtration system from Aqua-Aerobic Systems is an effective solution for wet-weather applications, including combined sewer overflow, sanitary sewer overflow and stormwater. The system uses a disk configuration and OptiFiber PF-14 pile cloth media, and it operates with three zones of solids removal to filter wet-weather flows without the use of chemicals. It is designed to handle a wide range of flows in a fraction of space and offers simple startup/shutdown with unattended operation for remote locations. The system also allows for dual-use application for tertiary and wet-weather operation.

800-940-5008;
www.aqua-aerobic.com



Franklin Electric Pioneer Pump GL1 Pump Package

Franklin Electric's Pioneer Pump GL1 Pump Package moves water in nearly any compact yet rugged industrial, municipal, agricultural, mining, dewatering or rental application.

product spotlight wastewater

High-accuracy methane and oxygen readings for biogas applications

By Craig Mandli

The treatment of residual biosolids from wastewater treatment plants is a major everyday challenge that municipalities have to tackle. One way many plants face this challenge head-on is by recovering those biosolids to produce biogas by a process of thermal hydrolysis and anaerobic digestion.

Transforming biosolids into biogas in essence is converting materials previously deemed harmful or even dangerous for the environment into valuable green energy that can power plant equipment or even be sold back to the power grid. For treatment plant operators, converting biosolids into biogas complies with environmental regulations, drastically reduces residual biosolids volumes and creates a new revenue stream. However, its production requires an attention to detail. The **LANDTEC BIOMETHANE 3000 fixed analyzer** from **QED Environmental Systems** is designed for the detailed methane and oxygen readings required for biogas production, the anaerobic digestion of wastewater biosolids, vehicle fuel anaerobic digestion and other biomethane production applications. Its use can help users maximize operational efficiency by optimizing the anaerobic digestion process.

The unit provides continual measurement of methane, carbon dioxide and oxygen with a user-definable fourth gas reading of hydrogen sulfide, hydrogen or carbon monoxide, which can help calm safety concerns. The analyzer provides accurate readings above the 95% methane level and below the 1%



LANDTEC BIOMETHANE 3000 from QED Environmental Systems

oxygen level at first stage production. Customizable to site requirements, it protects operators from oxygen issues while preventing the risk of injecting poor-quality gas into the energy grid network. With its modular design, the unit enables hot swapping for serviceability and on-site maintenance, minimizing operational downtime.

Built with an IP65-rated enclosure, the analyzer is certified for use in potentially explosive atmospheres (ATEX) and IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres (IECEx) Zone 2 areas. A variety of communication options are available, including Modbus RTU and optional Process Field Bus (PROFIBUS), Process Field Net (PROFINET) and Ethernet communication protocols.

With a clear and informative color visual display, the analyzer is easy to install and operate according to the maker. It operates in a wide temperature range and offers a fully automated calibration function to maintain methane testing accuracy and ensure data reliability in extreme temperatures. It comes with built-in liquid level monitoring with a dedicated alarm, an optional automated moisture removal drain and a dedicated autocalibration alarm.

734-995-2547; www.qedenv.com

This robust, diesel-driven pump package features the PP43075 solids-handling pump, which passes up to 1 5/8-inch solids and reaches a maximum flow of 540 gpm and a max head of 130 feet. The GL1 extends the GL Series towable diesel pump range down to 15 hp for smaller-scale applications. The environmentally safe, vac-assist priming system with PosiValve evacuates air faster to accelerate and simplify priming, while efficient tank sizes provide up to 23 hours' runtime at full load.

260-824-2900;
www.pioneerpump.com



Water Cannon Inc. - MWBE FL-ABB 200 surface cleaners

The FL-ABB 200 stainless steel surface cleaners from Water Cannon Inc. - MWBE have an added air-recovery design and hook up to pressure washers and wet vacuums for

almost any cleaning requirement. The cleaners remove dirt, paint, grime and even graffiti from a wide variety of surfaces. There is no overspray or flying debris, providing a safe and clean work area. They are available in 12-inch single-arm and 21- and 30-inch double-arm floor models. The air recovery port will accept 2-inch vacuum hose. Floor units are standard with three or four caster wheels, and all units are rated to 240 degrees F. The professional line is ready to use with no tools required for assembly.

800-333-9274; www.watercannon.com

product spotlight

water

Expanded monitoring capacity provides simplified alerts for increased growth planning

By Jared Raney

Up to 40 channels for treatment monitoring makes the **Express II autodialer system monitor** from **Sensaphone** a one-track solution for facilities with varying automatic processes, including large water treatment facilities.

"It expands on Sensaphone's line of traditional autodialers where customers need to monitor many more points than previous devices had allowed," says Rob Fusco, director of Business Development for Sensaphone. "The Express II lets those customers save money by purchasing one device instead of potentially four or five."

Not only does it allow a greater range of monitoring than typical systems, it also has the capacity to notify up to 48 employees with custom phone calls.

"The Express II system allows users to remotely monitor for changes in environmental conditions and equipment performance around the clock," Fusco says. "When the system detects that a sensor reading has moved out of the preset range, it immediately sends alerts, allowing personnel to quickly address the situation."

The Express II is designed to integrate easily with existing system components such as floats, pump alarm outputs and level transducers, and it is optimized for a number of applications beyond water and wastewater, including commercial greenhouse operations, livestock facilities, oil and natural gas facilities, and HVAC applications.

Express II from Sensaphone



"Water facility operators use the Express II system to monitor the status of pumps, tank levels, indoor and outdoor temperature, humidity, ventilation, carbon dioxide and power failure," Fusco says.

The system is resilient, housed in a NEMA-4X enclosure, with an internal rechargeable battery backup, allowing 12 hours of continuous monitoring even during power outages.

"It is protected from dust, dirt and moisture both indoors and out. It is simple to increase monitoring capability with easy-to-install expansion input and output cards," Fusco says. "The LCD shows continuous input status and assists with keypad programming for simple and easy setup. It has a temperature sensing range of 85 degrees below zero to 300 degrees F."

Following UL and CSA standards, it includes remote access features and a small physical profile at 14.5 by 13 by 8.3 inches and 18 pounds.

"The Sensaphone Express II Monitoring System is an easy-to-configure, cost-effective solution for large water and wastewater facilities that require many monitoring points or operations that are planning future growth," Fusco says. **855-807-1887; www.sensaphone.com**



Atlas Copco Smart Air Xc4004 controller

The Smart Air Xc4004 controller from Atlas Copco is designed for all of its large air compressors and boosters with flows up to 4,500 cfm and pressures up to 5,000 psi. The 7-inch controller display allows a simultaneous view of several parameters, including pressure and flow. The navigation is available in 30 languages, and the display is anti-glare, freeze-free and IP67 rated, providing the necessary protection from water, dust and dirt contamination. A secondary point-of-use controller unit is also available and provides the option to remotely operate portable compressors.

800-732-6762; www.atlascopco.us



FCI - Fluid Components International ST Series flowmeters

ST Series flowmeters from FCI - Fluid Components International have a retractable packing gland option, which requires a simple wipe-down cleaning so that the process line doesn't need to be interrupted, bypassed temporarily or completely shut down. Insertion-style meters can be installed rapidly or retracted quickly through a single tap point in the pipe. The meters come in low-

or medium-pressure configurations. The low-pressure kit is suitable for lines pressurized up to 50 psig. The medium-pressure configuration is designed for lines pressurized up to 500 psig. The meters are available with a choice of graphite or Teflon packing material and one threaded or flanged process connection. The Teflon packing material is required when the process media is ozone, chlorine or bromine.

760-744-6950; www.fluidcomponents.com



ClearSpan Fabric Structures Armor Shield Cover

ClearSpan Fabric Structures' Armor Shield Cover is a 29-ounce

architectural vinyl building cover that is designed for ultimate durability. The protective membrane consists of seven layers, including a sturdy base fabric, multiple layers of protective coating and a dual-sided PVDF topcoat that repels dirt. It is both mildew resistant and flame retardant. It is available in white, gray, tan and green. A 12-ounce poly cover is also available for all ClearSpan buildings upon request.

866-643-1010; www.clearspan.com tpo

Check out more manufacturers and dealers at:
tpomag.com

Aries Clean Energy biochar certified by USDA and IBI

Aries Clean Energy announced that its Aries GREEN biochar product has earned the U.S. Department of Agriculture Certified Biobased Product label and certification from the International Biochar Initiative. The product is now able to display the USDA label and the IBI Certified biochar seal.

A. O. Smith receives 2019 Energy Star Partner of the Year award

A. O. Smith has been named a 2019 Energy Star Partner of the Year for its contribution and dedication to manufacturing high-efficiency water heaters. A. O. Smith's accomplishments were recognized by the U.S. EPA and the U.S. Department of Energy at a ceremony in Washington, D.C.

Aqua-Aerobic Systems launches new website, announces acquisition

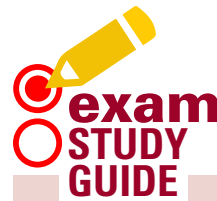
Aqua-Aerobic Systems launched a new, mobile-friendly website featuring the company's complete portfolio of products and systems, applications and aftermarket programs. The new site highlights its research and technology center and technical seminar program, and it includes a comprehensive resource library, calendar of events and the latest company news. The new site can be found at www.aqua-aerobic.com.

The company also announced it has acquired FUCHS Enprotec GmbH, based in Mayen, Germany. FUCHS Enprotec GmbH provides mechanical engineering processes and technologies for the treatment of municipal and industrial wastewater, sewage sludge and off-gas. The company manufactures a full line of aeration, mixing, biosolids treatment and odor control products with more than 3,500 installations in 60 countries.

Centrisys/CNP announces facility expansion, earns leadership award

Centrisys/CNP, based in Kenosha, Wisconsin, announced the completion of a 34,000-square-foot building expansion, including an upgrade of its balancing equipment with a centrifuge balancing bunker in the interior of the building. A company committee was formed to design and build the balancing bunker space and determine what equipment would work best. The bunker isolates the operator in a protected control area and includes video monitoring to see into the balancing areas, avoiding proximity to the running equipment. Cranes are installed overhead to place parts and components in the balancing cradles.

The company also announced that it has been recognized by Frost & Sullivan with the 2019 North American Product Leadership Award for its PONDUS thermal hydrolysis process. With this product, Centrisys/CNP allows for the industry to not only accelerate the sustainability of anaerobic digestion, but also to enhance thermal hydrolysis process. PONDUS originated in Germany and is currently used in six installations in Europe and one in China. Centrisys/CNP introduced PONDUS in North America through an agreement in 2015. **tpo**



Licensing exams can be challenging. Our **Exam Study Guide** helps you prepare by presenting questions similar to those on an actual exam. You can find many more sample questions on the *TPO* website at www.tpomag.com/study.

WASTEWATER

By Rick Lallish

What is the maximum blanket level in a secondary (activated sludge) clarifier?

- A. 5%
- B. 10%
- C. 25%
- D. 50%

ANSWER: C. Basic operation and knowledge of clarifier process controls are fundamentals that most operators should understand. In activated sludge processes, the sludge blanket should never exceed 25% of the sidewall depth of the secondary clarifier. In some texts, a 2-foot blanket is recommended. Whenever the blanket approaches or exceeds this depth, operators should take precautions. This is usually an indicator of problems such as filamentous bulking or equipment malfunction. The blanket should be checked daily, preferably at about the same time each day. More information can be found in the Water Environment Federation training manual, *Wastewater Treatment Fundamentals 1 – Liquid Treatment*, Chapter 8.

DRINKING WATER

By Drew Hoelscher

What is the best backflow control device for protecting a potable waterline from contamination?

- A. Reduced-pressure zone
- B. Air gap
- C. Double check
- D. Vacuum breaker

ANSWER: B. An air gap provides complete separation between potable water and a potential source of contamination. This complete separation must be at least two times the internal diameter of the potable water supply line, but no less than 1 inch. However, it is not always possible to have a complete separation, so a reduced-pressure-zone assembly would be installed on the potable supply line if the potential contamination poses a health hazard to the public.

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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people/awards

Raynetta Marshall was hired as general manager of the City of Tallahassee (Florida) Underground Utilities & Public Infrastructure Department.

The Horsham (Pennsylvania) Water and Sewer Authority hired **John Solecki** of Gilmore & Associates to replace Ted DeLeone, the director of field operations, who retired.

Cheryl Johnson, Public Works administrator in Spearfish, South Dakota, retired after 37 years with the city. She was the first superintendent for the city's new wastewater treatment plant, which was being constructed when she was hired in 1982 at the age of 22.

The Missouri Department of Natural Resources awarded \$50,000 Small Community Engineering Assistance grants to the cities of **Holden** and **Leeton**. The grants offer funding to hire an engineering consultant to develop a report that identifies needed wastewater system improvements.

Les Morefield was hired as supervisor of Public Works for the Town of Middletown, Virginia, replacing **Donald Welsh**, who retired. The town hired **Alan Nance** as a wastewater treatment operator.

The **Fergus Falls Wastewater Treatment Facility** received a Certificate of Commendation from the Minnesota Pollution Control Agency.

Tom Myers, wastewater superintendent in Siloam Springs, Arkansas, received the William D. Hatfield Award from the Water Environment Federation. The treatment plant received a safety award from the Arkansas Water Environment Association.

For the 11th consecutive year, the **South Dakota Science and Technology Authority Wastewater Treatment Plant** received the Operation and Maintenance Wastewater Treatment Award from the state Department of Environment and Natural Resources.

The **Somersworth (New Hampshire) Wastewater Treatment Plant** received a 2019 Energy Efficiency Award from the state Department of Environmental Services.

The **Winnepesaukee River Basin Program** received recognition from the New Hampshire Department of Environmental Services for energy efficiency.

Randy Scott, chief collections officer of the Sedona (Arizona) Wastewater Department, was named the 2019 Rod Olsen Employee of the Year.

The **North Cary (North Carolina) Water Reclamation Facility** received the Directors Award from the Partnership for Clean Water.

The **Eagle River Wastewater Treatment Plant** received the Registered Laboratory of the Year award from the Wisconsin Department of Natural Resources.

The **Louisville (Kentucky) Metropolitan Sewer District** and **Tetra Tech** received the 2019 Franz Edelman Award for Achievement in Advanced Analytics, Operations Research, and Management Science from INFORMS.

Two Louisa County Water Authority team members received 2019 awards from the Virginia Rural Water Association: **Christopher "Chris" J. Compton**, Maintenance Technician of the Year, and **Nancy Pugh**, Wastewater Operator Specialist of the Year.

New Jersey American Water presented its 2019 Environmental Grant Program awards:

- **Township of West Orange**, Environmental and Open Space Commission, River Clean-Up Initiative, \$8,100

events

July 31-Aug. 1

Water Environment Association of Texas Biosolids and Odor and Corrosion Conference and Expo, Embassy Suites San Marcos Hotel, Spa and Conference Center. Visit www.weat.org.

Aug. 7-9

Transformative Issues Symposium, presented by WEF and American Water Works Association, Hyatt Regency Washington on Capitol Hill hotel, Washington, D.C. Visit www.wef.org.

Aug. 18-21

Kentucky/Tennessee Water Professionals Conference, presented by the Kentucky-Tennessee Water Environment Association and Kentucky/Tennessee Section AWWA, Kentucky International Convention Center, Louisville, Kentucky. Visit www.kytnwpc.org.

Aug. 26-29

Kansas Water Environment Association and Kansas Section AWWA Joint Annual Conference, Capitol Plaza Hotel Topeka. Visit www.kwea.net.

Aug. 27-30

Chesapeake Tri-Association Conference, presented by the Chesapeake Water Environment Association and Chesapeake Section AWWA, Roland E. Powell Convention Center, Ocean City, Maryland. Visit www.chesapeakeetricon.org.

- **South Plainfield High School**, Environmental Science Club, Creation of an Outdoor Classroom, \$9,804
- Master Gardener Association, **Rutgers Master Gardeners Camden County**, Creation of an Education Garden, \$9,500.

The **North Red Deer (British Columbia) Regional Wastewater System** received the 2019 Project Achievement Award from the Association of Professional Engineers and Geoscientists of Alberta.

The Olivenhain Municipal Water District's **4S Ranch Water Reclamation Facility** was named the California Water Environment Association's 2019 Small Plant of the Year.

The **Winchester Water Treatment Plant** received a 2018 Virginia Optimization Program Gold Award from the state Department of Health, Office of Drinking Water.

The **Hopkinsville Water Environment Authority** received the 2018 Outstanding Drinking Water Plant Award from the Kentucky Water and Wastewater Operators Association and was recognized by the Area-Wide Optimization Program for meeting its goals in 2018.

The **Henry County Water Authority Towaliga Plant** was named Plant of the Year by the Georgia Association of Water Professionals.

The **Groton Utilities Poquonnock Treatment Plant** operations staff received the 2019 Certified Operator Public Health Drinking Water Merit Award from the Connecticut Department of Public Health.

The **Santa Margarita Water District** received the Clair A. Hill Water Agency Award for Excellence from the Association of California Water Agencies for its Lake Mission Viejo Advanced Water Treatment Facility project.

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