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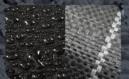
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#### COOKING UP EXCELLENCE

The Hawk Ridge private composting facility keeps multiple municipal customers and product end users happy with a quality process and responsive service.

By Jim Force

ON THE COVER: More than 30 municipalities around New England can be sure their wastewater biosolids are put to good use and not just filling up expensive landfills. They send their biosolids to the Hawk Ridge Compost Facility in Unity, Maine. There the biosolids are mixed with wood chips and other bulking agents, composted, and turned into useful products for landscapers, contractors, gardeners, and others. (Photography by Gabe Souza)

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➤ Hearts and Minds: "Water lillys" at work in Lynchburg, Virginia
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#### **Keeping Water Affordable**

LOCAL UTILITIES GO TO GREAT LENGTHS
TO PROVIDE SAFE AND RELIABLE DRINKING WATER.
WHAT HAPPENS IF RISING RATES MAKE THE PRICE
TOO HIGH FOR LOWER-INCOME FAMILIES?

By Ted J. Rulseh, Editor

or years, drinking water and wastewater utilities have invested to provide quality services, protecting lakes and streams from pollution and delivering clean, safe drinking water reliably to households and businesses.

The trouble is that, as the utility system ages, and as government regulations become stricter, utilities face a growing crisis of funding. That's according to

the National Association of Clean Water Agencies (NACWA) and the Association of Metropolitan Water Agencies (AMSA).

The two have embarked on an "Affordable Water, Resilient Communities" initiative, seeking approval for more federal government support to help utilities deliver on their mission.

#### **BIG FUNDING GAP**

The United States faces about \$1 trillion in necessary investment in drinking water and wastewater over the next 20 years, according to the initiative's literature: "The most recent EPA Clean Watersheds Needs Survey found \$271 billion in need for wastewater and stormwater systems, and the most recent EPA Drinking Water Needs Survey found \$473 billion in need for drinking water systems.

"These EPA surveys estimate the investment needed just to maintain existing systems. They do not include the costs of likely new regulations, population growth, system expansion and climate change/resiliency."

The rising cost of providing services is outstripping utilities' ability to cover their costs through rate increases. According to the Congressional Budget Office, the federal share of capital, operations and maintenance for water services has dropped to 5%, versus nearly 50% for highways, 17% for mass transit and rail and aviation (also 17%).

#### **FALLING BEHIND**

At the same time, according to NACWA and AMSA, "an enormous wealth disparity has emerged between the rich and poor. Wage stagnation, especially in the lowest income brackets, has led to unprecedented financial strain that has impacted ratepayers' ability to pay their water and sewer bills." The pandemic and its financial impacts have only made matters worse.

Compounding the issue, utilities face challenges not envisioned when the Clean Water Act and the Safe Drinking Water Act were developed:

- Responding to climate change and investing in resilience
- Investing in sewer overflow prevention and stormwater control
- Working with the farm community to protect source water and limit nutrient releases.

• Advancing environmental justice, green infrastructure and water reuse.

As a result, wastewater and drinking water rates have outpaced inflation in recent years and likely will continue to do so as utilities undertake infrastructure renewals and regulatory compliance projects.

"The reality is that the poorest households in our communities are the ones bearing the most disproportionate impact from water rate increases as a percentage of their household income — creating for many an agonizing choice between paying for water and for other essentials such as food or medicine," NACWA and AMSA state.

#### THE WAY FORWARD

In view of all this, NACWA and AMSA argue that now is the time for the federal government to recommit in a big way to investment in water and wastewater systems.

They advocate for the White House and Congress to make sure water is a top priority for infrastructure investment. In particular, they call on Congress to assign high priority to programs such as loan revolving funds, the Water Infrastructure Finance and Innovation Act program, and the Sewer Overflow and Stormwater Reuse Municipal Grants Program.

Wage stagnation, especially in the lowest income brackets, has led to unprecedented financial strain that has impacted ratepayers' ability to pay their water and sewer bills.

The also advocate for the creation of a permanent Federal Water Customer Assistance Program to help low-income water customers, targeting households with the greatest hardship in maintaining access to water services.

"For decades there have been federal programs to help low-income Americans pay for the most essential household needs — housing, food and energy — with water notably absent from this list," the associations observe. "Since December of 2020, Congress has provided more than \$1.1 billion for first-ever federal assistance to help low-income individuals pay water bills during the economic crisis caused by the pandemic. ... Congress must also recognize that the need will not evaporate when the pandemic ends."

#### WHERE YOU COME IN

Operators' support for this initiative, to the extent that it loosens the federal purse strings for water infrastructure investment, can help utilities acquire the equipment and staffing resources they need to fulfill their expanding responsibilities. And that will help make operators more effective in their roles.

You can find out more, including how you and your utility can engage with this effort, by visiting www.affordableh2o.org/#about-the-campaign. tpo



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#### **IPCC REPORT RELEASED**

#### **Climate Change Is Widespread**

Scientists are observing changes in the Earth's climate in every region and across the whole climate system, according to the latest Intergovernmental Panel on Climate Change Report. Some of those changes already set in motion — such as continued sea level rise — are irreversible over hundreds to thousands of years, according to the IPCC.

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#### WATER QUALITY MONITORING

#### New Cyanobacteria Web Tool

The U.S. Environmental Protection Agency recently launched the CyANWeb application, a new web tool that shows users when a harmful algal bloom may be forming in waters where people swim, fish and boat. Making the tool available across more

platforms will improve the agency's ability to respond to harmful algal blooms.

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#### **OVERHEARD ONLINE**

"Our country faces complicated water challenges, but innovative and inspiring leaders can change how our country views, values and manages water."

US Water Alliance Announces Winners of US Water Prize 2021 tpomag.com/featured



#### STOCKHOLM JUNIOR WATER PRIZE

#### **American Researcher Wins**

Eshani Jha from the United States has received the prestigious 2021 Stockholm Junior Water Prize for research on how to remove contaminants from water in a simple and cost-effective way. The winner was announced Aug. 24 during an online award ceremony as part of World Water Week.

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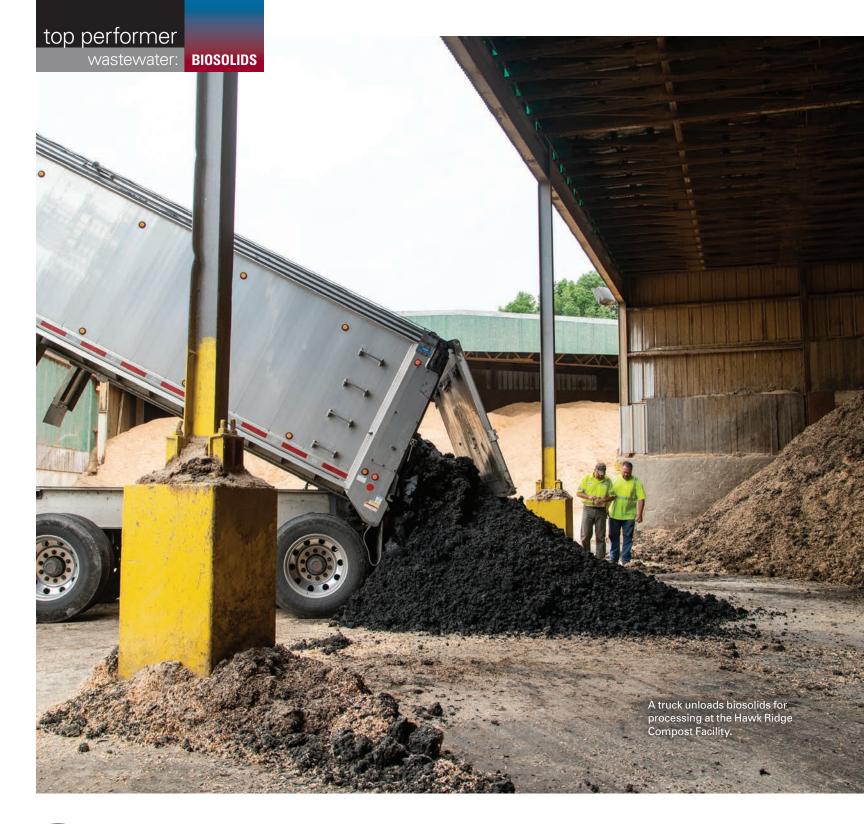
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# Cooking Up Excellence

THE HAWK RIDGE PRIVATE COMPOSTING FACILITY KEEPS MULTIPLE MUNICIPAL CUSTOMERS AND PRODUCT END USERS HAPPY WITH A QUALITY PROCESS AND RESPONSIVE SERVICE

STORY: Jim Force | PHOTOGRAPHY: Gabe Souza



ore than 30 municipalities around New England can be sure their wastewater biosolids are put to good use and not just filling up expensive landfills.

They send their biosolids to the Hawk Ridge Compost Facility in Unity, Maine. There the biosolids are mixed with wood chips and other bulking agents, composted, and turned into useful products for landscapers, contractors, gardeners and others.

Owned by Casella Organics, the 15-acre facility

uses an in-vessel tunnel composting system developed by Gicom Composting Systems of the Netherlands. The technology was developed to provide a climate-controlled environment for growing mushrooms. Since then it has been adapted to composting and is used in locations all over the world.

Hawk Ridge is licensed to process 4,800 cubic yards of biosolids a month (about 3,500 tons). It vields about 80,000 cubic vards per year of finished product, distributed under the earthlife brand.

Winner of a 2020 Biosolids Management Award from the New England Water Environment Association, Hawk Ridge started operation in the early 1990s with open-windrow composting. The Gicom tunnel technology came on board 1994; facility manager George Belmont says it improved operations, odor control and product quality. "With Gicom, we have more control over our composting system," he says.

In January 2009, Hawk Ridge became the nation's first privately operated biosolids management facility to become certified and admitted into the National Biosolids Partnership's Environmental Management Program.

#### TAKING CARE OF CUSTOMERS

Thirty-five municipalities in Maine, New Hampshire and Massachusetts use the Hawk Ridge facility.

"Some of our customers operate small municipal treatment plants and cannot afford the investment of money and staff time to achieve necessary biosolids certification on their own," Belmont says. "It made sense for us, as their biosolids management partner, to attain certification and offer them the security and confidence they deserve."

Their customer service is second to none. They go beyond normal to keep us happy." DAVID BOLSTRIDGE

> Municipalities pay Hawk Ridge a tipping fee based on wet tons. Contractors hired by Casella Organics haul the dewatered material to the composting site. Some clients produce as little as five tons a week; others generate several hundred tons. The percent solids range from the low teens to the high twenties. "We don't handle liquid biosolids," Belmont says.

> Success depends heavily on good relationships with customers. Belmont says the keys are "being responsive to our customers' needs, providing reliable and timely service and offering support to answer any questions customers may have a bout operations or regulatory compliance."



The Hawk Ridge facility produces high-quality compost products for a wide range of applications.

#### Hawk Ridge Compost Facility

Unity, Maine

www.casella.com

STARTUP: 1990

Gicom tunnel in-vessel composting system

80,000 cubic yards of earthlife products per year

AWARDS:

2020 New England WEA **Biosolids Management Award;** several others since 2004

The wastewater treatment plant in Camden, Maine, has sent its belt-pressed biosolids to Hawk Ridge for several years. David Bolstridge, plant superintendent, says the facility is great to work. "We're a tourist community and can have increased biosolids in the summer months," he says. "Hawk Ridge always finds a way to help us out if we need an extra roll-off to keep us running."

#### SOPHISTICATED PROCESS

Biosolids arriving at Hawk Ridge are tipped across a certified scale and then moved to an enclosed receiving area where, in Belmont's words, the "initial recipe" starts, A bucket loader turns over the biosolids, which are then blended with bulking agents including sawdust, wood chips and kiln-dried hardwood shavings (called turnings) from a nearby golf tee manufacturing plant.

The turnings work great, Belmont says, because of their porosity and ability to absorb moisture: "We're lucky to have them so close to us." At this point an inoculant — screenings from the cured compost — is added to help the composting process get started.

CASELLA ORGANICS

T 962W

The team at the Hawk Ridge Compost Facility includes, from left, Richard Howell and Richard Kaufmann, equipment operators; George Belmont, facility manager; Jim Stevens, operator; Robert Bowman, operations manager; and Keith Hunter, yard manager.

A bucket loader tosses and turns the material once more, and operators make sure the proper porosity, moisture and carbon-to-nitrogen ratios are maintained. Next, the material goes into a mixing system where it is blended further before it drops off a discharge belt into the in-vessel composting system.

There are six concrete tunnels, each 15 feet wide, 17 feet high and 110 feet long. Blowers (Air Industries of New England) force air through plenums in the floor up through the contents, which are piled 8 feet high. The computer-controlled aeration system first operates at near capacity for six hours to fluff the material.

Then the blowers return to a lower setpoint and the composting process begins, as the microbes feeding on the organic matter start to generate heat. All the while, the oxygen content of the mix is closely monitored; the flow of air can be adjusted as needed during this "warming up" phase.

#### HEATING AND COOLING

Pasteurization of the material at 55 degrees C for three days is a requirement. Hawk Ridge brings the mixture to 65 degrees C to ensure that the required temperature is maintained. Then things are cooled down. "Pas-

#### **ECO-FRIENDLY**

Composting is not the only beneficial activity at the Hawk Ridge Compost Facility. The plant is highly energy efficient, employing several initiatives to lower energy costs and save resources.

When fuel prices increased dramatically in 2008, management transitioned from an onsite diesel generator to the electrical grid. Partial funding from Maine Made Incentives shortened project payback to two to three years, with an annual savings of \$200,000 after that.

In 2010, Hawk Ridge replaced all old lights with new premium efficiency lighting, achieving a 13% reduction in energy usage. More recently, a geothermal system capitalizes on heat from the composting process to help heat the three-bay service garage, the truck washing building and the office. In summer, the same system uses the 55 degree ground temperature to air-condition the office.

Here's how it works: Ventilation air from the composting process passes through an air scrubber tower. Scrubber water in

the bottom of the tower registers at about 110 degrees F. In winter months, the water circulates through a heat exchanger that warms it. Then it is then piped underground to the heat pump in the garage. Another underground closed recirculation loop from the office heat pump sits on top of the loop going to the garage and receives the same heat transfer.

The heat pumps heat the building through a radiant heating system in the floor. In summer the heat exchanger is not used. The water in the recirculation loop from the office is cooled to the ground temperature of 55 degrees F and is drawn through the heat pump to cool the office building.

Energy savings are estimated at \$10,000 per year. Other energy-savings measures include optimizing blower flow rates, using variable-speed drives, ordering premium efficiency motors as replacements, combining compressed air systems and placing timers on all equipment block heaters.

teurization is great for killing pathogens, but it's not great for composting," Belmont explains. "During the cooldown phase, outside air is introduced into the tunnel to bring it back to a better composting temperature, around 50 degrees C, to get the microbes going again."

After seven days in the tunnels, the material is moved to an aerated curing area, where it is held for about 21 days. There the microbes continue the composting process. Then the material is stacked in 14-foot- high block piles. Finally it is broken into batches that are windrowed for another 45 to 90 days before being pushed up into a final pile for screening and blending.

A Compost Manager probe system (Freeland Scientific) monitors CO<sub>2</sub>, oxygen, moisture and temperature, indicating when the time is right to turn a windrow to add more oxygen. Properly aged, the final compost product is transported to finished cure piles, passed through a Komptech screener, and prepared for shipment to customers throughout the year; sales peak in the spring.

The final earthlife brand products include a contractor-grade compost that can be added to the loam pile, and a premium grade sold to nurseries and landscapers. Hawk Ridge also sells compost blended products such as Gro-Max, Super-Mulch and Super-Peat. All are sold in bulk.

Belmont says Hawk Ridge has provided more than 2 million cubic yards of compost products to garden centers, nurseries, golf courses, athletic fields, landscapers and contractors over the years. The facility operates from 6 a.m. to 3:30 p.m. Monday through Friday.

The staff includes Keith Hunter, yard manager; Jim Stevens, facility operator; Richard Howell and Richard Kaufmann, equipment operators; and Robert Bowman, operations manager. They are supported by sales, compliance and other staff members who are part of Casella Organics.



The composting process can operate entirely with outside air, or with recirculated air to reduce the need for treatment before the air is exhausted.

#### **CONTROLLING ODORS**

The enclosed tunnels of the Gicom system and the use of recirculated air are keys to eliminating odors. "Even though we're in Unity Plantation, an unorganized township, we have about 13 or 14 homes nearby, the nearest within 1,500 feet," says Belmont.

The composting process can operate with 100% outside air, or it can use recirculated air, cutting down on the amount of air that needs to be treated before it is exhausted to the atmosphere. Controlled by a computerized air handling system, the recycled air is piped through a recirculation loop into the aeration plenum.

"During startup the ratio is about 50% recirculated air and 50% outside or fresh air," Belmont says. Exhausted air passes through a Ceilcote (Verantis) odor-control scrubber. The pH of the wash water strips ammonia, and a biofilter filled with wood chips and compost further treats the air before it is discharged through roof-mounted dispersion fans. (continued)

#### Dare to Compare.



#### Picking the Right Blower Technology

Blowers are critical assets for wastewater treatment plants, and they are often the biggest energy consumers in the plant. Choosing the best blower is vital for plant operational success; however, too often engineers and operators, stick to blower technology they know best, rather than taking the time to compare blower technologies.

Multistage blowers have been a popular choice for many years, but did you know rotary screw and turbo blowers have better isentropic efficiencies than multistage blowers?

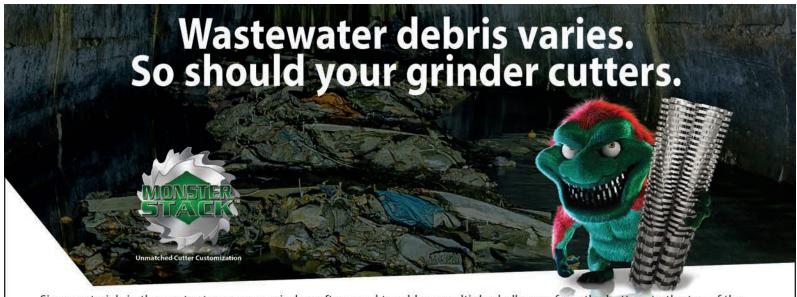
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Compost is moved from the first stage of the process into a grater that prepares the material for treatment before fermentation.

#### KEEPING UP WITH RULES

While every waste processing facility needs to address odors and respect its neighbors, many other environmental regulations require constant attention. Belmont says the changing regulatory environment is one of his facility's biggest challenges, especially the nationwide focus on PFAS.

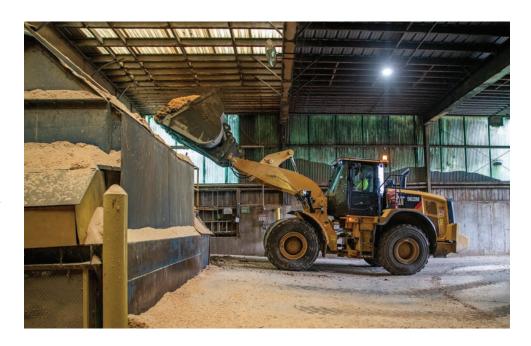
Most composting facilities and municipal wastewater treatment operations are finding small amounts of these "forever chemicals" in their biosolids. "In 2019, we began testing for these compounds. We currently test twice a year for PFAS and report our results to the state," says Belmont. "We have had to evaluate the risk assessment based in what we are finding in the products. We have reviewed loading rates, adopted best management practices, and have changed our labeling."

While emphasizing safety, he points out that Hawk Ridge needs to keep products going out the door. And

PFAS or not, municipalities still need to find a home for their biosolids. That's why Camden's David Bolstridge appreciates working with Hawk Ridge.

"Their customer service is second to none," he says. The previous plant he worked for also used the composting facility, so he has several years of experience with it. "They go beyond normal to keep us happy," he says. "We don't have a lot of storage here, and it's a big deal if we have to stop biomass going out. If we need something in a hurry, they respond."

Camden uses some earthlife composted products and offers them free to residents. "I'm pleased that the Maine Department of Environmental Protec-



tion is allowing us to continue to land spread it," says Bolstridge. "As far as costs go, it's about the same as landfilling, but it would be a travesty to fill our landfills with biosolids. It just makes sense to continue to land spread it." **tpo** 

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## **Boosting Water Jobs**

AN ONLINE JOB FAIR LAUNCHES AN EFFORT BY MILWAUKEE UTILITIES TO RAISE AWARENESS OF WATER CAREERS AND HELP THEM BUILD DIVERSE AND REPRESENTATIVE WORK FORCES

#### By Sandra Buettner

The Milwaukee Metropolitan Sewerage District and Milwaukee Water Works were challenged to create more awareness of water jobs available to area residents. The answer: A virtual jobs fair.

Milwaukee was part of a seven-city cohort chosen by the U. S. Water Alliance under its Water Equity Taskforce effort to create a more equitable workforce, with a demographic makeup representing the communities served.

Because of its location on Lake Michigan and its long history in the water industry, Milwaukee has been working to become a water-centric city. MMSD treats up to 650 mgd for 28 municipalities and serves 1.1 million people through its Jones Island and South Shore water reclamation facilities.

#### FORMING THE TEAM

After receiving the direction from the Milwaukee Water Equity Task-force's Roadmap to create more water job awareness, the two utilities joined with the Wisconsin Department of Natural Resources and Veolia Water Milwaukee, which is contracted by MMSD to operate, manage and maintain the two reclamation facilities, conveyance system and deep tunnel. During group meetings, team members decided to host an online water jobs fair.

"Having these four organizations join forces brought a great perspective to the meetings," says Lisa Sasso, MMSD senior project planner. "Each one of us brought different skill sets to the table. We all had experiences for this type of event in some form or another, and it helped immensely in sharing those experiences and ideas."

The four organizations promoted the fair, called "One Water, Our Water: Explore Milwaukee Jobs Fair," through their outreach channels. They issued a press release and used their accounts on Facebook, Twitter and LinkedIn. They also used word of mouth, contacted personal and professional networks and shared the event with city councils and the Milwaukee mayor's office. As a result, over 170 job seekers and career advisors registered for the event.

#### **EVENT TAKES SHAPE**

After several group calls and meetings, the team put together the agenda. Held May 12, 2021, the event was an online forum to tell participants about job openings in the four organizations. There was no charge to participants. Two local jobs organizations allowed the use of their offices for those who did not have access to technology.

The two-hour event opened with an introduction of the Milwaukee water sector. After that, each of the four organizations addressed the skill levels required for available jobs and talked about current and future openings at their facilities.

The DNR described its career pathway and explained how employees can move up in its organization. The Milwaukee Water Works featured an employee who spoke on his experience starting as a frontline worker and working up to management.

Participants learned how to engage with the organizations and were given contact information. That was followed by a question-and-answer session.



Milwaukee Water Works (MWW), Milwaukee Metropolitan Sewerage District (MMSD) and Veolia Water Milwaukee collaborated on the online job fair. Key players included, from left, Andi Kneeland, communications and community relations manager with Veolia; Aaron Saeugling, water systems and projects manager with the water works; Lisa Sasso, MMSD senior project planner; Jeff Spence, MMSD director of community outreach and business engagement; and Kamisha Harris, water marketing specialist with the water works.

Having these four organizations brought a great perspective to the meetings. Each one of us brought different skill sets to the table."

LISA SASSO

The team then went on to discuss a second event, planned for fall, with a focus on interviewing and hiring.

#### **NEXT STEPS**

Hoping to host an in-person event in fall, the team made plans to provide informational interviews to attendees. The goal is to get the attendees engaged, stay in touch and create a workforce support network for current and future job openings.

Down the road, as the event evolves, the group wants to add more water partners with job openings. After the pandemic, they plan to devise a trade show format where water organizations can host their own booths.

Aaron Saeugling, who serves as the water systems and projects manager for the Milwaukee Water Works, observes, "The city of Louisville has been especially helpful in sharing its best practices and what they learned along the way. They were like a twin city partnership with Milwaukee that is still ongoing today." **tpo** 







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# **Challenges Welcome**

JIM POULIOT EMBARKED ON A NEW JOB DETERMINED TO RESTORE AN AGING WASTEWATER TREATMENT FACILITY. THE COMPLETE REBUILD WILL ULTIMATELY INCLUDE A SOLAR ENERGY ARRAY.

STORY: Ted J. Rulseh | PHOTOGRAPHY: Adam Perri



im Pouliot always liked a challenge. That's a big reason he signed on four years ago as water and sewer superintendent in the Town of Epping, New Hampshire.

The membrane bioreactor wastewater treatment plant there was aging and in dire need of an upgrade. Working with a supportive water and sewer commission and town council, Pouliot and three team members are rebuilding the plant to state-of-the-art condition with three brand new MBR treatment trains.

The facility also includes an automated septage receiving that enabled the town to vastly increase the volume received from local haulers and generate revenue to support plant improvements. In addition, two old lagoons are being decommissioned; in a few years the site will be home to a 1.5 MW solar energy system.

Pouliot and his team have also found time to oversee construction of a new water treatment plant with greensand filters. It's no wonder, then, that Pouliot received a 2020 Regional Wastewater Treatment Plant Operator of the Year excellence award from the New England regional office of the U.S. EPA.

#### **FACING VIOLATIONS**

Pouliot grew up in Rhode Island. After high school he worked a few years on construction jobs before taking three and a half years of chemistry and biology studies at the University of Rhode Island. He left school after the birth of his second child, a son, and went to work at the Synagro fluidized bed reactor facility in Woonsocket, gaining experience in all phases of the operation.

At the time, his priority was to provide for his wife and kids: "My biggest concern was having a good, stable job, so I wouldn't have to worry about losing my job if the economy went down." After four years with Synagro he was hired on at the wastewater treatment plant in East Providence.



Eight years ago he moved to Portsmouth, New Hampshire, as an operator of two wastewater treatment facilities, including a sequencing batch reactor and a chemically enhanced primary treatment plant, one of only a few of its kind in the country. He arrived in Epping, a community of about 8,000 residents in far Southeast New Hampshire, in 2017.

At the time the old unlined lagoons were leaching pollutants including arsenic into the Lamprey River, the

treatment plant's receiving water. There had been more than 100 permit

violations in that year for ammonia, phosphorus, pH and other parameters; the plant was under an administrative order from the EPA to take corrective action. The plant equipment was old, maintenance intensive and subject to breakdowns.

#### TAKING CHARGE

Pouliot says, "I knew coming in that biggest question was: Would I have the backing of the elected officials in town?" He needn't have worried, because

Jim Pouliot

Town of Epping, New Hampshire

POSITION:

Water and sewer superintendent

EXPERIENCE:

15 years in the industry

Oversee operation and maintenance of water and wastewater facilities

FDLICATION:

3.5 years of chemistry and

biology studies, University of Rhode Island

CERTIFICATION:

**Grade 4 (highest) Wastewater Operator, Grade 4 (highest) Collection System Operator** 

Continue to maintain and improve the water and wastewater facilities

from the beginning, the board of selectmen and the water and sewer commission were behind him: "When I came, I was handed the keys and told, 'Get this plant up to shape.'

"They were willing to invest money down here, get things rolling in the right direction and make sure we did things the right way. There was no simply going with the cheapest bidder. We asked, 'Is this the correct way of

doing it? And is this what the system needs?' There was no Band-Aiding things together." Pouliot is especially grateful to Tom Gauthier, commission chair, and Mike Yergeau, the board representative to the water and sewer department.

At the beginning, Pouliot's sole co-worker was Norm Dionne, a town employee since 1987. "Trying to take care of two departments with two guys was unfeasible," says Pouliot. "I was able to convince the commission that we needed to hire more people." The newer team members are Anthony Shea, assistant superintendent, and Gene Doswell, operator.

"The crew I have is phenomenal," says Pouliot. "I give them a list of what I want done, and without question it will be done by the end of the day. And it will be done the way I expect it to be done, which is, you don't take shortcuts."

#### **GETTING IT DONE**

At the outset, Pouliot's biggest problem was deciding where to start and what upgrades should get first priority. "Especially since I had never worked in an MBR plant before, it was almost overwhelming," he says. "The first thing was just getting the process to the point of repair where we weren't causing so many violations going into the river.

"There were no standard operating procedures here when I started. There was no maintenance program.

All of that I had to develop myself. I took a lot of the information I learned from Portsmouth and brought it here to Epping."



#### FROM PROBLEM TO ASSET

One of Jim Pouliot's key challenges in the Town of Epping was decommissioning two old unlined lagoons that encompass about 8.5 acres.

"They were built back in 1967," Pouliot says. "They had never been cleaned out. Up to 2019, one of the lagoons was the septage receiving site for the town. A lot of septage was put in that lagoon, and it went in basically unscreened." Elevated levels of arsenic and nitrate began appearing in the Lamprey River, a federally designated Wild and Scenic River that flows past the lagoons.

The other lagoon functioned as an equalization tank; the original treatment system design could not accommodate I&I issues in the collection system.

Pouliot worked closely with Dave Mercier of the Underwood Engineers to devise a solution: cleaning out the lagoons, backfilling them to a level one foot above the river's 100-year floodplain boundary and converting the site to a 1.5 MW solar energy farm. A U.S. Department of Agriculture Rural Development grant will provide \$7.3 million for the project; and a 30-year, \$5.8 million loan from the same source at 1.25% interest.

"The energy savings from the solar farm will potentially cover the bond payments," Pouliot says. "We spend about \$130,000 to \$180,000 a year in electrical costs at the wastewater plant and another \$100,000 at the water plant. The bond payments should be about \$225,000 to \$250,000 per year once the project starts." Town residents overwhelmingly approved a referendum for the project in September 2020.

"The solar farm will not be built until both lagoons are completely decommissioned," Pouliot says. "We're looking at two-and-a-half years before the solar component is installed." The upgrade and upsizing of the treatment system should eliminate the need for flow equalization.

A key to his approach is minimizing maintenance. That means purchasing high-quality equipment that is simple to service and has spare parts readily available: "We're a small crew, and we deal with both water and sewer. Anything that's lower maintenance and takes less of our time, that's the road we're trying to go down."

The plant upgrades proceeded step by step. All equipment in headworks is new. The HVAC and electrical systems have been redone. Most components in the original UV disinfection system (Trojan Technologies) have been replaced with new TrojanUV components. Three sample-type turbidity meters have been replaced by one probe-type unit (Hach) in the UV channel. The office/lab building is renovated to into separate lab and office spaces, reducing the risk of sample contamination.

Most significant, the original MBR membranes and related instrumentation are being replaced with lower-maintenance AQQA flat-panel submerged membranes (Weise Water). The first of three new membranes went in last spring on a pilot basis; state regulators wanted the technology to be tested in colder and warmer months. The remaining membranes were to be installed before the end of this year.

#### TREATING THE WATER

The treatment process begins as a single pump station delivers the wastewater to a gravity-feed line. In the headworks the water goes through a 6 mm step screen (Claro Environmental Technologies) and into a grit chamber. A

The crew I have is phenomenal. I give them a list of what I want done, and without question it will be done by the end of the day."

Watson Marlow hose pump delivers the grit to a classifier (Claro).

After the grit chamber, chopper pumps (Vaughan) send the wastewater back to the headworks to a 2 mm screen (Claro). The flow then enters the MBR trains. After biological treatment, Boerger rotary lobe pumps pull the permeate through the membranes and send it to the UV system. From there it proceeds down a cascade falls to the Lamprey River.

The new MBR units have no air compressors or vacuum pumps; only one valve on each membrane train needs to be operated. Redundancy is built into the system so that if one permeate pump fails, the flow can be diverted to a fourth pump, ensuring that all three MBRs can continue to operate.

Biosolids are dewatered to 35-40% solids on a screw press (FKC); about 30 to 36 wet tons of material per week is sent to landfill. *(continued)* 



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#### HANDLING SEPTAGE

Septage receiving is essential to the process because it's the source of about half the treatment plant's revenue. "Because we're on a membrane system, we were only going to be able to take in about 6,300 gpd because of the BOD loading," says Pouliot. "The biggest obstacle was figuring out how to take in more septage without killing the process or causing violations."

The answer, worked out with Dave Mercier of Underwood Engineers, was to dewater the septage to remove much of the BOD: "Once we ran the numbers on that, we saw that were able to take on more septage haulers and grow that portion of the budget. We're now taking 50,000 to 60,000 gpd and sometimes up to 80,000, probably four or five time a year, mostly during the fall. We take in almost 10 million gallons of septage per year."

Haulers arriving at the plant swipe a card on the control panel of the receiving station (Claro) to open an air-actuated valve. The septage is transferred at about 300 gpm. It goes through an automated rock catcher and a step screen and then into one of two 12,000-gallon holding tanks.

Submersible pumps then send the material to the dewatering unit; the FKC screw press is fed a mix of 20 to 30 gallons of waste

activated sludge to about 80 gallons of septage. The solids are conveyed to a 30-cubic-yard dump container. The filtrate is sent to the headworks.

# Anything that's lower maintenance and takes less of our time, that's the road we're trying to go down."



Jim Pouliot (right) and Anthony Shea inspect the grit house pump (Watson-Marlow Fluid Technology Group) in the headworks building.

#### LEADING THE TEAM

With the upgraded plant and the expanded staff, there is ample time to maintain the system. That includes performing planned maintenance on a schedule in spring and fall. Pouliot prefers to lead with a light hand on the helm.

"I basically leave them alone. They need very little supervision. That gives me the time to concentrate on all the paperwork and the administrative side of things. But when they need my help, I'm out there getting dirty with them. I've always said that I will never ask them to do something that I won't do myself.

"Every Friday they start at headworks and work their way through the whole plant, mopping floors, sweeping, removing cobwebs. Once a month they wipe down all the equipment so there's not a lot of dust buildup. Whenever we do work, we mop after we're done. Outside, everything is mowed and manicured, so anybody who comes here can see that we take pride in our plant. Just because it's a wastewater plant doesn't mean it has to look like one."

Pouliot has Grade 4 Wastewater Operator certification, the highest; his colleagues all have Grade 2. Pouliot helped train the newer members up by sharing what he learned in previous jobs and by sending them to classes including courses offered by the state Department of Environmental Services. "I also take them to other plants to show them the different ways in which plants do things," Pouliot says.

The next few years will bring a big change in decommissioning the plant's old lagoons and activating the solar energy system: "That's going to make this facility state of the art. It's going to create a very economically feasible plant that will be easy to maintain."

Pouliot concludes, "I've always liked a challenge. This has been a good challenge. We've been able to accomplish a lot here." **tpo** 



A 6 mm step screen and 2 mm step screen-in-tank (both from Claro Environmental Technologies) protect an MBR system as well as a common wash press unit complete with bagger.

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## **Avoiding the Big Bang**

A SOLUTION THAT COMBINES HARDWARE WITH SOFTWARE SIMULATION CAN HELP BIOGAS-TO-ENERGY PLANTS MINIMIZE THE RISK OF DAMAGING EXPLOSIONS

#### By Fred Callahan

Biogas-fueled combined heat and power systems are increasingly common at wastewater treatment facilities.

Recent studies indicate that the United States has more than 2,200 operating biogas power systems and has potential to add some 13,500 more. However, the use of green and sustainable biogas energy brings some often overlooked risks in the form of explosions caused by backfire: the ignition of unburned gaseous fuel in intake and exhaust manifolds, exhaust lines and downstream piping.

These backfires can have devastating effects on the engine, exhaust ducts or even buildings and personnel. Now, practical and innovative solutions can mitigate this threat by using a self-resetting, closeable, spring-loaded valve with an integral flame arrester. The valves can be used indoors or outdoors and can be activated multiple times without plant downtime or maintenance.

#### VARIABLE FUEL

The explosion risk is vividly demonstrated when viewed in terms of the intake manifolds or exhaust lines of biogas-fueled engines, where all five elements of the explosion pentagon are potentially present during operation.

Biogas, when compared with natural gas, has more variable quality and a lower methane content. This poses an engineering challenge when setting up (mapping) the engines and acquiring the necessary air/fuel settings to achieve the optimum performance.

The use of green and sustainable biogas energy brings some often overlooked risks in the form of explosions caused by backfire.

Biogas consists mainly of methane (CH4) and carbon dioxide (CO2), but also contains impurities in amounts that depend on feedstock used. Therefore, it is necessary to conduct engine mapping during startup and after any significant changes to the process, conditions, feedstock or fuel to ensure the plant operates efficiently and safely.

For example, if an explosive mixture develops in the exhaust during startup — methane falling between the upper and lower explosive concentration — an ignition source in the form of engine backfire or contact with hot components can generate an explosion, releasing a massive pressure wave and flame front, with devastating consequences.

Since engines powered by conventional fossil fuels and many alternative fuels do not exhibit this same exposure to variable fuel quality and methane content, there is low awareness of explosion protection techniques in exhaust ducts at the initial design engineering phase.

#### FITTING THE APPLICATION

However, previous incidents in biogas plants confirm that there is a real explosion risk during the routine operation of the plant; therefore, proper consideration of mitigation measures is necessary.

Such mitigation and protection

measures need to consider the specifics of the application, including the explosive characteristics and variability range of the fuel and the exhaust duct pressure rating, length, diameter and geometry.

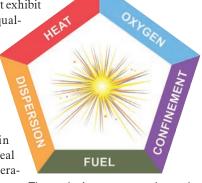
The initial assessment of any potential biogas engine explosion protection scheme requires design calculations to be made to determine the size, type, number and placement of explosion relief devices capable of mitigating the effects of any incident. A Windows-based engineering simulation software program is available to fulfill that requirement and to enable the selection of the optimum level of explosion protection.

The simulation has been independently tested by FTZU, an internationally recognized Notified Body Test Institute, using a variety of installations with different pipeline lengths, diameters and added components to create a range of realistic physical layouts.

After testing, FTZU identified a very close match between simulation and test. The software accurately predicted not only the right qualitative behavior but also the size and timing of the pressure peak.

#### DEPLOYING THE SOLUTION

Once the simulation results have been generated, the design of the protection system and devices required to mitigate any explosive/overpressure incidents can be formulated. The hardware solution consists of a series of flameless and reusable explosion-relief valves, designed in consultation with leading engine manufacturers specifically to protect personnel and plant equipment.



The explosion pentagon shows the conditions that must be present for an explosion to occur.



The device consists of a circular explosion-relief vent with stainless steel flame arrestors and a reclosable, spring-loaded valve plate with seal. If an internal explosion should occur, the pressure wave causes the valve plate to open and directs the explosive forces and fireball through the flame arrestors, quenching the flame and cooling the hot combustion gases as they pass through.

This enables the devices to be used indoors where other equipment may be situated or where personnel are working, and where conventional venting devices would not be permitted. Furthermore, a self-resetting design means that the units can be activated multiple times without plant downtime and without the need for maintenance.

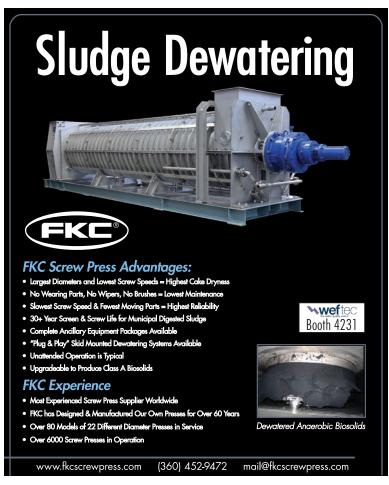
Available in a range of connection and venting area sizes with a compact profile, the explosion-relief valves are either designed for high opening pressures typically fitted to the engine intake and exhaust manifolds, or for lower opening pressures with a large effective vent area and located on the exhaust piping.

These devices are third-party certified by ATEX and IACS. Units are individually tested for function, opening pressure and leak-tightness before

As the movement intensifies to reclaim and use biogas as a sustainable fuel for power generation and as renewable source of energy for many processes, it is vital to ensure that engines and combined heat and power plants are equipped to mitigate against the risks of explosion. Specifying engineers should ensure that appropriate explosion protection relief devices are designed into biogas-fueled engines; this should also be considered in any plant upgrades or retrofits to existing equipment.

#### **ABOUT THE AUTHOR**

Fred Callahan (fred.callahan@hoerbiger.com) is regional sales manager, engines and generators, with HOERBIGER Safety Solutions, a subsidiary of IEP Technologies, a company specializing in explosion protection technologies. tpo



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#### **WASTEWATER**

By Rick Lallish

What part of a gravity belt thickener clears a path on the belt where the water falls freely through the belt?

- A. Polymer inlets
- B. Linear tension rods
- C. Chicanes
- D. Rivets

**ANSWER**: C. Gravity belt thickeners are very effective in thickening sludge for further conditioning before land application. They can achieve 0.4-8% solids, and sometimes higher. The devices remove water from the chemically conditioned sludge as it moves across a woven or porous belt. Chicanes are placed along the width and length of the belt. In addition to clearing a path, the chicanes assist in rolling the material, allowing the more filtrate to flow out. Thickening is a common subject on wastewater certification tests. Learn more in the WEF textbook, *Wastewater Fundamentals II – Solids Handling and Support Systems*, Chapter 2.

#### **DRINKING WATER**

By Drew Hoelscher

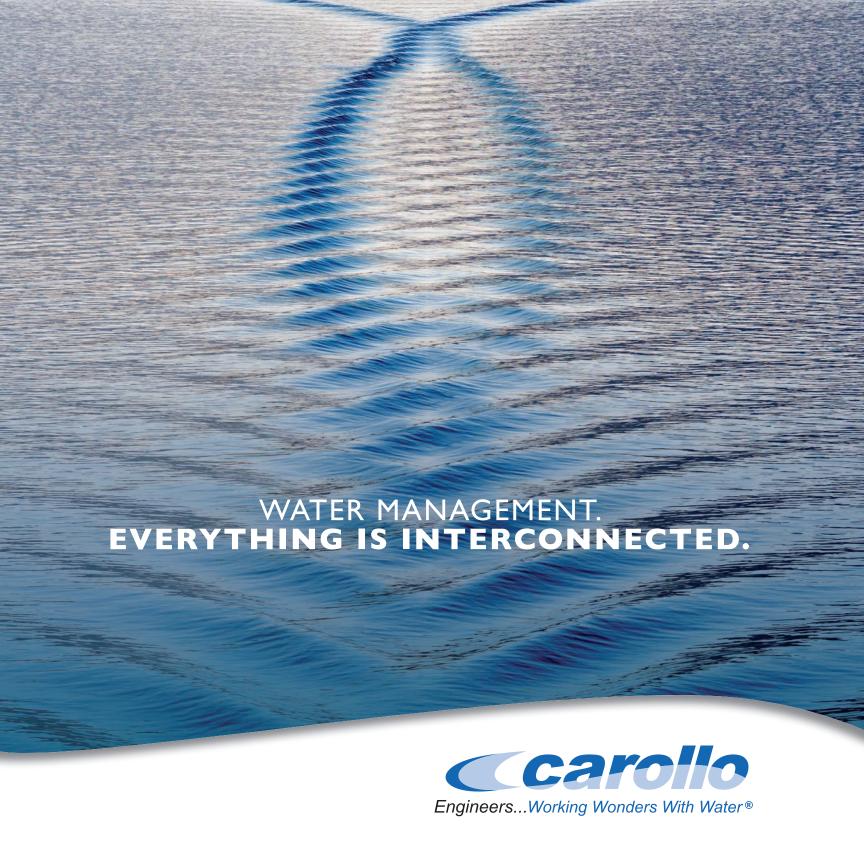
What type of flowmeter uses pressure differential to measure flow rate?

- A. Velocity flowmeter
- B. Venturi flowmeter
- C. Ultrasonic flowmeter
- D. Magnetic flowmeter

**ANSWER**: B. Venturi flowmeters rely on the pressure differential created as water flows through a pipe with changing cross-sectional areas. A pressure drop is created as the water passes through a reduced cross-section in the piping system. After the pressure difference is created and measured, the water flows through a pressure recovery section (increased cross-section) where up to 80% of the differential pressure generated is recovered. Venturi meters are commonly used to measure effluent flows from larger treatment plants.

#### **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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# **Getting to Zero Ammonia**

A NEW TECHNOLOGY INSTALLED IN A PLANT UPGRADE HELPS AN IOWA TOWN ACHIEVE 100% AMMONIA REMOVAL THROUGH WINTERS EVEN WITHOUT SUPPLEMENTAL HEATING OF THE WASTEWATER

#### By Melanie Lux

here's nothing Dan Van Langen enjoys more than a day of bird hunting with his German shorthair pointer Andie.

But these days Van Langen, director of Public Works in De Soto.

But these days Van Langen, director of Public Works in De Soto, Iowa, is more excited talking about the bugs in his town's wastewater lagoons than stalking pheasant in cornfields. That's because he has finally figured out how to remove the ammonia from the effluent even in the dead of winter, when low temperatures make the bugs less active.

He found the solution with help from Triplepoint Environmental and its NitrOx ammonia removal system. He was highly skeptical when the system was first piloted at the treatment plant in 2017, but now he is on board.

"When we consistently remove 100% of the ammonia in the dead of winter, with consecutive days of subzero temperatures, I can honestly say the NitrOx system is the best thing since sliced bread," he says.

#### TOUGHER ON AMMONIA

The story began in 2011 when the Iowa Department of Natural Resources was reclassifying all rivers, creeks and streams in the state under U.S. EPA guidelines. The goal was for all waterways to be fishable and swimmable, but in many cases, ammonia levels were too high.

Iowa was not alone; the same was true across the entire Mississippi Valley. Wastewater treatment plants from Minnesota to Louisiana suddenly



Brady O'Leary of Triplepoint prepared the NitrOx system for pilot testing.



Patrick Hill from Triplepoint, with their NitrOx ammonia removal system.

found themselves faced with a \$900 billion unfunded federal mandate to bring ammonia levels down.

Smaller plants like De Soto's, serving a community of about 450 households with two aerated lagoons, a quiescent cell and an average flow of 80,000 gpd, are especially challenged to make upgrades needed to satisfy the regulatory requirements.

Van Langen was more prepared than most. "I'm a stickler for having money in reserve, and we really try to budget accordingly each year," he says.

"I believe operators should plan for upgrades and be fiscally responsible. So when the state mandated us to take action on ammonia in 2016, we were financially prepared."

De Soto's project was part of an overall \$4.2 million plant renovation that included dredging of the lagoons, replacing 62 antiquated fine-bubble diffusers with 16 of Triplepoint's energy efficient aerators, and the ammonia system that would allow the plant to discharge safely to Bulger Creek.

#### **WEIGHING OPTIONS**

Before get into the wastewater industry Van Langen was a commercial photographer who specialized in weddings. With a wife and small children at home, he jumped at the opportunity to join De Soto's Public Works Department. Two years after joining, he was promoted to director.

Van Langen looked for an ammonia system knowing De Soto had no land to expand the plant; it is landlocked by railroad tracks to the north, a creek to the south and expensive land on the other two sides. There were also budget limitations.

He looked at a mechanical treatment facility, but the construction cost was \$15 million, and the new



The NitrOx system achieved 100% ammonia removal even through lowa's cold winters.

▲ After a month of zero ammonia in our effluent. I was drinking the NitrOx Kool-Aid."

#### **DAN VAN LANGEN**

plant would have required a Grade 3 operator at a much higher salary. The second option, an aerated rock bed nearly the size of a football field, was impractical.

The final option was the NitrOx system, a backend membrane bioreactor with four aeration tanks 10 by 20 feet and 18 feet deep, and a small process control building for a boiler, all for \$2 million. The compact size of the ammonia system and its ease of operation appealed to him.

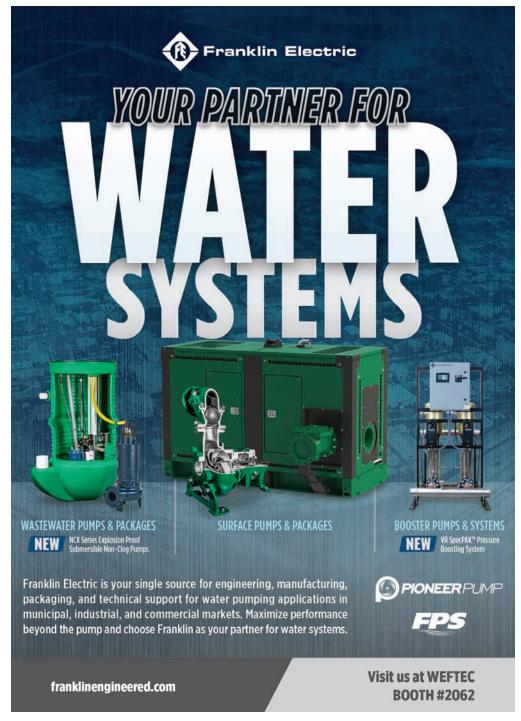
#### **GIVING IT A TRY**

Less appealing was that the technology was new to Iowa. And while the promised effluent ammonia numbers sounded great — an average of 0.3 mg/L even in the cold, Van Langen had his doubts.

"Mike Shoup, our engineer at the time, had met with Patrick Hill from Triplepoint and discussed doing a pilot of the NitrOx system," Van Langen says. "Triplepoint would run the pilot at no cost to us. Given there was no risk to us, and it would show the DNR that we were taking steps to reduce our ammonia levels, I agreed to the project. But I have to admit I was the biggest naysayer of the group. Put bugs in little houses and expect them to bring our ammonia down?"

Triplepoint conducted the pilot in the winter of 2019. As it progressed, it became clear that the system would work well for De Soto and for many other wastewater plants. Van Langen had to swallow his pride when Shoup's solution proved so successful: "After a month of zero ammonia in our effluent, I was drinking the NitrOx Kool-Aid."

There was one caveat. Because of the need to heat the water to 41 degrees F, thought to be the minimum temperature for the microbiology, De Soto's





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The four NitrOx cells are part of a \$2 million facility upgrade in De Soto, Iowa.

monthly energy bill rose from roughly \$900 to more than \$4,000. "We considered it a necessary evil," says Van Langen.

#### **RUNNING COOLER**

Contemplating the project later that year, Van Langen had an epiphany. His ammonia permit limit for January was 3.4 mg/L, so why was it necessary to remove 100% of the ammonia? He and Triplepoint's Patrick Hill decided to turn the temperature down to 40 degrees F and see if they could still meet the permit.

"We knew some of some bugs would die, but so what?" Van Langen says. "Funny thing, despite the cooler temperature, the bugs kept eating. Looking at that, I said to Patrick, 'Let's just turn the heat off." That was October 2019, and as winter set in and the water temperature in the reactors dropped as low as 32

degrees F, ammonia removal remained at 100%.

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Monthly energy bills dropped to an average of \$1,485, higher than in 2018 but attributable to the new blowers, a lift station, UV disinfection, outdoor lighting and a heated building. Van Langen's response to going heat-free with no drop in ammonia removal? "Mind blowing!"

During the winter of 2021, De Soto experienced three consecutive days of 27 degrees below zero. While Van Langen was tempted to turn on the heat, he let his bugs work, trusting the 36-degree temperature of the influent to protect them. They made it through.

"Looking at the cost of the ammonia removal system, the small footprint, ease of maintenance, and the data, this is a no brainer; the best solution on the market," Van Langen says. "A project of this scale and cost was only possible with the cooperation and understanding of our elected officials, the knowledge of our engineering department and the advice the city received from Triplepoint." tpo



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# Mysteries Solved

UNRAVELING TOUGH MECHANICAL AND WATER QUALITY CHALLENGES HELPS KEEP WORK LIFE INTERESTING FOR THIS WISCONSIN UTILITY LEADER

STORY: Scottie Dayton | PHOTOGRAPHY: Michael McLoone

aul Haugen had a mystery on his hands. The six wells supplying water to Germantown Waterworks' customers were supposed to be inspected every 10 years, but some ran barely half as long. For example, Wells 4 and 11 lasted two and four years. In February 2021, Well 5 went down after eight years. A cheese manufacturer exacerbated the situation by requiring the capacity of one well — 1 mgd.

"With the utility two wells deficient, we're at the threshold of not meeting peak demand," says Haugen, superintendent of the utility in Southeast Wisconsin. "If a water main ruptures or we have a major fire, the active wells would run nonstop and tax the motors."

Haugen inherited the mystery when the village hired him in June 2017. Not content with the status quo, he and Scott Weigand, designated operator, attacked the problem. CTW Corp., a pump contractor and Sarah Nunn, P.E., the company's operations manager, resolved the mechanical issues, but not their cause.

"Water conditions and water quality are never constant," Haugen says. "To understand what Mother Nature was throwing at us, Sarah recommended Andy Jacque, Ph.D., chief scientist and owner of Water Quality Investigation. Once he identified iron bacteria as the culprit, the Gordian knot unraveled."

Nunn nominated Haugen for the 2019 Operator Meritorious Award from the Wisconsin Section-AWWA based on his commitment to finding the answer. "Winning was a total shock," Haugen says. "The award wouldn't have been possible without my team."

#### WATER QUALITY

Treatment facilities at Wells 3 and 11 plus four other wells can supply the village with 1.8 mgd. Each treatment facility has a well pump room, a chemical room, a



Paul Haugen, water utility superintendent in Germantown, Wisconsin

hydrous manganese oxide chemical room, filters (sand and anthracite dual media with support gravels), a generator and an air compressor/blower room. The Well 3 facility has the laboratory.

Besides chlorination and fluoridation, hydrous manganese oxide is injected to remove radium. Water is stored



**Winning** was a total shock. The award wouldn't have been possible without my team." **PAUL HAUGEN** 

Haugen (center) talks with Mason Rens, left, head driller, and Conrad Rens, assistant driller, of Municipal Well & Pump. The contractor was drilling a new well on the site of a new water tower.



The team at the Village of Germantown water utility includes, from left, Steve Lemke and Eric Kleiss, water utility technicians; Paul Haugen, water superintendent; Lauren Downs, summer intern; Scott Weigand, foreman/designated operator; and Jeff Downs, water utility technician. Not pictured is Mike Zielinski, water utility technician.

Haugen checks a drilling sample on the site where a new water tower will be built.

in three towers with 2 million gallons combined capacity and distributed through 97 miles of mains. Besides Weigand, the plant team includes Jeff Downs, Eric Kleiss, Mike Zielinski, and Steve Lemke, certified operators and Crystal Bartz, billing clerk.

Haugen, 58, graduated from Homestead High School in Mequon, Wisconsin, in 1981. He worked on oil drilling rigs in Utah, Colorado and Wyoming before returning home to build coaxial cable for a communications company. In 1984, he joined the Fox Point Water Utility, eventually certifying as a Grade 1 (entry level) distribution and groundwater operator.

Meanwhile, he learned all the village had to offer, from collecting waste for the public works department to earning an emergency medical technician license and serving as a firefighter. In 1990, he was promoted to water utility foremen. He left the village in 2014, worked three years for an electric utility, and then joined Germantown Waterworks.

"Thankfully, Fox Point taught me the basics, because I walked in here cold," Haugen says. "Without a succession plan, I had no idea where my predecessor left off and what should follow. It was daunting, but Scott helped me through those days."

#### **LOST AND FOUND**

In early October 2017 Scott Weigand, designated operator with the Germantown (Wisconsin) Waterworks, was on foot flow-testing hydrants behind a commercial property and apartment buildings. His route paralleled a large pond and natural drainage area with 6-foot-tall grasses.

Although the storm ditches were dry, the pond had running water. Weigand called Paul Haugen, his superintendent. Looking on GIS, they saw the pond, containing tens of thousands of gallons, and a distribution main running through it. "Our GIS pictometry, an aerial image capture process, dates to the 1960s," Haugen says. "The pond shrank in size the farther back we went."

Unable to isolate various water sources because of the surrounding properties, Haugen walked around the pond, GIS map in hand. When he reached the location of the distribution pipe, he walked cautiously into the tall grass and saw water bubbling up.

To uncover the leak, the utility crew began with a complex bypass feed to keep a restaurant open. They connected to a hydrant, drew a sample for a Bac-T (coliform test), drilled a hole in the building and ran piping to the water meter.

Meanwhile, a contractor dug a 12-inch-diameter wet well and dewatered the pond. Then Haugen's team exposed the area and discovered an old, undocumented valve box. Iron bacteria had eaten the valve's 1.25-inch galvanized pressure-testing plug.

"I used a 5 gallon bucket to measure water volume and it filled in a second," Haugen says. "We were losing 31.5 million gallons per year. I'm proud of my team. They installed a new valve, replaced a hydrant and upgraded the piping in three work days."

### PREVIOUS MAINTENANCE

On the surface, basic maintenance appeared to have kept the utility in good condition. Annually, it averaged 8 to 10 water main breaks and lost 12 to 14 hydrants to internal part failures and vehicle collisions. The crew routinely flushed the distribution system from the wells and water towers to the ends of the pipes and exercised valves.

Haugen, however, took a deeper look and saw what had to change. "My approach is to stay ahead of the curve by repairing more infrastructure and replacing more old hydrants and valves," he says.

For workers, a facility rehab now means going through the building with a fine-toothed comb, identifying what isn't working and fixing it from the roof on down. A recent project was patching the floors and coating them with epoxy paint because caustic chemicals had eaten holes in the concrete.

But deep in the wells, a problem that had developed over a decade was reaching maturity. "The condition wasn't significant enough for my predecessor to detect," says Haugen. "It only rumbled to life after I arrived, and we were fortunate to catch it when we did."

Before replacing the 10-foot sections of column pipe, Jacque recommended coating them with epoxy. "A contractor sandblasted the pipes inside and out, then COVID hit and all manufacture of column pipes and epoxy coatings ceased," Haugen says. The plant plans on using Bar-Rust 233H (Devoe) solvent-free epoxy.

Meanwhile, Jacque discovered that the microbes were eating the graphite-based lubricant on the column pipe couplings. He recommended switching to Slickon GTS Gold Thread Sealant with polytetrafluoroethylene (Anti-Seize Technology), a non-carbon-based grease.

Once Well 4 is online, Jacque's pump maintenance program will continue biofilm mitigation via weekly low-dose chlorine injections. First, the pump must run for five minutes, enabling the drawdown to create a vortex. "Then we shut off the pump, pour in the chlorine, and the vortex carries it down to the cased region and aquifer," Haugen says. "The chlorine needs two hours of static water to kill the critters." (continued)

### **OPENING SALVO**

Mastering each well's history was a learning curve. For example, before starting a well, operators originally used a vegetable oil bath to lubricate the spider that centered the pump rods as they passed through it. In 2015, Well 4 was the last to be converted to a water lube bath. Workers also replaced the pump and piping.

Three years later, customers began complaining about cloudy water. "We didn't know if there was a hole in a column pipe, if the drawdown exceeded a pump's output, or if something else was wrong," Haugen says.

CTW analyzed the situation and determined Well 4 was losing capacity. After pulling everything out of the well, the team found holes in the ductile iron column pipe and the coupling threads, and the 13-stage pump was missing impellers. With no idea what caused the damage, they repaired it and replaced the piping.

In 2020, Well 4 lost pumping capacity again. This time, Nunn recommended partnering with Andy Jacque, Ph.D., chief scientist and owner of Water Quality Investigation in Mount Horeb, Wisconsin.

"For years the water industry has misunderstood the complex relationship between biofilm, corrosion, disinfection and coliform positive results," Nunn says. "Andy identifies the core issue or deficiency, removes it and, by substantially improving water quality, reduces chemical additions and system repairs."

### **WELL 4 RESTORATION**

Jacque analyzed Well 4 water samples under the microscope and identified nonpathogenic iron bacteria as the culprit. "The bacteria create communities that need nutrients to survive, so they eat the iron in carbon steel column pipes," Haugen says. "Once the bacteria attach to the pipe, they secrete slime, or biofilm, which forms a hard protective shell. Most of our system is ductile iron or PVC pipes, and all six wells show signs of biofouling."

Iron bacteria don't give up easily. Operators followed Jacque's recommendations and cleaned the cased region and lower bore hole with inhabitant hydrochloric acid and glycolic acid to fracture the shells. After neutralizing and discharging the chemicals, they introduced high doses of chlorine to kill the exposed microbes.



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Scott Weigand (right) and Paul Haugen with an OptaCell horizontal pressure filter system (Tonka Water, a Kurita Brand) at Germantown's Well 11.

A secondary protocol involves weekly testing of water samples from the column pipe, lower bore hole and aquifer for biofilm growth. Quarterly, Jacque analyzes the samples under a microscope.

"We're still recirculating chlorine and testing pH to see how much is being absorbed," Haugen says. Operators use the Pocket Pro Low Conductivity Tester (Hach). Once the epoxy coating arrives and the SIMFLO pump is installed, Haugen estimated that Well 4 would be online in a week or two.

## ROLLING THE DICE

Haugen's challenges were far from over. His predecessors knew Pump 11, a treatment well, had a stray current problem, but not its source. They suspected the current was exacerbating corrosion and biofilm. In 2016, operators installed an impressed current cathodic protection system to generate sacrificial anodes, but wondered if the microbes would feed on them or prefer the column pipe.

In 2020 and based on the history of Well 4, Haugen pulled Pump 11 for rehab. Upon inspection, CTW found a quarter-size hole in the column pipe. "It was too small to affect the well's specific capacity, but Sarah said the pump would fail in less than six months," he says.

That September, the utility's SCADA system recorded an amperage increase on Pump 3, the second treatment well. When the draw exceeded the setpoint, SCADA turned it off. "Such an alarm usually indicates a mechanical restriction, so we cautiously tried to restart the pump," Haugen says. It didn't work.

When CTW technicians pulled the pump, they found a sand lockup. "The bottom of the bore holes is sandstone, and it sloughs off occasionally," Haugen says. "When the pump drew in the particulates, they seized up some impellers."

CTW rebuilt the pump and removed the ball bearings in the ratchets on top of the motor to prevent future lockups. "The ratchets normally retain the static energy inside 900 feet of pump rods for the next startup," Haugen says. "Now when the pump shuts off, the coiled energy runs out and the kinetic energy reverses in a second, flushing away any sand."

It's vital to retain operators instead of replacing them with contractors. Operators have the historical information to keep water systems healthy."

## **UNCERTAIN ELEMENTS**

The pumps aren't Haugen's only challenge. A cheese manufacturer has its own 1 mgd production well, which is often offline for maintenance. When that happens and without warning, the owners switch to utility water. "Meeting their demand of 600 to 900 gpm takes one pump and puts us in a tighter spot," Haugen says.

Haugen is working with the Public Service Commission to create a rate structure beneficial to the village and the plant's owners. "They want to become a full-time customer but are waiting for the rate case," he says. "Our caveat is that they must keep their well as backup until our new Well 12 is online in two years."

Weather emergencies are another loose cannon in Haugen's life. In mid-December 2020, a winter storm caused power outages across the region. Haugen had two wells offline and Well 4 without a generator. "The situation was too tense for me to sleep that weekend," he says. "I even alerted nearby Menomonee Falls to the possibility of opening the two 8-inch interconnections."

It wasn't necessary.

The averted crisis was barely in Haugen's rearview mirror before Jeff Downs heard a rhythmic subterranean booming from Well 5 during daily pump rounds. Weigand and Haugen arrived to cycle the pump and listen: not good. CTW crews at Wells 4 and 11 quickly converged to help.

"Five isn't deep, so the guys pulled the pump in a day and found a hole in the pump bowl," Haugen says. "It had blown in an instant and acted like a jet engine, forcing the pipe column against the cased region." CTW had the well back online in a week and a half.

### TORCH BEARER

Haugen's list of current and future improvement projects is daunting. Once completed, they will fulfill his biggest goal of leaving a standard of excellence for the utility to follow. That includes writing succession plans and mentoring his eventual replacement.

Haugen also invests in new people, just like his mentor, Marty Gladowski, the former village of Brown Deer water superintendent. "Marty answered all my newbie questions because he believed veterans should share their knowledge and advice with those passionate to learn," Haugen says. "It's vital to retain operators instead of replacing them with contractors. Operators have the historical information to keep water systems healthy."

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This root ball pulled from a South Bend sewer was named The Blob, because it appeared to be trying to eat a worker's foot.



# By the Numbers

AN ARRAY OF SENSORS IN THE COMBINED SEWERS HELP THE SOUTH BEND WASTEWATER DEPARTMENT KEEP THE SYSTEM FLOWING SMOOTHLY AND PREVENT SEWER OVERFLOWS

### By Steve Lund

Radcliff loves his numbers.

"As a civil engineer, I'm all about measurement," says Radcliff, combined sewer overflow operations manager for the South Bend (Indiana) Wastewater Department.

The numbers generated by a network of sensors (CSONet, hosted by Xylem Vue) on the collection system, along with data visualization tools developed by South Bend and EmNet, enable Radcliff to see trends and spot issues before they become problems. As a result, dry-weather overflows of the combined sewer system have all but been eliminated, and wet-weather overflows substantially reduced.

"Our overflows per inch of rain keep going down and down," Radcliff says. Part of that reduction is from a sewer separation project, and other efforts to prevent I&I, but Radcliff thinks much of it comes his team's use of data collected by the sensors to manage the system better.

### **MULTIPLE SENSORS**

Originally installed in 2007 and upgraded in 2017, the 150 sensors in the system measure flow, depth, velocity, positions of weirs and gate control valves, water temperature, river level, turbidity and oxidation reduction potential (ORP). The system has automated valves to direct the flow in the sewers and control stormwater basin levels.

"We've learned quite a bit from having the sensor data," Radcliff says. "For example, we discovered our interceptor pipe was not being completely filled before we would have wet-weather discharges. Using the sensor data, we identified places in the system where we could run parallel throttle lines and pinch valves.

"It's a 'smart' sewer system. As rain comes in, the pinch valves open up and allow more flow to go into the interceptor, until all that capacity gets filled. Then they start closing down. We've been able to optimize flow into the interceptor and help minimize wet-weather discharges."

### DATA FOR PLANNING

Radcliff hopes the sensor data will help improve the design and reduce the cost of the next phase of South Bend's Long-Term Control Plan. The first phase was the creation of the sensor system, along with separation of the storm and sanitary sewers in some neighborhoods. The first phase reduced combined sewer overflows by 75%, according to the city's website.

The next phase will involve building storage areas in the collection system. The original estimated cost was \$700 million, more than four times the cost of the first phase, but data collection over the years has led to some modifications. The new Phase 2 is called the Smarter Alternative for a Greener Environment and has a much lower price tag at \$200 million. The city is waiting for federal approval of the new plan.

"We recognized that we could do this a lot better," Radcliff says. "It's like the old expression, 'You don't know what you don't know.' We got smarter over the life of the



Richard Radcliff, CSO operations manager for the South Bend Wastewater Department

sensors that we put in. That's what allowed us to revise our Long-Term Control Plan and, we hope, save the city a considerable amount of money while concurrently making the environment better."

### **REVISED STORAGE**

Radcliff says the revised plan still calls for underground storage, but not as much as in the initial plan. "We're still going to need tanks; the system still does overflow, but the sizes and the locations have changed," Radcliff says.

"The success we've had will allow us to build smaller and fewer tanks than we thought we would need. Sensors brought light to the collection system and allowed us to find blockages, find I&I and find problems. Sensors gave us a better focus on where the problems are."

Working with the numbers and visualizations that the sensor network produces, Radcliff can see problems developing that sometimes don't show up in a physical inspection. In one incident he called to alert a crew on the road to a problem at a site. They said they had just checked it, and it was OK. Radcliff didn't think so and arranged to meet them at the site. *(continued)* 

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"This place is 25 feet deep," he says. "We set up confined-space equipment and sent a man down there. When we brought him back up, he had a quarter-piece of manhole cover that had lodged in there. It wasn't enough to stop the flow, but over time, stuff could have built up on that piece of manhole cover and caused a blockage, and possibly an illegal overflow."

### **DISCOVERING "MONSTERS"**

His colleagues wondered how he knew what was in there; he said he didn't know what it was; only that something wasn't right. "I'm in an office two miles away, and this is 25 feet underground," Radcliff

says. "I saw the level rise a tenth of a foot, and I knew that wasn't normal. This is the kind of thing you miss with your eyes, but the numbers don't lie."

A quarter of a manhole cover is tiny compared to some of the things Radcliff and his crew have found in the collection system. At one point he saw a bump in the

trend line for a section where the water level went from 2 to 3 feet to 4 feet, then back to around 3 feet. They found a large amount of grit in the section where the water level bumped up. After a CCTV inspection, they found a root mass that was slowing down the flow and causing the grit to be deposited.

They also found large chunks of concrete and rocks that formed a dam inside the 96-inch interceptor sewer. The only way to remove that was to send a diver in to tie ropes around the obstructions so they could be hauled out. "To me, looking at numbers, I know what normal looks like," Radcliff says. "It could be a manhole cover, a root mass, whatever. It's apparent to me from a distance."

Radcliff has given a PowerPoint presentation called "Discovering Sewer Monsters" at an Indiana Water Environment Association conference and other events. One obstruction found in the sewers he named "The Blob," because it resembled the monster from an old sci-fi film. Another he called

"Jaws" because it reminded him of a shark. He adds theme music to the presentation to enhance the effect.

## TARGETING MAINTENANCE

The sensor data also helps South Bend prioritize maintenance near the 35 overflow points in the system. "It may not be necessary to go to every site every single day," Radcliff says. "If any sites appear to be above normal ranges, we can go to those sites. It allows me to optimize flow in the system and optimize maintenance and operations."

I don't know how you could manage a collection system without a sensor network. You'd just be blind."

RICHARD RADCLIFF

Over time, sensors have shown that some areas are problem-free, so the sensors could be moved to places where they might be more useful. "As a result of looking at the data, it's clear that some sites we don't need to worry about," Radcliff says. "We've moved sensors around, we've deleted some in some areas, and we've added some to others. It's a living, ongoing system."

Before the monitoring system was installed, South Bend was averaging 35 dry-weather overflows a year, each one resulting in a hefty fine from the EPA. Now the system almost never has dry-weather overflows. Radcliff can't imagine managing a sewer collection system without a network of sensors.

"If someone asked me to manage a system that didn't have sensors, I'd say it's all but impossible. I don't know how you could manage a collection system without a sensor network. You'd just be blind. You'd never be able to quantify the effect of the changes you make." **tpo** 



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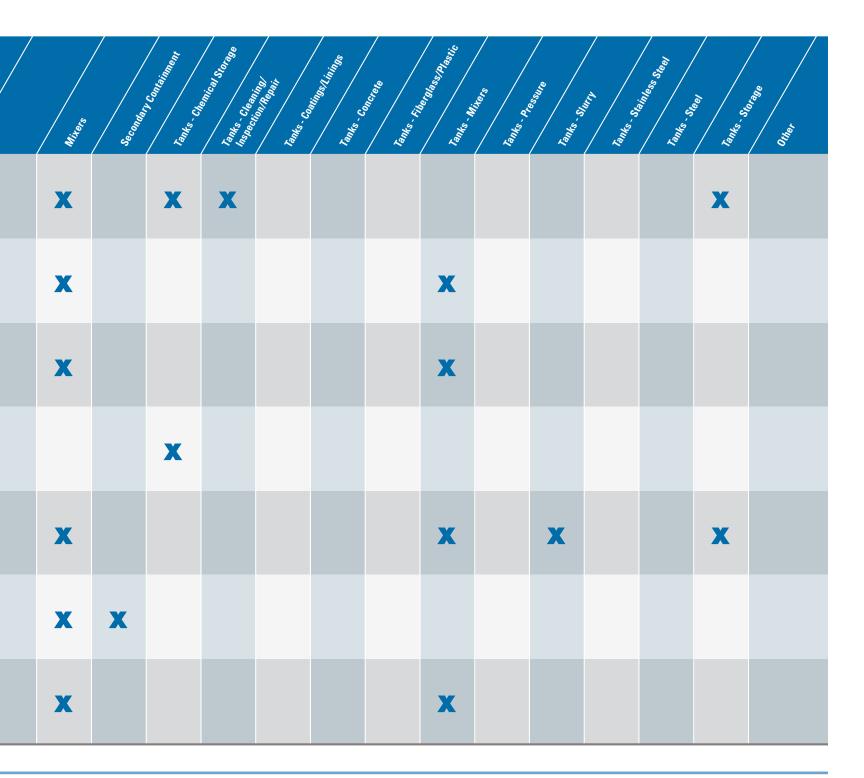
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We went with the superheroes theme because it is truly applicable to what we do here."

Steve Lee, safety specialist, compares prices of different liquids to tap water in a game of "The Price is What?"

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# **Superheroes Take the Stage**

A SOUTH CAROLINA UTILITY FEATURES PLANT WORKERS IN COSTUMES TO EDUCATE AND ENTERTAIN CHILDREN AT ITS THIRD ANNUAL TRICK OR TREATMENT

# By Sandra Buettner

Beaufort-Jasper Water and Sewer Authority plans to host third annual Trick or Treatment event in October at two of its wastewater treatment facilities.

"We went with a superheroes theme because it is truly applicable to what we do here," says Pamela Flasch, director of public affairs. "We wanted to encourage our future workers who may be attending the event to think of us that way."

The first Trick or Treatment in 2019 was in person, and 500 fifth and sixth graders attended over two days. After COVID-19, the 2020 event went virtual. "We hope the 2021 event will be in person again," Flasch says. "While the short video vignettes we created for the virtual event worked well, the children appreciated the hands-on activities and touring the plants in person."

### **FUN WITH MASCOTS**

The authority promoted the event through its website, outreach to schools and Facebook, Instagram and Twitter. There was a waiting list after the first event, and many adult civic groups and homeowner associations asked to attend when they heard about it and saw it on social media.

The authority is based in Okatie, South Carolina, and treats about 10 mgd of wastewater. The service area covers the two southern counties of Beaufort and Jasper, a tourist area that includes Hilton Head Island and is home to about 100,000 residents.

The half-day, in-person event was held for two days in October from 9 a.m. to 1 p.m. Staff members all took part in making it fun and engaging.

School buses alternated drop-offs of kids throughout the morning. The children were greeted by the mascots Flow, the Clean Water Advocate, and Swampy, the Great Swamp Steward. Pictures were taken with each class, their teachers and the mascots.

A tour guide and monitor took

each class through either the Port Royal Island Water Reclamation Facility, home to one of two solar arrays, or the Hardeeville Water Reclamation Facility, winner of an Envision Bronze Award from the Institute for Sustainable Infrastructure.

# CARNIVAL ATMOSPHERE

"We went with a carnival atmosphere and made it for fun for the kids by putting the exhibits and demonstrations in tents around the plants," Flasch says.

Throughout the facilities, the students visited booths where staff members from various departments explained different aspects of what they do. One booth had the children look through microscopes to see good versus bad bacteria. Another showed what to flush or not flush, and how the cost of tap water stacks up against bottled water and other common liquids.

The SCADA team showed the students how a SCADA system works. Another booth had the water engineering system, nicknamed WES, that is

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Mascots Flow and Swampy gather for a class photo with students at the Hardeeville Water Reclamation Facility.

a favorite at education festivals for the children. Created and built by Brian Chemsak, chief of plant operations, and Kevin Sexton, water operations manager, the interactive unit features a water source pump and a collection of pipes with which children build a working system to get water from a holding tank into buckets.

### **TAKEAWAYS**

At the end of the event, teachers received bags of "creepy candy" to give to their students. They also received a wastewater report to share in their classrooms. The children received a trifold brochure that among other things told them what they should and should not put down the drain, and a recap of what they learned at the event.



Tricia Kilgore, P.E., director of technology and innovation, talks to students about good versus harmful bacteria.

Feedback from the students, teachers and public was overwhelmingly positive. Trick or Treatment won a Public Information and Education Award in the Educational Programs category from the National Association of Clean Water Agencies.

"The staff really had a lot of fun with the event," says Flasch. She continued, "In addition to fulfilling one of our external engagement goals, this event became a team builder for our plant staff. We will definitely keep it going and will continue the superhero theme." tpo

# The Pathway to Cyber Confidence

ATTACKS ON CRITICAL INFRASTRUCTURE INCLUDING WATER AND WASTEWATER ARE AN INCREASING AND SERIOUS THREAT. HERE IS SOME ADVICE ON HOW TO DEFEND CRITICAL ASSETS AND PROCESSES.

By Ted J. Rulseh

wo fairly recent events should have erased all doubt about whether cyberattacks are a serious threat to critical infrastructure, including water and wastewater treatment plants.

In February, an attack on a water treatment facility in Oldsmar, Florida, briefly but dramatically changed the level of sodium hydroxide in the water. If the operations team had not detected the change and taken action, the sodium hydroxide in the water supply would have reached an extremely dangerous level.

In May, a ransomware attack on the largest fuel pipeline serving the East Coast of the United States forced a temporary shutdown of operations and led to gasoline shortages in multiple states.

These should not be seen as isolated incidents, as cybercrime is on the rise worldwide.

Schneider Electric is among companies carefully monitoring trends in cyberattacks and advising water and wastewater utilities on how they can defend themselves. Andrew Nix, an operational cybersecurity consultant with the company, talked about the issues and the path to cyber-confidence in an interview with *Treatment Plant Operator*.

### **LDO**: How widespread is the threat of cybercrime today?

**Nix:** Cybercrime and cyber incidents on the operational side are a hugely growing issue with critical infrastructure and with public and private organizations both private and public. The U.S. Department of Justice estimates that cybercrime will cost the global economy \$6 trillion this year, more than the gross domestic product of the United Kingdom and France combined.

# **Upo:** What does the picture look like on the industrial and utility side specifically?

**Nix:** In 2016 the Industrial Control Systems Cyber Emergency Response Team, a division of the Department of Homeland Security, qualified 390 new vulnerabilities in the industrial control space that could affect critical infrastructure including water and wastewater utilities. Of those, 91% were classed as vulnerabilities susceptible to remote attack. Accenture, a major consulting firm, has estimated that operational cyberattacks have gone up by more than 67% since then.

## **LDO**: Why are attacks on the operational side so worrisome?

**Nix:** In the operational technology space it can be hard to quantify how many attacks there are because most organizations have little visibility to the day-to-day happenings of their operational systems — their SCADA and control systems. So they don't find out about intrusions until weeks or even months after they happen. By then the damage may already be done. The information has been leaked, they're in panic mode trying to get it resolved, they don't necessarily know where it started, and so they can't definitively say it won't happen again.

# **tpo**: What is the greatest type of risk for entities like water and wastewater utilities?

Nix: Downtime to operational systems is the number one driver behind cybersecurity risk in that space. The water industry has huge potential for life safety implications if there is a failure in delivery, in purification, in any number of things. Water is the basis of human life, and delivering it in a timely and safe manner is absolutely critical.



Andrew Nix

The water industry has huge potential for life safety implications if there is a failure in delivery, in purification, in any number of things."

# **LPO:** What lessons can be learned from the attack on the Florida water plant this year?

**Nix:** Very few utilities are exempt from similar events. The attack could have happened to anyone. An unknown person somewhere in the world gained full read and write access the facility's SCADA system. Fortunately, the value in question was changed so dramatically that an employee noticed it and was able to shift it back and raise an alarm. But imagine if that happened during a shift change, in a hurricane, or at three in the morning. Attackers don't work on your schedule. They don't care if you're short-staffed, if you haven't had time to patch your PLCs, or if there wasn't budget for cybersecurity this year. They will take advantage of that.

# **Upo:** What exactly do you mean in talking about the path to cyber confidence?

**Nix:** It's about what can be done for the people who deliver clean water and deliver the energy that keeps our society running and keeps us comfortable and happy in our homes. It's about giving them the ability to go home at night feeling that their operation is safe. That comes down for key areas: Reliance on standards, effective training and enforcement of a cybersecurity culture, observing cybersecurity fundamentals (see sidebar), and being unafraid to ask for help.

**tpo**: What are these standards and in what ways are they helpful? **Nix:** There are standards like IEC 62443, and there are AWWA standards. (continued)



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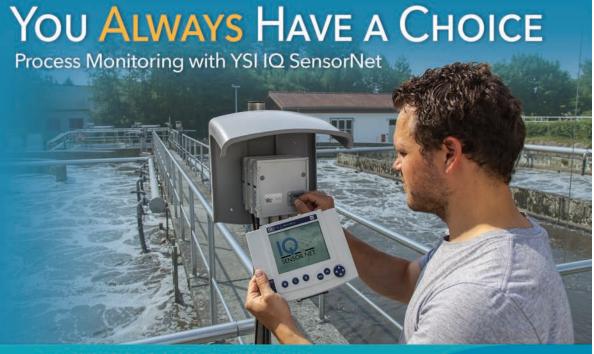
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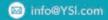
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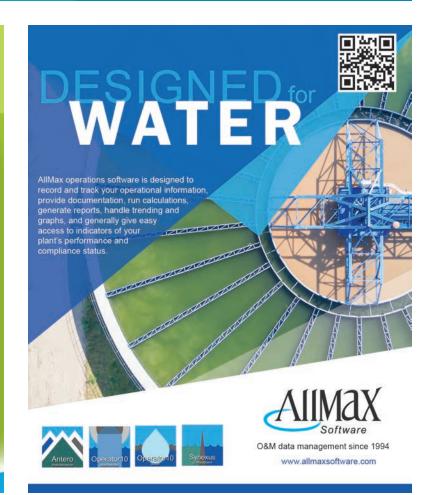


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# In training and enforcing a culture of cybersecurity, it's important for everyone in the organization to know how they, in their specific roles, fit into being cybersecure." ANDREW NIX

The AWWA cyber risk tool can give high-level guidance to what cyber policies and procedures a utility needs to have in place in order to run facilities safely. Tools like that provide great starting points, but there's a need to understand how they apply to a particular industry and a particular facility.

### **LDO**: How does training fit into the picture?

**Nix:** In training and enforcing a culture of cybersecurity, it's important for everyone in the organization to know how they, in their specific roles, fit into being cybersecure. That means going beyond a mandated minimum of training to implement a role-based cybersecurity workshop. Those operating the SCADA system, for example, need to understand the impact they have on the cybersecurity hygiene of the facility, versus someone operating an engineering workstation or someone on the administrative side. People in each role need to have a genuine feel for how they fit into the cyber health of the organization and what their responsibilities are in keeping it safe.

# **LPO**: Why is it important for water and wastewater utilities to reach out for assistance?

**Nix:** Their core business is delivering safe drinking water or cleaning wastewater and making sure they meet the necessary standards. They shouldn't have to be cybersecurity experts in their own right. It's appropriate for them to reach out and ask experts in the cybersecurity field for assistance. That way the folks they hired can focus on making their facilities runs flawlessly, while experts help make sure the cybersecurity of the equipment is stable and up to date.

### **tpo**: What kinds of assistance can a firm like yours provide?

**Nix:** We have the perspective of not only manufacturing equipment that runs water and wastewater facilities, but also operating manufacturing facilities of our own that we have to protect from a cybersecurity standpoint. So we have strong insights into the ways many industries manage cybersecurity, and can help our customers secure their operational infrastructure as well. We've developed a team of cybersecurity consultants who can help water and wastewater entities understand the level of cybersecurity they need to defend against the latest threats in their industry.

# **LPO**: How would you define the level of security water and wastewater facilities need?

**Nix:** The standards specify security levels from 1 to 4. Given the criticality of water, we recommend that water and wastewater organizations aim for Security Level 3, which is protection against intentional violation using sophisticated means with resources. We can help customers identify where they stand today, what their risks are, and where the gaps are in their current system. Then we can help them pick the most cost-effective way to make themselves an unattractive target for cybersecurity bad actors. **tpo** 

# Seven Fundamentals

Here, in brief, are seven fundamentals of cybersecurity as describe by Andrew Nix of Schneider Electric:

- 1. Perform an asset inventory. "Without an asset inventory, you don't know what you're protecting," says Nix. "This is a great starting point to understand what's in your network, what its state is today, and at a base level what you must do to make sure what you have is secure."
- 2. Assess the risks. You can do this with internal staff, if qualified, or with a third-party expert. This assessment reveals where your assets and policies stand in terms of overall cyber hygiene. "That's going to give you an understanding of what cybersecurity policies and practices you have in place, how they relate to your equipment, and where the gaps are that need to be filled.
- 3. Minimize control system exposure. Control system equipment should not touch the open internet, and the most critical devices should be kept the farthest away from the outside world. "Control systems should be protected several layers away from the outside world," says Nix. "You can utilize OT-specific tools that scan your network looking for PLCs, industrial controls and equipment that can communicate outside of their operational zone, or worse, on the open internet. Ideally, those tools should come back with a clean report."
- **4. Enforce user access controls.** Be sure that access to the SCADA system and other controls is granted only to the appropriate personnel at appropriate levels of access. This applies to internal team members as well as vendors, engineering companies and contractors.
- 5. Safeguard against unauthorized physical access. "Make sure there are no open USB slots or internet ports that users can access to plug into a device," says Nix. "Be sure that panels have locking mechanisms to make sure they are safe. Don't allow people to write password on sticky notes and paste them to the side of a PLC."
- 6. Install independent physical safety systems. Devices have built-in functionality to protect themselves, but that alone may not suffice once the devices are plugged into your network: "It's important to have an overarching tool to monitor that and tell you when there is an anomaly based on how the equipment is running in your specific system."
- 7. Embrace vulnerability management. "You can't bring down a SCADA system just to install an update when you feel like it," says Nix. "That has to be very well planned. It's critical to understand the vulnerabilities in your operational space, how they affect your equipment, and what actions you need to take on to address them. Have policies in place to keep the equipment protected while it's running between its patching cycles."



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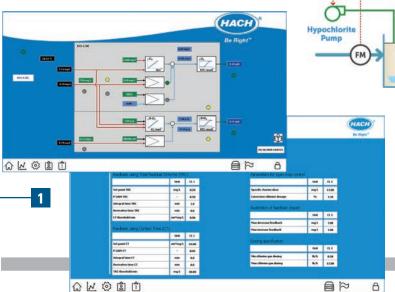
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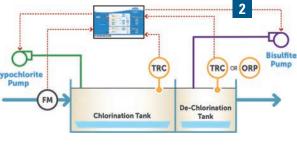


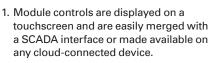
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- The RTC-C/DC system captures data at feed forward and feedback points in the process and adjusts chemical dosing according to real-time process status.
- Operators manually follow optimization recommendations or can pair them with plant systems and existing infrastructure to automate the process.

# **Controlling Chlorine**

A SOFTWARE MODULE CAN HELP CLEAN-WATER OPERATORS ACCURATELY REGULATE THE DISINFECTION PROCESS, SAVE ON CHEMICALS, AND ENSURE PERMIT COMPLIANCE

### By Ted J. Rulseh

hlorine remains a widely used and highly effective disinfectant for wastewater. But how much chlorine is the right amount? What are the consequences of over- or under-dosing? And what are the benefits of dosing accurately and consistently?

Innovative technology from Hach is designed to give plant operators visibility to disinfection process data in real time, getting rid of guesswork and uncertainty. The RTC-C/DC (chlorination/dechlorination) software module can help operators optimize chemical usage and cost-effectively meet their effluent-quality targets across all shifts. This helps ensure continuous production, permit compliance and protection of public reputation.

The technology is part of the company's Claros Process Management series of modules designed to help operators tackle the challenges unique to each facility. Bob Dabkowski and Dave Rutowski, application development managers with Hach, talked about the technology in an interview with *Treatment Plant Operator*.

# **LPO:** What challenges in the marketplace was this technology designed to address?

**Dabkowski:** Operators sometimes can feel helpless when they don't understand why the process is reacting in a certain way. Without the proper data, they don't see what's happening, and so they lack critical understanding of the disinfection process. At the same time, when you look at the EPA's ECHO website (echo.epa.gov) you see very common violations such as too much chlorine in the effluent or too many fecal coliforms. So there is an issue around compliance.

# **ÉPO**: In what basic way does the software help make operators more effective?

Rutowski: In our industry we talk about what a precious resource

Fundamentally, the chlorination/dechlorination management system lets users operate the disinfection process using the same science the engineers used when they designed the plant."

# **BOB DABKOWSKI**

water is, but from a plant operations standpoint labor is also a precious resource. During storm events when something is going wrong at a plant, operators are tasked with many other things to do, so repetitive and redundant testing falls to a low priority. That is where hardware and software solutions can take over and keep everything running stable and consistent.

# **LPO:** How have operators historically regulated chlorination and dechlorination?

**Dabkowski:** The typical way is to measure total residual chlorine at the end of the contact chamber with a grab sample maybe once a day or once per shift, and then evaluate whether the chlorine dose needs to increase or decrease. Obviously that misses an entire smorgasbord of data, including *E. coli* and fecal coliform counts.

## **Upo:** What are the deficiencies of that method?

**Dabkowski:** That grab sample is an instantaneous snapshot of the process. It is that literal 10 mL in a sample cell, compared to the millions of gallons of water flowing through the plant in a day. And so, what's happening the rest of the day, nobody knows. They can only try to guess based on that one sample.

**Rutowski:** Just getting that chlorine value as a static number, even if the number stays the same, doesn't necessarily reflect the same process con-

ditions, such as the flow of the plant or the organic loading it's experiencing. Just because you have the same number doesn't mean the chlorination process is running consistently.

### **LDO:** In simple terms, how does the software module function real-time?

**Dabkowski:** Fundamentally, the chlorination/dechlorination management system lets users operate the disinfection process using the same science the engineers used when they designed the plant. It's all about the concept of CT, which is well understood on the drinking water side as chlorine concentration multiplied by contact time. In wastewater we tend to just look at the chlorine concentration and neglect the contact time. But it's the same disinfection process, so why don't we use the same science and operate wastewater plants by way of the same CT concept?

## **LDO:** In simple terms how would you describe the workings of the software?

Rutowski: The system uses feed forward and feedback loops. The feed forward chlorination calculation is based on continually maintaining an influent concentration of chlorine that correlates to the chosen CT by adjusting the dosage based on wastewater flow. The feedback calculation modifies the influent chlorine dosage based on the measurement of total residual chlorine at the end of the chlorine contact tank, to detect when chlorine demand changes.

## **LDO:** How does this technology help optimize chemical usage?

**Rutowski:** It does so by enabling appropriate dosing at very short cycle times, instead of making major step feed changes once a day or once a shift. We can do multiple analyses as fast as the cycle time of the instrument, and augment that with measurement of other variables such as plant flow and hydraulic residence time in the contact chamber.

## **LDO:** Is the system interfaced with chemical feed pumps so that dosage is adjusted automatically?

**Rutowski:** It can be, but it doesn't have to be. The end user can make that decision. Most plants do decide to automate the process, but if there are certain conditions where they want manual control, the plant team has every right to use the values and the information as a suggestion engine, and then still make manual adjustments.

### **LDO:** How does this technology potentially enhance operator safety?

**Dabkowski:** By dosing the proper amount of chlorine, we can reduce the quantity of chlorine gas used and the risk associated with changing out chlorine gas cylinders. If the disinfectant is sodium hypochlorite, then there are fewer incidences of trucks coming to the storage tanks. In addition, the elimination of grab samples reduces the general risk of operators being out in that part of the process.

## **LDO:** What is involved in deploying and installing this system?

Rutowski: It depends on what the facility has in place. Many plants may have online instrumentation that provides data, or they read data and record it in a software system or by hand. We can integrate with existing instrumentation, or if the plant doesn't have chlorine instrumentation in place, we can install it in the proper locations. Then we can pair that with a PLC or a compatible industrial computer that becomes the brain

of the operation, integrating with SCADA or a stand-alone control system to send signals to the chemical feed pumps.

### **LDO:** What experience provides confidence in the effectiveness of this software?

**Dabkowski:** The RTC-C/DC is another module developed out of our Claros Process Management platform. On that platform we have 29 modules with the same approach. We have deployed similar modules for diverse appli-



Claros Project Management is a specialized team of technical support, planned maintenance and field service within Hach." **DAVE RUTOWSKI** 

> cations across North America and Europe, at some 1,700 sites across the globe. Fundamentally, we recognize that every wastewater plant has unique challenges. Our platform is very flexible, so we can work with operators to make it fit into their system.

> **Rutowski:** The heart of the platform is the team that supports it. There are human beings behind the process. Claros Project Management is a specialized team of technical support, planned maintenance and field service within Hach. That team stands behind the successful implementation of each system. tpo

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# Updated screening system reduces downstream clogging

By Craig Mandli

There's a famous quote that states, "Don't reinvent the wheel, just realign it." That's exactly what **Parkson** is doing with its popular Aqua Guard, as an **upgraded screening system** — **UltraClean** — is designed to reduce downstream clogging problems by as much as 50%. The updates are the result of extensive research into improving the capture rate at the

ciency throughout the plant process.

"We invested considerable research and development to improve one of our oldest products for the benefit of the wastewater treatment plant," says Dave Mitchell, senior product manager for Parkson. "We have accomplished that with the UltraClean, and that enhancement translates into less maintenance for plant personnel and better capture rates."

headworks of a plant in an effort to maximize effi-

This performance comes from a series of improvements in the "head" of the screen. The screen utilizes a unique filter element system designed to automatically remove solids larger than element spacing.

"The enhancements take element screening to an entirely new level by significantly increasing removal rates and dramatically reducing the time and effort needed for operating maintenance," says Mitchell. "This is accomplished through improvements to the belt path geometry, new brush design and rotational speed, optimized spray nozzles, and numerous tool-less access ports."



UltraClean from Parkson

Aqua Guard screen filter elements form an underwater grid that ensures better capture rates when compared to rake bar screens that utilize only vertical bars for screening. A specific configuration of filter elements is mounted on a series of parallel shafts to form an endless moving belt that collects, conveys and discharges solids for further processing or disposal. Solids contained in a wastewater flow are captured on the filter elements and carried upward on the belt assembly to discharge at the rear of the unit. Two-stage screening is achieved, which results in improved capture rates.

"Customers who have retrofit their existing Aqua Guard to an UltraClean tell us they get up to two times the removal rate and operator attention is cut by 75% at the headworks," says Mitchell. "Additionally, downstream equipment like pumps and diffuser equipment does not require clean up and operates much more efficiently in the absence of rags. After upgrading, they also noticed a big difference in the amount of material being removed from the belt." 888-727-5766; www.parkson.com

net connectivity. It is manufactured in a NEMA 4 cabinet and is standard with all three basic platforms: the Phantom I and II for point source odor control; the FORSe2 oxygen generation system for force main corrosion control; and the FORSe 5 combination ozone and oxygen system for larger odor and corrosion-control applications. The efficiency of immediate data access and system control reduces operational costs, and the design allows for stand-alone remote system monitoring. Programming options include specific alarm alerts that can be sent to any computer or smart phone to quickly identify and correct problems.

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# QED Environmental System SEMSoft 6.0 software

QED Environmental System SEMSoft 6.0 software provides users of the LANDTEC SEM5000 Methane Detector the ability to rapidly download, sort and generate EPAcompliant reports based on the device's readings. The software added TAG ID capability to allow users to input site specific location identifications to mark locations within a landfill

boundary, with or without GPS data. The user can use named locations to take and record readings, and can use GPS proximity to find the points. Enhanced map integration helps to speed up readings, benefitting tablet users. Operation enhancement includes calibration adjustment to compensate for chamber clearing. 800-810-9908; www.qedenv.com



Sensaphone 1400 and 1800 remote monitoring systems

To help operators of smaller water

and wastewater facilities who do not

# product spotlight

# Non-invasive flowmeter a fit for large-diameter pipes

By Craig Mandli

Monitoring flows in large-diameter pipes is notoriously expensive. However, it is now possible to measure flows in large water mains using clamp-on flowmeter technology. The TFX-5000 transit time ultrasonic flowmeter from Badger Meter has a wide, bidirectional flow measuring range and no pressure head loss. It also meets requirements for lead content in potable water plumbing products by never coming into contact with the water.

"The TFX-5000 meter is a clamp-on, non-invasive meter," says Cheryl Ades Anspach, senior product manager at Badger Meter. "It can be installed quickly and easily without cutting or tapping process piping and can be retrofit in existing installations without shutting down systems operations — reducing both installation time and material costs."

The TFX-5000 measures volumetric flow and heating/cooling energy rates in clean liquids as well as those with small amounts of suspended solids or aeration, such as surface water. By clamping onto the outside of pipes, the meters have inherent advantages over other flowmeter technologies, including reduced installation time and cost; non-invasive, non-contact measurement; continued operation during installation, as there's no need to shut down the process; no pressure head loss; and no moving parts to maintain or replace.

"Customers prefer the TFX-5000 because it offers easier wiring and checkout, and its cover can be hinged open or completely removed to allow easier access to wiring in tight spaces," says Ades Anspach. "It features resistors integrated on the main board, which eliminates sourc-



ing and the installation of external resistors, such as RS-485 terminating resistors. Test modes for current and digital outputs also ensure the signals get through to building automation systems."

The TFX-500 can data log up to eight records using Modbus RTU or BACnet MS/TP over EIA-485; Modbus TCP/IP; BACnet/IP; Ether-Net/IP; or AquaCUE/BEACON connectivity. Users can configure and troubleshoot over USB with SoloCUE. It includes ultrasonic speed and temperature compensation; a large, easy-to-read graphical display; and a rugged aluminum enclosure for a long service life in harsh environments. It is available in a variety of configurations that permit the user to select a meter with features suitable to meet particular application requirements.

"Installation and setup can be completed by a single person within an hour, which is a benefit in both new and retrofit system and supports social distancing guidelines," says Ades Anspach.

877-243-1010; www.badgermeter.com/flow-instrumentation

staff their premises around the clock, Sensaphone offers two early warning systems. These remote monitoring systems notify personnel immediately of changes in environmental conditions that can indicate equipment malfunction. The Sensaphone 1400 and 1800 systems let users remotely keep tabs on sensor reading fluctuations of pump status, tank level and pump alarm outputs. Sensaphone's 1800 system can accommodate up to eight sensors to monitor conditions such as temperature, humidity, air circulation, carbon dioxide, water pH, water leaks, fire, smoke, power failure and unauthorized access. The Sensaphone 1400 system can accommodate up to four sensors. Both systems connect to any traditional telephone line and provide 24/7 monitoring.

855-807-1887; www.sensaphone.com



# Gorman-Rupp **EchoStorm** venturi aeration device

Gorman-Rupp's new static venturi aeration device, is designed to add dissolved oxygen into liquids as they are being pumped. It adds oxygen to wastewater, reduces the size of

The EchoStorm,

organic solids and degasses organic solids. The EchoStorm is available in 2-, 3-, 4- and 6-inch sizes. Depending on the Gorman-Rupp pump it is paired with, the EchoStorm can provide flows from 50 to 1,300 gpm with up to 857 pounds of dissolved oxygen per day. The device can be combined with Gorman-Rupp Super T Series, Ultra V Series, Super U Series, 80 Series, 10 Series and 6500 Series pumps. It is also designed to operate

in a variety of pump configurations, such as packaged pump stations, engine-driven products and custom engineered pumping systems.

419-755-1011; www.grpumps.com



Endress+Hauser Promag W 800 flowmeter

The Proline Promag W 800 flowmeter from Endress+Hauser delivers reliable and maintenance-free

volume measurement of drinking and process water, especially in areas without a supply of power. Batterypowered, it provides maintenancefree operation for up to 15 years, as well as worldwide secure data transfer via cellular radio. Other features include seamless consumption measurements with a maximum measured error of plus/minus 0.5%, exact

cost allocation and billing in accordance with various laws and regulations, monitoring of important characteristic variables such as water volume, totalized flow, flow limits, etc., and targeted leakage detection by water balancing between two measuring points or by detecting pressure changes caused by water losses. 888-363-7377;

www.us.endress.com tpo

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# industry news

# Duperon announces new marketing manager

Duperon Corp. announced the addition of Cynthia Camburn as marketing manager. With 20 years' experience she is an alumna of the University of Michigan, where she earned two Bachelor of Arts degrees focused in English and communications.

## De Nora announces finalization of two acquisitions

De Nora announced the finalization of two major acquisitions, adding Grundfos' ISIA S.p.A. and the UV Technologies Division from Calgon Carbon Corp. to its portfolio of water treatment solutions. The addition of these chlorine dioxide and ultraviolet water treatment technologies will allow De Nora to further enrich its comprehensive range of solutions to its customers and further its mission in combating emerging contaminants and complex water treatment challenges.

## Seeg and AWS launch new program

Seeq launched a new program, the Seeq SaaS Workshop. In collaboration with Amazon Web Services, the Seeg SaaS Workshop simplifies the migration path to the cloud for Seeq's on premise customers. Benefits for manufacturing organizations include ease of deployment, added support and faster access to new Seeq capabilities. Eligible customers participating in the Workshop will benefit from a no-cost SaaS migration service, along with additional pricing options for Seeq subscriptions.

## Xylem wins global water award

Xylem received the Water Project of the Year award for the rebuilding, expansion and modernization of one of the largest potable water treatment plant of the local authority in the Paris area. Established in 2006 by Global Water Intelligence, the Global Water Awards are presented each year at the Global Water Summit to recognize the most important achievements in the international water industry. The Water Project of the Year award honors the project that shows the greatest innovation in terms of optimizing its physical and environmental footprint.

### Blue-White launches new website

Blue-White's launched its new website, www.blue-white.com. All Blue-White products can now be viewed on one site making it simpler to use. The new site is easy to navigate and ensures quick access to all technical information and data to make an informed decision. Blue-White's new eQuote helps suggest the right solutions and provides instant access to list prices on products and accessories. The site also features case studies, videos, news feeds, informative articles, company news and much more. tpo



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The NOH utilizes straight thru flow path ensuring that rags do not get caught in the heater and can withstand grit and highly abrasive materials



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# Clarifiers, Digesters, Water Towers, Structures and Components

By Craig Mandli

# **Buildings/Structures**

# LEGACY BUILDING SOLUTIONS TENSION FABRIC BUILDINGS

Combining rigid-frame engineering with the proven benefits of tension fabric membranes, Legacy Building Solutions offers fabric structures that are fully customizable.



They utilize a durable rigid frame in place of the hollow-tube, open web truss "hoop" framing traditionally used for fabric structures. The strength of the structural steel frame provides several engineering advantages, most notably the ability to easily customize buildings to the exact width, length and height required. In addition to long clear spans, the buildings have straight sidewalls that maximize the useable square footage inside the structure. The design allows for much more structural flexibility than traditional fabric structures, including the ability to add lean-tos, mezzanines, sidewall doors and more. The structures are also engineered to provide desired overhangs or handle additional loads for items such as sprinklers and conveyors. 877-259-1528; www.legacybuildingsolutions.com



Spiraflo clarifier from Lakeside

# **Clarifiers**

# LAKESIDE SPIRAFLO

The Spiraflo clarifier from Lakeside is a peripheral feed clarifier designed for the removal of suspended solids in a primary,

secondary or tertiary clarification system. Wastewater enters the outer perim-

eter of the clarifier tank and is directed along the narrow raceway formed by the skirt and the outer wall. This flow pattern dissipates the wastewater's hydraulic energy as it flows around the raceway, eventually spiraling down underneath the skirt and into the main settling area. The flow travels inward from the skirt toward the center of the tank, coinciding with the direction of the sludge, and the clarified water rises into the centrally located effluent weir trough. The combination of the spiraling flow pattern and the skirt eliminates all possibility of short-circuiting and provides better utilization of the total tank volume for more effective settling. **630-837-5640**; www.lakeside-equipment.com

# **Coatings and Linings**

## **AGRU AMERICA SURE-GRIP**

Sure-Grip liners from AGRU America are made of HDPE, HDPE-el, PP, PVDF or ECTFE, and serve as a long-term alternative to spray-

applied concrete protection products. The liners prevent concrete corrosion and degradation, can substantially extend the lifetime of manhole liners and other structures and, by preventing exfiltration and infiltration, provide direct protection for the environment. The liners have anchoring systems that enable construction in areas of significant backpressure. Unlike spray-applied liners, which have to

Sure-Grip liners from AGRU America be reapplied regularly due to cracking or delamination, these liners are long-lasting, and are designed to avoid the residuals cost often associated with

concrete spray-on liners, which require tank emptying and cleaning every few years for reapplication. **843-546-0600**; www.agruamerica.com

# **Digesters/Components**

# RKI INSTRUMENTS DIGESTER GAS MONITOR

Waste digester gas contains high levels of methane, carbon dioxide and hydrogen sulfide, with little to no oxygen. The RKI Instruments Digester Gas

Monitor checks for all of these gases on a cyclic basis using a powerful air aspirator to draw a sample from up to 100

Digester Gas Monitor from RKI Instruments

feet away. The system also handles high humidity and high hydrogen sulfide with filters, air aspiration and automatic purging of the sample line. Measurement time is just 4 minutes, taken at selectable intervals of 15 minutes, 1 hour, 4 hours, 8 hours, 24 hours or manually initiated. System integrity is maintained at all times for operation, flow and fault conditions employing relays, 4-20mA or Modbus signals. The outputs are the readings received from the last cycle taken. Readings, flowmeters and filters are easily visible through a NEMA 4X enclosure. **800-754-5165**; www.rkiinstruments.com

# Grating/Handrails/Ladders

## PATTERSON DAVIT CRANE

Patterson davit cranes are manufactured with a low maintenance, easy-to-assemble design. They are available in 1/2- and 1-ton capacities with key features such as a reliable brake with long life and readily available

davit cranes from Patterson

parts, a hot-dipped galvanized finish and no plastic sheaves or pulleys. **800-322-2018**;

www.pattersonmfg.com

# **Media/Media Filters**

# ALFA LAVAL AS-H ISO-DISC CLOTH MEDIA FILTERS

Alfa Laval AS-H Iso-Disc cloth media filters can be engineered to maximize the filtration area in an existing basin. They provide superior tertiary filtration that can meet California Title 22 reuse standards.

The design enables individual disc turbidity to be measured and allows users to see the flow from each one and, if necessary,

AS-H Iso-Disc cloth media filters from Alfa Laval

isolate an individual disc for maintenance without disrupting the rest of the flow. **866-253-2528**; www.alfalaval.us



### KRUGER USA ANOX K5 MEDIA

ANITA Mox is a sidestream deammonification technology that is offered in both MBBR and integrated fixed-film activated sludge configurations, depending on site conditions. As such, the system

Anox K5 Media from Kruger USA

consists of engineered polyethylene carriers — Anox K5 Media from Kruger USA — to provide ample protected

surface area for biofilm to thrive. The media (approximately the diameter of a quarter) hosts two types of bacteria in the same reactor. The outer layer consists primarily of ammonia oxidizing bacteria, which convert about half of the ammonia to nitrite. The inner layer consists mainly of anaerobic autotrophic ammonia oxidizer bacteria, which utilize the resulting nitrite and much of the remaining residual ammonia and convert them to nitrogen gas that is released harmlessly to the atmosphere. 919-677-8310; www.veoliawatertech.com

# SUEZ WATER TECHNOLOGIES & **SOLUTIONS FILTRAFAST**

The FiltraFast media filter from SUEZ Water Technologies & Solutions is designed for treatment of high flows and includes compressible media to enable up to 10 times the loading rate of

conventional media filters. The high-rate downflow gravity or pressure filter uses hydraulic

FiltraFast media filter from SUEZ **Water Technologies & Solutions** 

loading to create the required media porosity with no mechanical compressing devices. The backwash sequence is designed to enable maximum recovery, extend media life and limit energy consumption. Units are available in different configurations and can be customized to specific applications. Based on project requirements, units can be fully shop-assembled and delivered, or erected on site. 866-439-2837; www.suezwatertechnologies.com



### JDV EQUIPMENT NOZZLE MIX SYSTEM

The Nozzle Mix System from JDV Equipment is a dualzone mixing technology that provides uniform mixing patterns that produce even distribution and a stable environment. It can help optimize solids suspension and contact to promote efficiency in a wide range of applications. The system is designed with pumps installed outside the tanks to facilitate ease of maintenance. The pumps are typi-

cally chopper pumps or pumps incorporating inline grinders that prevent fibrous materials from Nozzle Mix System from JDV Equipment accumulating and causing plugging problems. The application dictates which type(s) of the many var-

ied pump options can be used. The high-velocity nozzles are mounted inside the tank and are oriented to discharge in a flow pattern that completely mixes the tank contents. 973-366-6556; www.jdvequipment.com

# MAZZEI INJECTOR CO. VENTURI AERATION SYSTEM

The Mazzei Injector Co. venturi aeration system uses a simple pump to push effluent through a manifold that discharges into the bottom of a basin, no matter how deep. The effluent flow passes through venturi injectors where the pressure drop creates a vacuum that draws in air or oxygen, shearing and mixing it with the liquid, providing extremely high gas transfer efficiency. The vast majority of the remain-



Venturi aeration system from Mazzei Injector Company

ing air is incorporated into the contents of the basin through high-shear mixing nozzles. The company's computational fluid dynamics (CFD) team optimizes aeration systems for the precise sizing, placement and orientation of injectors,

> pumps, pipes and nozzles. Through CFD analysis, they can develop aeration systems with high turndown rates allowing operators to adjust flow and

energy consumption to meet system needs. There are no moving parts to fix or replace, and injector systems have been used successfully in systems with solids levels as high as 6%. 661-363-6500; www.mazzei.net

### PARK PROCESS VORTAFLO

The VortaFlo static mixer from Park Process combines two mixing nozzles of different sizes to create turbulence and induce mixing. The addition of the injection quill allows chemicals or polymer to be injected in the mixing zone past the turbulence-creating nozzle prior



VortaFlo static mixer from **Park Process** 

to passing through the mixing nozzle. In the case of polymer flocculating biosolids, the turbulence nozzle causes the biosolids to roll in the mixing chamber so the polymer has maximum contact with biosolids particles prior to passing through the mixing nozzle, where flocculation is promoted. It is available in sizes ranging from a 1-inch inlet/outlet and 2-inch mixing chamber to a 12-inch inlet/outlet and 20-inch mixing chamber. 855-511-7275; www.parkprocess.com



### VAUGHAN TURBO-S MIXER

The Turbo-S Mixer from the Vaughan is a small, powerful propeller mixer that is mounted vertically inside an 18-inch elbow and is capable of mixing a pit with just 2 feet of liquid above the floor. It incorporates an upper cutter above the propeller to stop wrapping and fibrous material binding to protect the

Turbo-S Mixer from the Vaughan

mechanical seal. It can be used in dairy manure mixing and in municipal treatment plant anoxic zone

mixing and oxidation ditches. It can be quickly implemented in primary influent channels, Bardenpho basin mixing, scum blanket mixing and primary sludge storage mixing. Additionally an optional turntable can allow it to be easily reaimed in the pit. 888-249-2467; www.chopperpumps.com tpo



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# case studies

By Craig Mandli

Onsite system needed to accommodate winery/brewery in unique venue

Problem: Spyglass Winery in Sunbury, Pennsylvania, planning an expansion including a brewery and restaurant, needed a cost-efficient, long-term solution to treat high-strength wastewater and handle substantial flow fluctuations. It had to be easy to operate and consistently



meet stringent treatment requirements for shallow subsurface infiltration.

Solution: Premier Tech Water and Environment designed a 2,000 gpd treatment system. The first stage includes a polyethylene primary treatment tank and a grease trap, each with 3,490 gallons capacity, followed by a 900-gallon equalization tank. These are combined with Premier Tech's ready-to-use polyethylene Rewatec moving-bed bioreactors and clarifier, which reduces BOD and TSS to domestic strength. The process is completed by two Ecoflo biofilter units with 100% coco filtering medium. The integrated pump in the biofilters allows for low-pressure dosing of the at-grade bed where treated wastewater infiltrates.

### **RESULT:**

The system showed excellent resilience after sharply reduced flows during the COVID-19 pandemic. With the gradual resumption, the system continues to efficiently handle flow and contaminant-load fluctuations and to meet discharge criteria. **800-632-6356**; www.pt-waterenvironment.com tpo

# classifieds October 2021





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### **POSITIONS AVAILABLE**

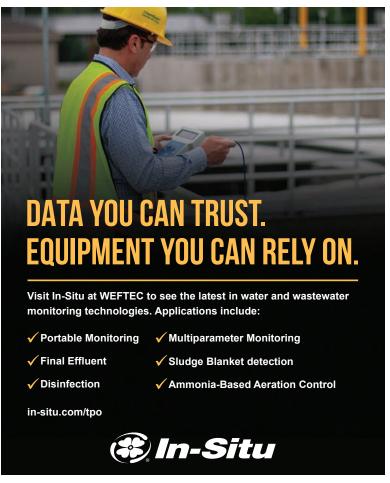
The City of Ormond Beach in Florida (population 40,000) seeks Wastewater Treatment Plant Operators C, B, and A. Responsible for process control of 8MGD air-activated sludge wastewater plant. Requires a high school diploma/GED; a valid Florida driver's license; and a Class C or higher Wastewater Treatment Plant Operator License issued by the State of Florida. Excellent benefits. Please view the entire job description and apply online at www.ormondbeach.org/jobs. Equal Opportunity Employer. FL (010)











# people/awards

The **Washington County Service Authority** earned the 2020 Virginia Optimization Program Gold Award from the Virginia Department of Health Office of Drinking Water, the highest excellence ranking. WCSA has received the award each year since 2010.

The **Orange County (California) Water District** and the **City of Fullerton** have begun operation of the Kimberly Well 1A PFAS Treatment Plant, the county's first wellhead filtration treatment plant to remove PFOA and PFOS.

The **Aqua Pennsylvania** wastewater treatment plant in Upper Providence township received the Phase III Directors Award from the Partnership for Clean Water.

Three members of the **Town of Purcell** wastewater treatment staff were recognized by the Virginia Rural Water Association. **Adam Bailey** was named Wastewater Rookie of the Year, **Jason Chapman** was named System Operator Specialist of the Year and **Kristen Muller** was named Lab Technician of the Year.

**Scott Young** was named as Kentucky Rural Water Association executive director, replacing Gary Larimore, who retired after leading KRWA for 42 years.

The **City of Framingham Water Department** received a 2020 Public Water System Award from the Massachusetts Department of Environmental Protection in the Large Consecutive Community Systems Category.

The **City of Toledo (Ohio) Collins Park Water Treatment Plant** was recognized as 2020 Co-Project of the Year for a 40 mgd expansion project from the Toledo Section of the American Society of Civil Engineers.

**SCV Water** received the Best Environmental Project award from the American Public Works Association – High Desert Branch in California for removing PFAS from groundwater.

**Randy Hamilton** retired after 45 years with Chillicothe (Ohio) Municipal Utilities, the last 27 as water systems superintendent.



**Dean Stokes** was named wastewater treatment plant manager in Salem, Ohio, replacing **Jeff Zimmerman**, who retired after 28 years in the utilities department.

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# events

### Oct. 6

AWWA webinar Asset Management Practice: Where Is the Industry, and Benchmarking Your Own Practice. Visit www.awwa.org.

### Oct. 6-8

2021 Intermountain AWWA Section Annual Conference, Zermatt Resort, Midway, Utah. Visit www.ims-awwa.org.

### Oct. 10-13

AWWA and Arkansas WEA 2021 Annual Conference, Embassy Suites Hotel, Hot Springs. Visit www.awwwea.org.

### Oct. 12-14

2021 North Dakota AWWA Section Annual Conference, Fargo. Visit www.awwand.org.

## Oct. 16-20

WEFTEC 2021, McCormick Place, Chicago. Visit www.weftec.org.

## Oct. 18-21

California-Nevada AWWA Section Annual Conference, online. Visit www.ca-nv-awwa.org.

### Oct. 20

AWWA webinar, Microplastics in Drinking Water: From Research to Application. Visit www.awwa.org.

# Oct. 24-26

Southwest Section AWWA Annual Conference and Exposition, Hyatt regency, Tulsa, Oklahoma. Visit www.swawwa.org.

### Oct. 26-28

2021 Iowa AWWA Section Annual Conference, Cedar Rapids. Visit www.awwa-ia.org.

"As an operator, my number one job is to comply with our discharge permit limitations to protect the receiving waters we discharge to. I care about the waters. I take my responsibility

to protect our environment seriously."

Mark Fogle Senior Wastewater Treatment Operator Lakehaven Utility District, Federal Way, Wash.

Read what matters to operators in every issue of TPO.



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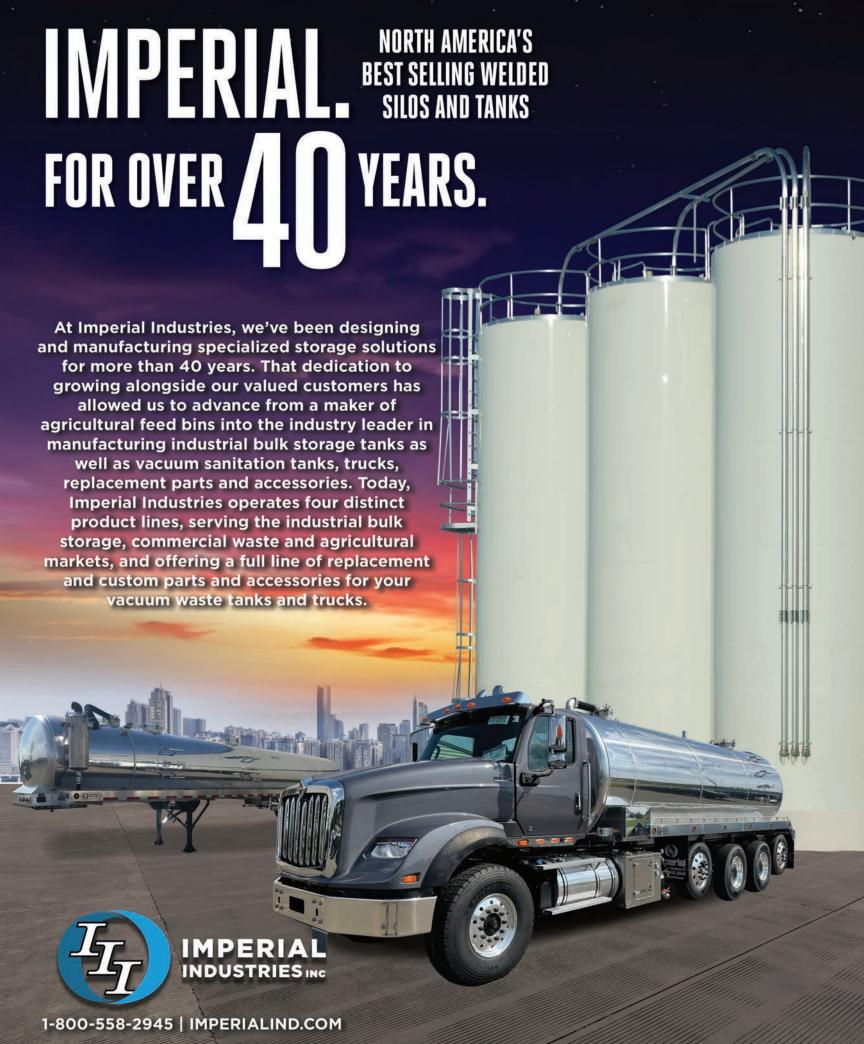
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- · Reduced cost due to minimal civil site construction
- · Low total cost of ownership



SVI<sub>5</sub> comparison of aerobic granular sludge (left) and conventional activated sludge (right)





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