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OCTOBER 2020

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USEPA Compliant

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Published monthly by COLE Publishing, Inc.
1720 Maple Lake Dam Rd., P.O. Box 220, Three Lakes, WI 54562

Call toll free 800-257-7222 / Outside of U.S. or Canada call 715-546-3346
Mon.-Fri., 7:30 a.m.-5 p.m. CST

Website: www.tpomag.com / Email: info@tpomag.com / Fax: 715-546-3786

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ADDRESS CHANGES: Submit to *TPO*, P.O. Box 220, Three Lakes, WI 54562; call 800-257-7222 (715-546-3346); fax to 715-546-3786; or email holly.gensler@colepublishing.com. Include both old and new addresses.

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EDITORIAL CORRESPONDENCE: Address to Editor, *TPO*, P.O. Box 220, Three Lakes, WI 54562 or email editor@tpomag.com.

REPRINTS AND BACK ISSUES: Visit www.tpomag.com for options and pricing. To order reprints, call Jeff Lane at 800-257-7222 (715-546-3346) or email jeff.lane@colepublishing.com. To order back issues, call Holly at 800-257-7222 (715-546-3346) or email holly.gensler@colepublishing.com.

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Are You Nervous?

IF YOU TEND TO FREAK OUT AT LICENSE EXAM TIME, HERE'S SOME ADVICE TO HELP YOU SETTLE DOWN, FOCUS IN AND EARN THAT PASSING SCORE

By Ted J. Rulseh, Editor

Studies show that some people fear speaking in public more than they fear dying. For many water and wastewater operators, licensing exams come close to creating that level of anxiety.

It's possible, as some will attest, to know the material through and through, yet fail the exam because of intense jitters. Fortunately, there are ways to beat exam anxiety and remove that impediment to a passing score. Here are a few tips I have gleaned from my own experience and some research.

Nerves can work in your favor. One of the best bits of advice I ever got was from a college counselor giving me a pep talk before a job interview. "If you're not nervous," he said, "you're not up." Being too anxious of course can hurt you, but so can being too casual. The right level of nerves can help you perform at your best. So embrace that quicker heart and dose of adrenaline — let them work for you.

Prepare — but not too much. Confidence is a great antidote to anxiety, and confidence comes from good preparation. On the other hand, it's a bad idea to "cram" into the wee hours the night before the exam. If you're sleep-deprived when you sit down in the exam room, you won't be at your best. Study consistently over time. Take the exam when you know you're ready. Then you won't feel compelled to cram.

> Being too anxious of course can hurt you, but so can being too casual. The right level of nerves can help you perform at your best.

Practice. One thing that helped me in a big way in my post-college exams was answering practice questions. You get an edge from not just knowing your material, but also knowing how the questions will be structured. It's a bit like taking your first driver's license test in your family car, instead of one you had never driven before. You can find sample water and wastewater exam questions on the *Treatment Plant Operator* website at www.tpomag.com/study.

Skip the caffeine. Your body and brain will be plenty stimulated at test time — you won't need any chemical enhancement. Drink lots of coffee and the caffeine buzz may leave you too "wired" to focus properly on the task at hand.

Focus. Don't worry about other people in the room around you, working away as if they know everything. Have faith in your own preparation. Concentrate on the questions.

Breathe. You can study mindfulness and various forms of meditation if you wish, but there's a lot to be gained when under stress just by taking several long, slow, deep breaths. Studies show that this can slow down your heart rate, reduce blood pressure, decrease muscle tension and impart a sense of ease and calm.

Watch your thoughts. Henry Ford supposedly said, "Whether you think you can't or think you can, you're right." Avoid thoughts such as I should have studied more and I'm not smart enough. Instead, do what elite athletes do: Imagine yourself succeeding. Picture yourself walking out of the exam room confident that you "hit it out of the park."

Plan to reward yourself. Think of something great you're going to do when — *not if* — you pass. Maybe it's to get some tickets to a ball game, buy something you've wanted for a long time or take your family out for a nice dinner. Then, when it's all over, do it!

Finally, remember this quote from Mark Twain: "I've suffered a great many catastrophes in my life. Most never happened." If you've prepared correctly, the catastrophe you fear — exam failure — likely won't occur. That knowledge alone should help you settle in for a positive experience and successful outcome. tpo

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WATER QUALITY

Preparing for Wildfires

After the 2017 Tubbs Fire and 2018 Camp Fire in northern California, drinking water tests revealed a plethora of acutely toxic and carcinogenic pollutants. Water inside homes was not safe to use, or even to treat. This online exclusive article takes a look at strategies that could mitigate those harmful outcomes in the future.

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OVERHEARD ONLINE

"It seems clear that consistent communication from utilities is key in strengthening public trust in tap water."

National Survey Shows High Confidence in U.S. Tap Water

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FOREIGN CYBERATTACKS

Protecting Critical Infrastructure

The National Security Agency and the Department of Homeland Security's Cybersecurity and Infrastructure Security Agency recently issued a joint alert warning that foreign hackers are targeting critical infrastructure, including water/wastewater systems. The agencies recommended that critical infrastructure operators take specific and immediate action to secure their systems.

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THE BIOSOLIDS QUESTION

Studying Rural PFAS

Linda Lee, a Purdue professor of agronomy, recently received a $1.6 million grant from the U.S. Environmental Protection Agency to study how agricultural land application of PFAS-contaminated biosolids may affect surface waters and groundwaters that feed drinking wells in rural areas.

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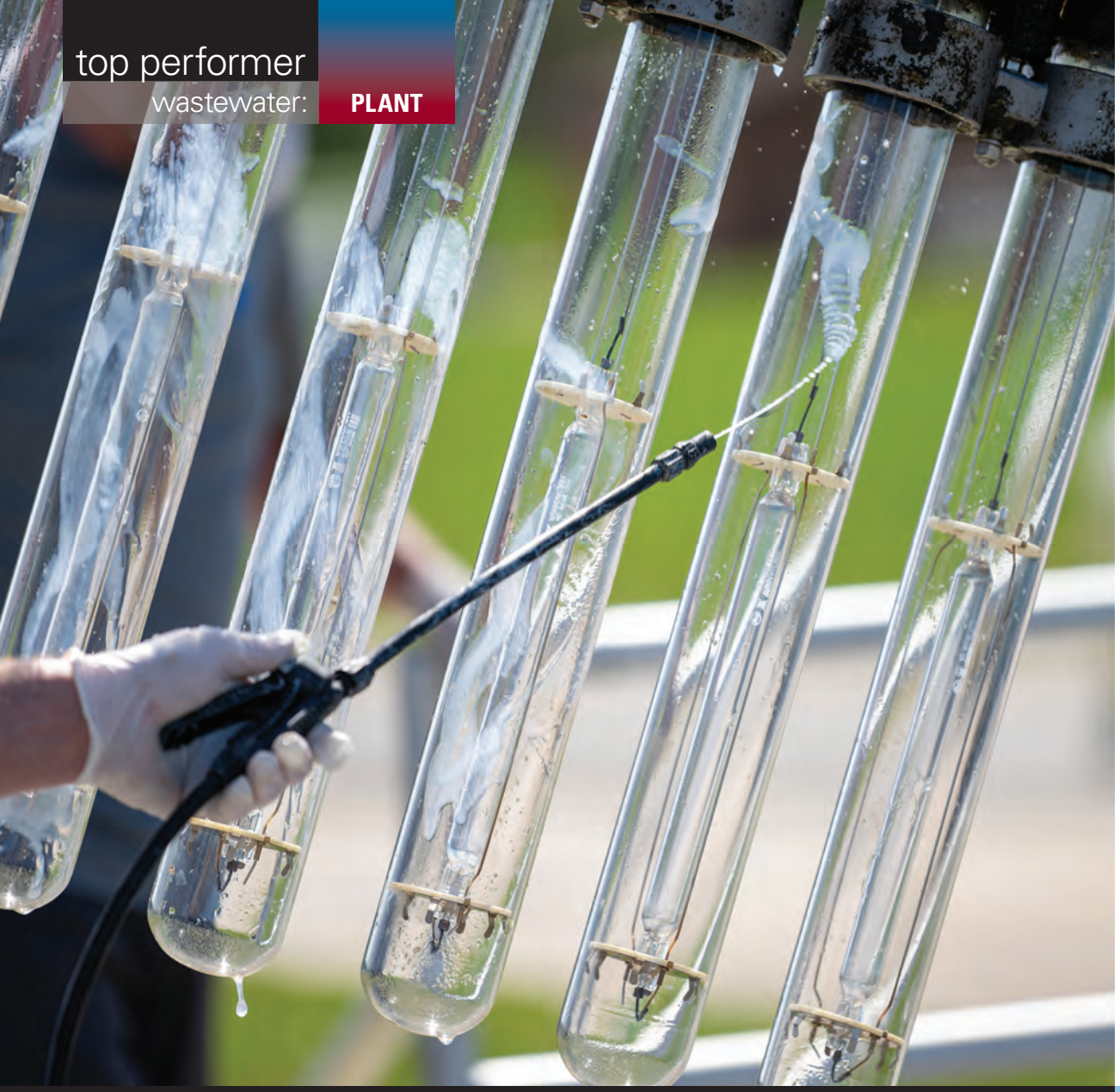

An operator applies cleaning agent to quartz sleeves encasing the UV lamps (TrojanUV) at the Shelbyville Water Resource Recovery Facility.

Devoted to DIY

THE SHELBYVILLE CLEAN-WATER PLANT TEAM RIDES DO-IT-YOURSELF EFFORTS TO ENERGY SAVINGS, HIGH PERFORMANCE AND INDUSTRY RECOGNITION

STORY: **Jim Force**
PHOTOGRAPHY: **Marc Lebryk**

Thanks to the energy of management and staff, the Shelbyville (Indiana) Water Resource Recovery Facility has significantly reduced its energy use.

"Our people did much of the work themselves," says Kevin Kredit, superintendent. "They rewired and reprogrammed equipment, installed variable-frequency drives and figured out how to reduce equipment use — running only two pumps instead of three for example."

The plant also improved digester gas usage and secured a grant to install solar panels on the grounds. Overall, Kredit says, electricity use has been cut by a third while the costs for energy improvements have been paid back in just over a year.

These are just some of the achievements in which the plant staff can take pride. The facility earned the 2019 Resource Recovery Facility of the Year from the Indiana Water Environment Association. The plant has also received collections system, laboratory and safety awards.

MIX OF TECHNOLOGIES

The Shelbyville facility achieves both nitrogen and phosphorus removal, using a rather novel design that combines an older trickling filter system with a unique twist on aeration.

Wastewater is collected via 75 miles of sewers and directed to two large pumping stations. One handles flow from the north side of the Big Blue River, including an industrial park; the other takes all domestic and industrial flow from south of the river and includes an in-line double-drum Channel Monster grinder (JWC Environmental).

Four dry-pit submersible pumps (Pentair Fairbanks Nijhuis) move the wastewater through a 24-inch force main under the Big Blue River and into the treatment plant headworks. At the plant, the flow passes through a Parshall flume and two grit chambers. A pair of pumps (Trillium Pumps USA SLC - WEMCO) move the grit to a Gritt Mitt classifier (WesTech Engineering).

Three primary tanks follow; floatables are diverted to collection boxes by a mechanical skimmer. Pentair Hydromatic pumps lift the flow to three high-rate trickling filter towers that are 20 to 25 feet deep and filled with plastic crossflow media that hosts a zoogleal film. Hydraulically driven arms distribute the water over the beds.

RAPID SETTLING

The original facility was designed as a trickling filter plant, "the way of things back in the 1970s and '80s," Kredit says. "All our BOD, TSS and nitrogen removal is accomplished through the towers."

Water then passes through three aeration tanks fed by blowers (Hoffman & Lamson, by Gardner Denver) and coarse-bubble diffusers, but no treatment takes place there. "The aeration just keeps our solids in suspension before final clarification, especially solids that settle off the trickling filters," Kredit says. That process enhances settling in the final tanks.

The effluent is UV disinfected (TrojanUV) before discharge to the Big Blue River. An ultrasonic metering device calibrated to a 36-inch Parshall flume measures flow at that point. The plant meets its phosphorus removal requirement by dosing with selenium-

The Shelbyville facility achieves nitrogen and phosphorus removal through a combination of trickling filters and aeration.

Gary Karnes (left) and Rolland Scudder replace the grate under the bulbs for safety before cleaning the bulbs in the UV disinfection system.

Shelbyville (Indiana) Water Resource Recovery Facility

www.cityofshelbyvillein.com

BUILT:
1958; major expansion in 2000

AREA SERVED:
City of Shelbyville

POPULATION SERVED:
22,000

FLOWS:
8.0 mgd design, 5.34 mgd average

TREATMENT LEVEL:
Secondary

TREATMENT PROCESS:
Contact stabilization, biological nutrient removal

RECEIVING STREAM:
Big Blue River

BIOSOLIDS:
Land-applied

ANNUAL BUDGET:
$4.1 million (operations)

lanthanum, a rare-earth mixture that reacts with phosphorus to form a dense, fast-settling precipitate.

The mixture is injected just ahead of the aeration basin at 35 gpd: "We found that was the best place to add it. It's expensive, but it doesn't add to our solids load."

HANDLING SOLIDS

Biosolids are digested and thickened before dewatering on a belt press (Komline-Sanderson). In two primary digesters, the material is heated to approximately 95 degrees F and mixed by two Pearth gas mixers (Evoqua Water Technologies) and six gas-bubble boxes at the bottom of each tank.

The sludge is then transferred to a secondary digester where it is stored for seven to 14 days for liquid-solid separation. The secondary digester is not heated or mixed. "We let natural decomposition occur, which causes more liquid-solid separation," Kredit says.

The plant fully uses the biogas produced in the digesters. A dome-shaped Dystor membrane system (Evoqua Water Technologies), installed in the early 2000s and recently rehabilitated, stores the methane and prevents odors. "We use this gas as a substitute for natural gas to heat our primary digesters," Kredit says. "We also inject some of the gas back into the digesters to promote stirring and mixing."

Through a contract with Synagro Technologies, cake at 24% to 27% solids is spread on farm fields.

CONTROL AND MAINTENANCE

The Shelbyville plant team includes Jim Vierling, collections foreman; Blake Branum, plant lead operator; and Gary Karnes, Larry Karnes, Seth Mohr, Scott Gaudin, Brian Morton and John Barnes, plant operators.

Ed Williams operates the belt press; Bronda Vierling is administrative assistant; Michelle Higdon is lab manager; and Richard Clouse, Dom Huber, Rolland Scudder, Cody Riggs, Kyle Richardson and Richard Richardson take care of the collections system.

The staff keeps a close eye on all levels of treatment without the standard SCADA system. Instead, the facility is equipped with an OmniSite cellular system that alarms the staff in case of any malfunctions on the lift stations and plant equipment.

"OmniSite maintains a website called GuardDog, which our operators monitor for any equipment issues," Kredit says. "The website alerts us to any failures or issues, as well as high levels in the pumping stations."

The monitoring system has proven its worth by notifying staff of clogging in pumps, allowing them to remove the blockage before it shuts the pump down. A Google Calendar, adopted five years ago, helps manage plant maintenance, doing away with time-consuming paperwork. "Our staff uses the calendar and a laptop in the control room to schedule regular grease, lubrication, cleaning and other maintenance tasks," Kredit says.

New user-friendly variable-frequency drives (ABB) improved power consumption at the plant.

GOOD HOUSEKEEPING

Keeping the processes clean and functioning well is a key component in the plant's success. For example, regular cleaning of the UV system led not only to more efficient disinfection, but also to a plantwide energy conservation program that has paid off handsomely.

"When I was lead operator back in 2015, we realized we were running our two UV trains at 100% power usage in order to maintain the required kill rate," Kredit says. "We were using aftermarket parts, and our quartz sleeves, ballasts and lights were fouling regularly.

"We went back to TrojanUV parts and installed all new quartz sleeves. We also implemented a regular system of cleaning and maintaining the system. Once per week, we clean our secondary weirs by manually brushing them in the morning and hand-wiping the sleeves of the UV system after lunch."

Those procedures enabled the team to lower the setpoint on the UV system without sacrificing treatment. "Instead of two trains operating at 100% power, we now operate one train at about 35% power while maintaining the required kill rate," Kredit says. "We invested $50,000 in new UV parts and realized payback in just over a year."

CUTTING ENERGY COSTS

With those savings pocketed, Kredit and his crew looked for other power-consuming functions. First, they went after "low-hanging fruit" and replaced all plant lighting with LEDs. Next, they looked at the power consumption at each process station, mainly pumps and blowers.

"Basically, where we had three pumps or blowers, we were able to take one out of service and still maintain treatment standards," For example, they found it was possible to lift wastewater to the top of the three trickling filter towers with two pumps instead of three. And since the blowers don't aerate but only keep solids in suspension, the staff found it acceptable to run just one blower at a time.

(continued)

> "I think the lesson we learned here is that when we look deeper, we can find more than what our job description says we are."
> **KEVIN KREDIT**

Kevin Kredit, plant superintendent

The Shelbyville plant invested about $140,000 in energy improvements and has seen a 32.3% reduction in kilowatt-hours.

Shelbyville Water Resource Recovery Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
CBOD	100.3 mg/L	4 mg/L	20 mg/L summer; 25 mg/L winter
TSS	63.5 mg/L	7 mg/L	24 mg/L summer; 30 mg/L winter
Ammonia	11.3 mg/L	0.61 mg/L	3.4 mg/L summer; 5.3 mg/L winter
Phosphorus	2.36 mg/L	0.91 mg/L	1.0 mg/L summer; 1.0 mg/L winter

They got even more bang for the buck by installing new ABB VFDs. Some of the VFDs dated to 2000; the new ones do a better job of managing power consumption and keeping equipment from running full bore around the clock. They are more user friendly.

"We installed 22 VFDs around the plant and did the work ourselves," Kredit says. That included all the programming and wiring once the staff had learned the basics from ABB.

Taken together, the efficiency improvements are saving plenty. The plant invested about $140,000 for improvements and has seen a one-third reduction (32.3%) in kilowatt-hours used for a savings of $325,000 (28.2%) over the last five years.

While saving money, the energy-efficiency plan also gave the plant staff an opportunity to learn and grow. "I think the lesson we learned here is that when we look deeper, we can find more than what our job description says we are," Kredit says.

"Through our energy program, we've gained a lot of insight. It's shown us that we're capable of more. It has given us new things to learn and do, and it's added to the enjoyment of our jobs." tpo

A CLEAN-WATER CAREER

Bradley Fix

Forty years in the clean-water profession. Water Environment Federation fellow. WEF program committee member. Winner of the WEF William D. Hatfield Award, and the Bedell Award for service to a WEF member organization. A curator of the NASSCO sewer history project.

These are just some of the milestones and professional contributions that mark the career of Bradley Fix, recently retired as superintendent at the Shelbyville Water Resource Recovery Facility. A native of the area, he graduated from high school in 1973, then worked as an electrician and went into the service, completing basic and advanced individual training.

He served in the Indiana Army National Guard for 22 years, attaining the rank of sergeant.

His clean-water career began in 1980, when he was hired to run the Shelbyville treatment plant. He set about making improvements, some as rudimentary as cleaning up the grounds and removing beer bottles from under the bushes.

His service in the Army and the Guard reinforced those basics, he says. "I told the mayor that our wastewater plant and collections system represented the biggest and most important assets the city had, even more than new fire trucks or police cars," he remembers.

Fix went back to school, quickly earning his operator's certification up to Indiana Class 4 (highest). He oversaw three expansions and upgrades, including its conversion from a rock media trickling filter operation to one of the Midwest's first contact stabilization facilities in the mid-1980s.

He built a staff that he continues to love even though he's not in charge anymore. "They mean more to me than any award," he says. "They were some of the best. They took care of the facility. They were family. That was probably the hardest part of retiring."

Even in retirement, Fix stays active in clean water, monitoring two groundwater sites in the area and doing the paperwork: "We didn't inherit the environment from our parents or grandparents. We're just borrowing it from our kids and grandkids."

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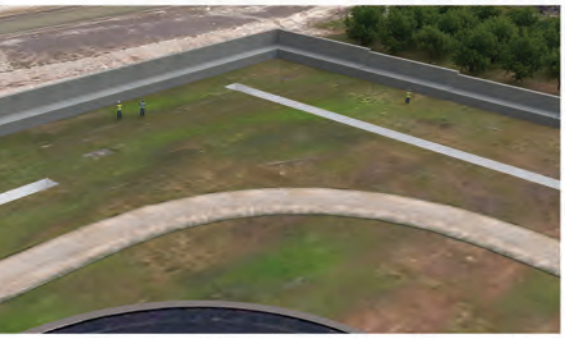

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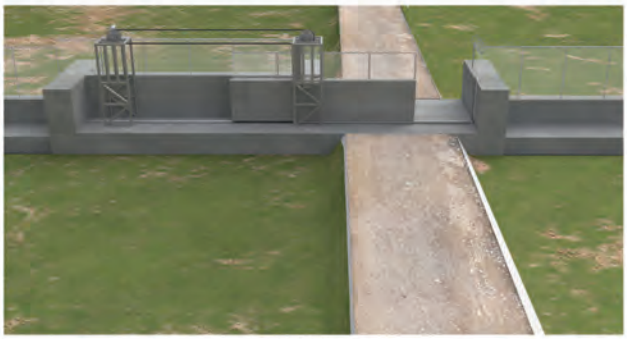

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Time of Opportunity

THE WATER ENVIRONMENT FEDERATION'S EXECUTIVE DIRECTOR LOOKS FORWARD TO MEETING TODAY'S WATER CHALLENGES, FOSTERING INNOVATION AND ELEVATING THE STATURE OF OPERATORS

By Ted J. Rulseh

Walt Marlowe

Walt Marlowe came aboard as the Water Environment Federation's executive director on Sept. 9, 2019.

A few weeks later, he was in Chicago at WEF's Technical Exhibition and Conference, where he experienced the energy and passion of competitors in the annual Operations Challenge. "I was blown away by the energy we had at the Ops Challenge awards ceremony," he recalls.

"We filled that ballroom with 1,000-plus people. They came together not only to compete, but also to share their experience, meet new friends and celebrate what they do every day to keep their utilities running. It was amazing how the energy in that room captured the strength of WEF."

Marlowe came to WEF with a civil engineering degree from Stevens Institute of Technology, an MBA from George Washington University, six years as an engineering consultant and nearly 30 years of background in association management. He previously served the American Society of Civil Engineers, the Construction Specifications Institute and the American Association of Pharmaceutical Scientists.

Marlowe looks forward to helping the clean-water sector address issues such as climate change, water scarcity and the replenishment of the water workforce as experienced professionals retire. He talked about his role in an interview with *Treatment Plant Operator.*

tpo: What attracted you to the clean-water industry?

Marlowe: I was introduced to it through my work with the civil engineers, and I also got a little taste of it at the consulting firms where I worked. My work with ASCE connected me to this community. Water is everything. We can't exist without it. Dealing with water challenges is this century's huge issue. Natural population growth, the limited supply of freshwater, how we use our water — all gets magnified by climate change and the complexities of politics at the local, national and global levels. Water is an absolutely fascinating topic.

tpo: What were your perceptions of WEF before you took on your position?

Marlowe: The passion that the people in the water sector bring to their jobs is unrivaled. It's this culture of sharing a common mission that people are doing something good for humanity. I'm a structural engineer, and I brought a certain amount of passion to that work, but it doesn't quite connect in the same way that supplying clean water to the population does. I could sense that community within WEF, and it was very attractive to me.

tpo: What does it mean to you now being WEF's executive director?

Marlowe: You get to a point in your career where it's not about climbing any kind of ladder anymore — it's about trying to make as big a difference as possible in an area that you care about. The opportunity to be executive director at WEF opened up at such a time in my career. I consider myself extremely lucky.

tpo: What is your perception of WEF after a little more than a year in the organization?

Marlowe: The community I expected to find is definitely here. I'm amazed at how much time people contribute to this organization and how proud they are of the work they do, whether on the design side, in management or in the field making sure all these systems are working every day. I also like the diversity in this field — that it takes multiple pieces, from wrangling public support to finance, design, operations and management. It's an amazing industry.

tpo: What about diversity in a different sense — diversity and inclusion as it relates to racial, ethnic and cultural heritage?

Marlowe: That has additional light shining on it now in view of Black Lives Matter and other social initiatives. This year's events have made us realize that we have to invest even more time in proactively addressing these issues. Does our committee leadership path encourage diversity? Does our board look like our membership? Our workforce at the plants, in the utilities and in the consulting firms — do they look like the communities they serve? Are we doing enough outreach to attract people to this profession?

> "The passion that the people in the water sector bring to their jobs is unrivaled. It's this culture of sharing a common mission that people are doing something good for humanity."
> **WALT MARLOWE**

There's a need to make sure everyone knows that this is a diverse, equitable, inclusive and welcoming community.

tpo: In general terms, how do you approach the leadership of the organization?

Marlowe: I'm not a very formal, hierarchical person; I like to think I am open and accessible, and that's pretty important in an association. The CEO of a for-profit company makes decisions and the organization follows along. Leadership of an association is a much more collaborative, facilitative

situation. It's not my company — this is the members' community. My job is to help foster that community and bring expertise so that from the business side, we can be sustainable. The openness, the willingness to listen to all our stakeholders and ensure they see value in the organization — those are some things I bring to the table.

tpo: What opportunities do you see to strengthen the organization and expand its reach and influence?

Marlowe: Our brand is all about sharing high-quality, unbiased, fact-based information. That's incredibly important in today's world. Innovation is going to be huge; WEF has a natural role in bringing people together to identify innovative solutions and in helping to transmit those across our membership and the broader water community, in the U.S. and globally. We also have to be a leading voice in helping our members communicate with governments to make sure they understand the critical nature of clean water.

tpo: What about the importance of getting the general public on board and better informed about the importance of clean-water people and facilities?

Marlowe: That is a huge challenge. Our industry workers who provide clean water every day have done such a great job that the public largely forgets how valuable and critical a service we provide. Households will spend hundreds of dollars a month on cable TV, phone and internet connections, and other entertainment, yet they may balk at a $20 or $30 bill for clean water. We need to work hard to get people to recognize how important that service is. Until then, we're not going to see politicians be particularly supportive of investing in water infrastructure or in new solutions to deliver water.

tpo: What would you say to clean-water operators about the value WEF brings to them?

Marlowe: I see the operations side being one of the faster-growing areas of WEF because there is a need for education and information exchange. In particular, as we deal with the aging out of some of the current workforce, the newer workforce will need to be educated. We continue to develop programs to put education into the hands of operators and designers in ways so they can use it when they need it.

tpo: What are some beneficial ways in which operators can engage with WEF?

Marlowe: Member associations provide an easy way for operators to connect with their peers and with other utilities in their geographic area. It's also a way to be introduced to the continuing education and training materials we provide, the preparation materials for operator licensing and our best practices manuals. Getting involved in a member association is a great way for operators to dip their toes into WEF. Then they can work their way up into all kinds of national and global activities.

tpo: What is the outlook for this year's WEFTEC conference in light of the coronavirus pandemic?

Marlowe: We made the unfortunate decision to cancel the in-person portion, but we're still going to have a robust experience. People will still get a lot of education and networking, as well as exposure to new product and service solutions on the exhibit side. In addition, they'll have access to it 24/7 to use at their convenience, and not just during the week of the live events — things will be archived for people to go back to. We'll also have some secondary live events throughout the year. It's going to be a great experience.

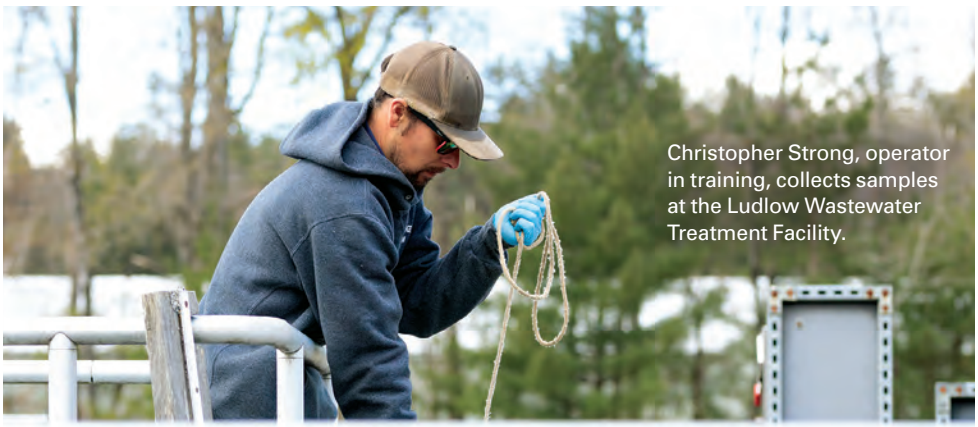
tpo: Would you care to offer any words of inspiration to operators and the rest of the WEFTEC community?

Marlowe: WEF will celebrate its 100th anniversary in eight years. By then, in my vision, we're celebrating how relevant and valuable WEF is, how much the general public has increased its awareness of and respect for the value of water, and how our water workforce is as highly valued in the community as first responders like fire and police. That is what I would love to see in a few years. tpo

Dealing With Ups and Downs

A SMALL VERMONT CLEAN-WATER PLANT EARNS RECOGNITION FOR EFFICIENT NUTRIENT REMOVAL AND SUCCESSFUL HANDLING OF SEASONAL FLOW SPIKES

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Ben DeFlorio**



Christopher Strong, operator in training, collects samples at the Ludlow Wastewater Treatment Facility.

The Village of Ludlow is home to about 2,500 Vermonters. Its clean-water plant often treats wastewater from up to 25,000 people.

That's because the plant also serves the Okemo Mountain Resort, a major skiing destination, and the many seasonal homes and condominiums that surround it. The quick ramp-up in flow on winter weekends and holidays can be challenging for the plant team.

Chuck Craig, chief operator, runs the village's oxidation ditch treatment system with Joe Gaudiana, assistant chief operator, and Christopher Strong, operator in training. The three also take care of wastewater collections and the drinking water system, which serves only the village. "Everything from the source water protection area to the outfall in the Black River is under our care," Craig says.

Ludlow (Vermont) Wastewater Treatment Facility

www.ludlow.vt.us

BUILT:
1971, latest upgrade in progress

POPULATION SERVED:
2,500 (up to 25,000 in ski season)

AREA SERVED:
Village of Ludlow and nearby resort area

FLOWS:
1.05 mgd design, 273,000 gpd average summer, 542,000 gpd average winter

TREATMENT LEVEL:
Secondary

TREATMENT PROCESS
Extended aeration activated sludge

DISCHARGE:
Black River

BIOSOLIDS:
Sent off site for treatment

AWARDS:
Facility Excellence Award in Wastewater, Green Mountain Water Environment Association

ANNUAL BUDGET:
$640,000 (plant operations and collections)

> "Everything from the source water protection area to the outfall in the Black River is under our care."
>
> **CHUCK CRAIG**

Evidence that they do their jobs well is the Facility Excellence Award in Wastewater that was presented in 2019 by the Green Mountain Water Environment Association, recognizing the facility's performance in nutrient removal and handling of load spikes.

WORK IN PROGRESS

Ludlow lies about 100 miles south of the skiing mecca of Stowe. The wastewater treatment facility has a 1.05 mgd design capacity; it handles 273,000 gpd on average during summer and 542,000 gpd on average in winter.

Built in 1971, the plant has been upgraded at various times. It was constructed with two shallow oxidation ditches, two 50,000-gallon Spiraflo clarifiers (Lakeside) and drying beds for biosolids. In 1992, these were replaced with two 9-foot-deep oxidation ditches with mechanical surface aerators (also Lakeside), each holding 438,000 gallons and operated in parallel. An additional 100,000-gallon Spiraflo clarifier was also installed.

Another upgrade in 1992 added two aerobic digesters, which now function mainly for thickening and storage; biosolids are shipped off site for processing. The headworks includes a 0.25-inch Raptor fine screen (Lakeside). An upgrade now in progress will add new influent pumps and process-control pumps in a new pump building, replace all controls and add a SCADA system. The work was scheduled for completion by the end of 2020.

REMOVING NUTRIENTS

In operation, influent passes through the fine screen unit, which washes and squeezes the screenings to prepare for landfilling. "Pumps then lift the wastewater to an anoxic selector tank where we starve it of oxygen a little bit," Craig says. "That process gets the phosphorus and nitrogen removal going."

In the selector tank, installed 15 years ago, the influent is quiescently mixed with return activated sludge with no aeration. "That starves the microorganisms of oxygen to produce endogenous respiration," Craig says. "It tends to kill off the bacteria that we don't want, like the filamentous, and breed the good ones. In summer we denitrify pretty regularly, so we don't release much nitrogen. And the process binds up the phosphorus a little bit, too."

From there, the flow enters the aeration tanks, followed by clarification. The clarifier effluent is disinfected with chlorine and dechlorinated with sodium metabisulfite before discharge to the river.

The Ludlow Wastewater Treatment Facility has a 1.05 mgd design capacity; it handles 273,000 gpd on average during summer and 542,000 gpd in winter.

HANDLING THE PEAKS

Outside the skiing/tourist season, only one aeration basin and one clarifier operate. "We only run half the plant," Craig says. "We lower the solids concentration in the biological area to 1,200 to 1,500 mg/L (from 2,000 to 2,500 mg/L in winter) because we don't have as much demand."

The flow begins to increase when Okemo Mountain Resort opens, usually by Thanksgiving. "We get variable flows from then until April," Craig says. "During the week, we're still at 270,000 to 300,000 gpd. But on any busy weekend or holiday, we can see 700,000 to 900,000 gpd, and if it rains, over 1 mgd.

"The village leaders were smart in the past. They built the plant big enough, so we have some flexibility with tankage. We have the two big ditches and the three clarifiers, and that helps buffer the load. We try to keep ahead of it a little bit by monitoring our mixed liquor suspended solids. The wasting process is a manual thing. There's a lot more sludge wasting and sludge handling during the winter. We can adjust the dissolved oxygen levels in the ditches by raising and lowering the water level."

Six pumps (Pentair Myers) handle both return and waste activated sludge. Operators manually open and close valves to shift between RAS and WAS. Gaudiana notes, "Our percent removal of BOD and TSS is about 96% on a regular basis. We must be doing something right." Plant operation is simplified by all-gravity flow once the influent is lifted after the headworks.

> "The village leaders were smart in the past. They built the plant big enough, so we have some flexibility with tankage."
>
> **CHUCK CRAIG**

Chuck Craig, chief operator

OTHER DUTIES

The collections system also flows by gravity except for one lift station in a corner of the village that handles a small wastewater flow. Craig and his team maintain the lines and about 650 manholes.

"At least once a year, we hire a company to come in for a couple of days with a Vactor truck and a big jetter," Craig says. "We hit all the known trouble spots. We have a small trailer jetter of our own (Spartan Tool) so if we get in a bind, we can go clean out a line. The most trouble we have is with the tops of manholes. We have to adjust the tops when they pave the roads. We try to change out a manhole or two every year."

The drinking water system draws from Jewel Brook, a few miles south of Ludlow. "They built a collection area where there used to be a natural upwelling of groundwater," Craig says. "Since then, a flood-control dam was built with intake galleries underneath that catch that same water. It runs by gravity to the village."

The water is chlorinated and the pH is raised to 7.4 before it is fed to the distribution system. "We've got some distribution valving to keep our water tanks full," Craig says. "We have two tanks for fire protection, and all the fire hydrants are on that system."

KEEPING IT RUNNING

The wastewater facility is staffed on weekdays from 7 a.m. to 3:30 p.m. and otherwise runs automatically. The operators alternate night and weekend on-call duty, wearing pagers for notification of alarms.

"Every day of the year someone is here doing the testing," Gaudiana says. "We check all our process controls every day. We test the domestic water for pH and chlorine residual. One of us does that every third weekend. It's a two-hour day."

Ludlow Wastewater Treatment Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT (monthly avg.)
BOD	150 mg/L	5 mg/L	30 mg/L
TSS	150 mg/L	5 mg/L	30 mg/L
Total nitrogen	22 mg/L	10 mg/L	Monitor only
Total phosphorus	2 mg/L	0.75 mg/L	7 pounds per day

Preventive maintenance is performed on a regular schedule. Gaudiana, with a background in automotive racing engines, handles most of the maintenance and in-house equipment repairs.

While the plant runs smoothly most of the time regardless of seasonal load swings, "Once in a while things happen, and we have to wait a day to figure it out," Craig says. "We rely on settleability. One day it will settle just fine, the next day it may not and the following day it goes back to being just fine. Possibly something comes with the influent that we don't know about, and it upsets the process a little bit. It may take us a day or two to gather information and determine what's going on."

Sometime microscopy provides an answer; at other times, the DO level in the ditches can provide clues. "Occasionally we adjust the return solids rate to the ditches," Craig says. "We try not to do that often if we can help it, but we're able to do it."

(continued)

DRAWN TO THEIR CAREERS

Craig and Gaudiana took different paths into their careers. Both have Grade 4 (second highest) wastewater operator and Class 3 (groundwater) water operator licenses. Craig, a Vermont native, studied carpentry and cabinetmaking at a technical high school and worked in the homebuilding business around Ludlow for about 20 years.

"A friend of mine went into the wastewater field right out of high school and is now a public works director," he says. "The municipalities in Vermont have a pretty good pension plan and good health insurance." An opening came up in Ludlow, and Craig came on board as an operator in training. He became an operator after three years and has been chief operator for the past four years.

Gaudiana, from Connecticut, grew tired of urban life and moved to Ludlow after his daughter graduated from college. He worked for the village seasonally for two years doing lawn maintenance and other tasks; in winter, he did snow removal and other work for a property manage-

Chuck Craig reviews building plans with (from left) Joe Gaudiana, assistant chief operator, and Christopher Strong, operator in training.

LOOKING UPHILL

As winter sets in, the Ludlow (Vermont) treatment plant team turns its attention to higher ground. The Okemo Mountain Resort, a major Vermont skiing destination, is responsible for large seasonal spikes in flow.

The mountain and surroundings have numerous condominium developments, about 80% of them owned by nonresidents, many from surrounding states including Connecticut, Massachusetts, New York and New Jersey.

The resort offers 121 trails, slopes and glades and 20 lifts of various types. The area's annual snowfall averages 200 inches, and the resort's snow-making equipment can cover 98% of the terrain. The resort's base elevation is 1,144 feet; the summit elevation is 3,344. The vertical drop of 2,200 feet is the highest in southern Vermont.

The mountain is a huge attraction on prime ski weekends and holidays: On one March weekend, the resort reported 15,000 visitors. Days like that mean busy days at the Ludlow treatment plant.

Christopher Strong and colleagues staff the facility on weekdays from 7 a.m. to 3:30 p.m.; otherwise it runs automatically with operators on call for alarms.

(continued)

The team at the Ludlow Wastewater Treatment Plant includes, from left, Joe Gaudiana, Christopher Strong and Chuck Craig.

> "Our percent removal of BOD and TSS is about 96% on a regular basis. We must be doing something right."
> **JOE GAUDIANA**

ment company. He was hired on at the treatment facility seven years ago.

Craig takes special pride in helping protect the Black River, a pristine water fed by mountain streams and an attraction for sport anglers. He and Gaudiana share dedication to the village. Craig observes, "One thing that drives us is customer service. If any of our customers call us or the municipal office with a problem or complaint, we drop what we're doing if at all possible and attend to that immediately."

Gaudiana notes, "We couldn't do what we do without the people above us making the decisions — the elected boards and Scott Murphy, village manager. They leave us to do our jobs and trust us to do the right things."

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Jason Manning, plant superintendent, leads a family to the outside portion of the Trick or Treatment tour.

A Spooky Good Time

A NORTH CAROLINA UTILITY DRAWS ACCOLADES FOR AN ANNUAL HALLOWEEN-THEMED EVENT IN ITS WASTEWATER TREATMENT LAB

By Sandra Buettner

At the end of October, the Greenville (North Carolina) Utilities Commission's wastewater treatment lab transforms into a spooky venue and a fun learning experience.

The commission staff created the first Trick or Treatment event in 2016 after seeing an article about something similar held at a major clean-water facility. They decided to try the idea on a smaller scale. Plant staff members dress up in costumes and decorate the plant with Halloween props.

JoEllen Gay, environmental compliance coordinator, calls the event a great team-building experience. The lab and pretreatment staff brainstormed ideas to deliver messages about wastewater treatment in fun and entertaining ways.

The Greenville Utilities Commission treatment plant has been in operation since 1985. It was built for a capacity of 10.5 mgd but was upgraded in 1995 to a state-of-the-art facility that can now treat 17.5 mgd (10.54 mgd average flow).

SPREADING THE WORD

After the staff developed ideas for the first event, the public relations department created a catchy flyer that was posted on its Instagram and Twitter accounts. They also sent the flyer to teachers, inviting them and their students, and promoted Trick or Treatment during outreach visits to schools, colleges, and science and STEM fairs.

The day before the event, staff members decorate the lab with beakers and flasks full of glowing, bubbly, colorful water. Pumpkins carved with the word "POO," mock cobwebs and plastic spiders add to the spooky nature of the space. Caution tape all around the plant alerts the attendees that they are entering the Halloween-themed lab.

The day before the event, staff members decorate the lab with beakers and flasks full of glowing, bubbly, colorful water.

Karen Foster, industrial pretreatment specialist, observes, "Each year, we try to add something a little different to the lab to change up the experience." Attendees are also encouraged to wear costumes. All guests enter through the lab and see the microorganisms that treat wastewater on a large TV monitor connected to a microscope. A live slide is used, and children and adults can look through the microscope to get a close-up view of the microbes.

MEMORABLE GIFTS

After visiting the lab, attendees are led by a plant operator to the oxidation ditches to see where the microorganisms live and work. Next, they move on to the secondary clarifiers. Tours last 30 minutes and up, depending on the attendees' ages.

Upon leaving, the children received disposable plastic lab gloves filled with candy. They also received squeezable stress reliever toys printed with "Cleaning Water Through Science" and "Toilets Are Not Trash Cans," and coloring books on the wastewater treatment process.

A family enters the "keep out" zone of the tour — the plant laboratory.

The utility also uses the event to promote its Cease the Grease campaign, handing out reusable plastic lids imprinted with the campaign theme for attendees to put on a jar or can at home. Residents can store FOG in the containers and toss them into the garbage when full.

POSITIVE FEEDBACK

One news station team filmed the event for airing on its 6 p.m. newscast. Attendees' comments have been overwhelmingly positive: children and adults told how much they enjoyed the event and how much they learned. One third grader who came dressed as Harry Potter "absolutely fell in love with our plant and loved the tour so much he stayed for quite some time and asked a lot of questions," Gay says.

He went back to school and wrote about the tour and the plant in one of his assignments titled, "The Eight Wonders of Greenville." His teacher was so taken with his enthusiasm that she called the utility and scheduled a tour for the entire class.

The plant hosted the group for the day with snacks and gave them a private tour. The staff also performed some simple lab tests for the students, showing them the pH levels for Mountain Dew, milk and water. After the tour, they gave the third-grade author a special Greenville Utilities Commission T-shirt and declared him an honorary employee. tpo

The Greenville (North Carolina) Utilities lab goes all-out with ghoulish décor for the Trick or Treatment event.

Aerial view of the City of Lebanon Authority's wastewater treatment plant.

Automated Efficiency

A SELF-TUNING CONTROL SOLUTION SUSTAINS OPTIMAL PERFORMANCE AND REDUCES OPERATING COSTS AT A PENNSYLVANIA CLEAN-WATER PLANT

By Tanner Devlin

In 2012, the City of Lebanon (Pennsylvania) Authority wastewater treatment plant was upgraded with a smart digital control solution to support its complex operations, minimize energy usage and comply with new effluent total nitrogen limits.

The plant operates a two-stage biological process with an integrated fixed-film activated sludge system added downstream of the existing trickling filters. The IFAS system was selected to fit space limitations. Complementary components — including coarse- and fine-bubble diffusers and geared turbo blowers — provide oxygen, mixing and media scour. Tertiary denitrification filters and carbon feed provide a variable polishing step before discharge.

Operating a two-stage biological process to tight nutrient limits is a challenge. The second-stage IFAS process was specifically configured for nitrification and denitrification. For best performance, the bulk of the BOD is removed by the trickling filters while still providing enough carbon residual for denitrification.

The advanced control system (EDI - Environmental Dynamics International) was added to optimize the biological processes and to provide tight automation performance, helping the plant to remain in permit compliance and meet operating efficiency targets set by management.

OPTIMIZED RESPONSE

The City of Lebanon Authority plant, serves the city and a number of surrounding boroughs and townships. It discharges into the upper Chesapeake Bay watershed, thus requiring a keen focus on nutrient removal.

The second-stage activated sludge treatment plant is split into four identical, parallel trains. Each consists of an anoxic zone, a swing zone, three IFAS zones, a final swing zone and adjustable internal mixed liquor return flow.

The swing zones are designed to be switched between anoxic and aerobic operation. This gives operators real-time control of the available reactor volume and biomass inventory for nitrification and denitrification performance.

While the design gives plant staff the equipment needed to produce the desired results, the operating window for nutrient removal is specific. Critical parameters — including carbon for heterotroph activity, oxic conditions for ammonia conversion, and internal recycle and anoxic conditions to off-gas nitrogen — are required to be optimized in real time.

The IFAS solution is also flexible; it includes mechanical mixers in each anoxic zone, fine-bubble diffusers and mechanical mixers in each swing zone, and coarse-bubble diffusers in the oxic zones with mobile media.

SMART PERFORMANCE

Fred Updegraff, P.E., of the Gannett Fleming engineering firm led the upgrade project and concluded that to operate effectively and efficiently, the plant needed a control system to orchestrate both the first- and second-stage biological processes and to automate blower and diffuser operations.

In consultation with BioChem Technology (the digital technology provider in the EDI operating management system), the parameters for the IFAS process were specified and a process optimization controller was provided to manage a bypass loop around the trickling filters. The controller uses a model-based algorithm, continuously calibrated in real time. It recognizes and accounts for changes in performance as the configuration of the system and process setpoints are optimized.

A complementary aeration control system automates the operations of the diffusers and blowers. Model-based algorithms are used to determine airflow and valving requirements. The algorithms account for oxygen transfer and pressure differences with the fine- and coarse-bubble diffusers; dynamic most-open valve optimization minimizes the operating pressure at the blowers. The solution also uses machine learning to provide tight automation performance as loading, temperature and diffuser operating performance varies.

In total, the advanced control system optimizes critical process setpoints, including trickling filter bypass flow, swing zone conditions, residual DO targets, and internal mixed liquor recycle rates. It also manages:

- The trickling filter bypass flow valve
- Swing zone mixers and diffuser airflow
- The internal mixed liquor recycle pump rate
- Oxic zone diffuser airflow
- Blower airflow

By monitoring the performance of controlled elements, the system uses dynamic simulation to optimize total energy use. Now operators know that system performance and energy use are regulated to meet management objectives.

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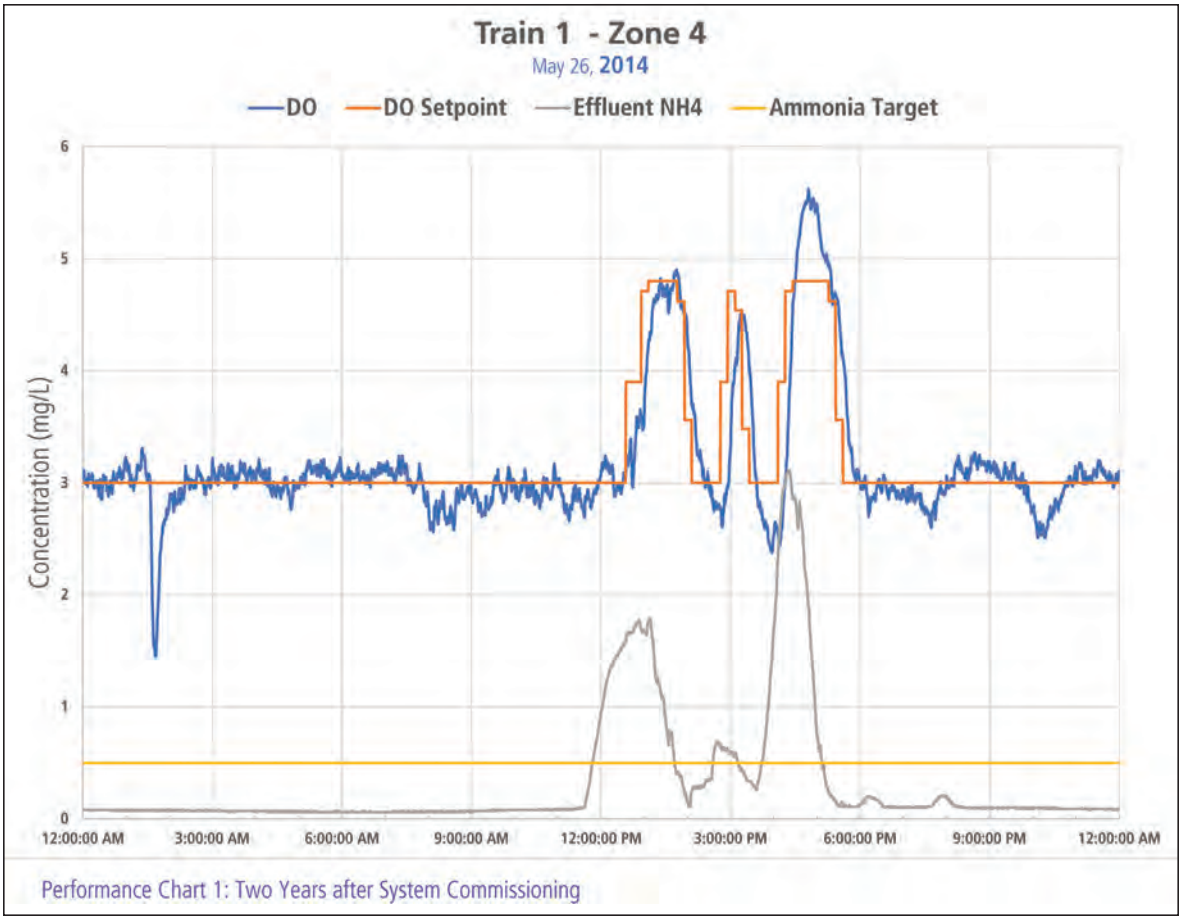
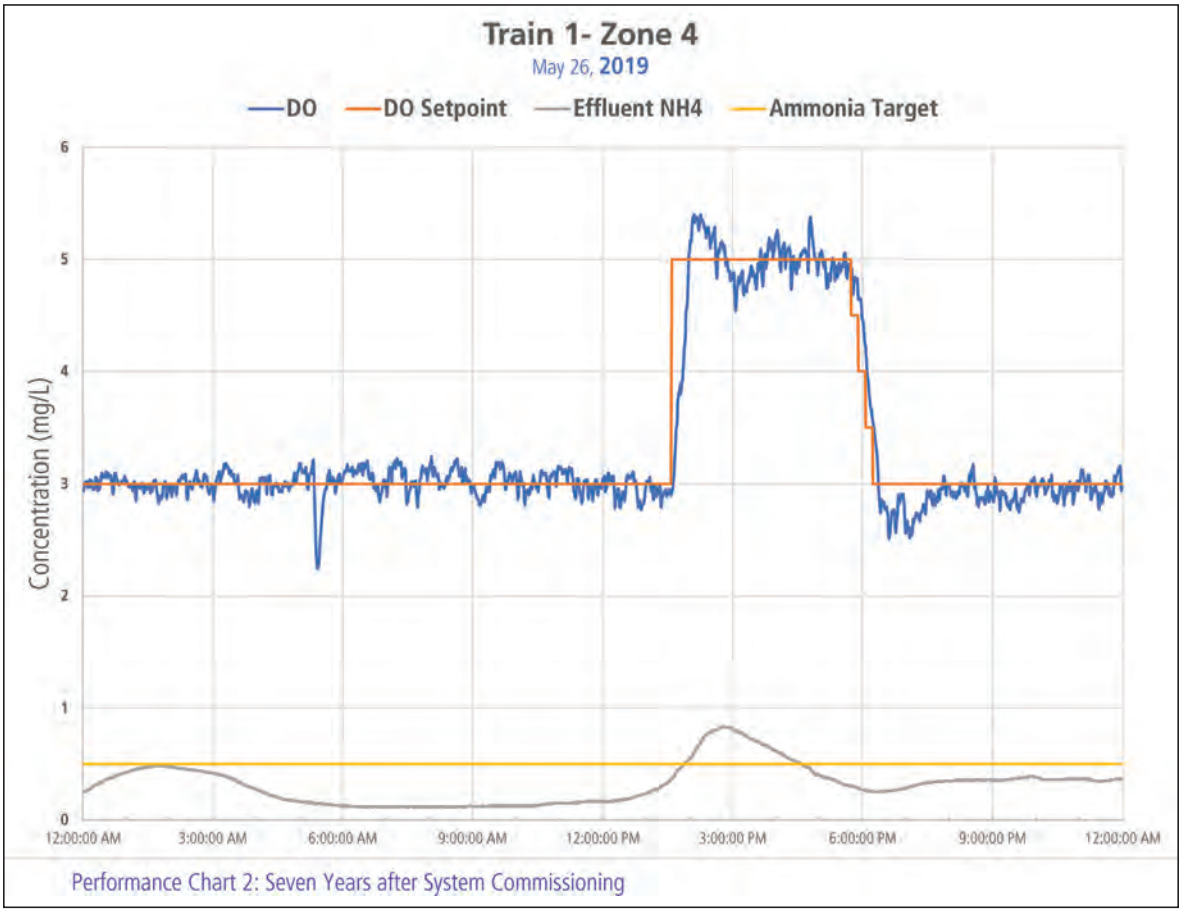


The control solution maintained steady treatment performance as shown by results documented two years after commissioning (2014) and seven years after (2019).



The steady performance of the Lebanon control system (more than seven years without manual retuning) is setting a new standard for the industry.

LONG-TERM PRODUCTIVITY

The control system enables the plant to meet permit requirements while minimizing operating cost. The process optimization system reduces energy use by an estimated 15% compared to operation with fixed dissolved oxygen setpoints and the aeration control system delivers an additional 10% reduction in energy compared to traditional PID-based control.

The control solution has performed without additional tuning since commissioning. System performance was documented two years after commissioning in 2014 and again in 2019, after seven years. When within the operating range of the associated components (blowers and valves), the aeration control system maintains a residual DO within plus or minus 0.5 mg/L of the setpoint more than 95% of the time. The process optimization system also continues to adjust critical setpoints to provide desired treatment performance.

This level of automation performance is unique considering a recent ABB study stating that control systems have a half-life of six months and must be retuned regularly to maintain system performance. That report also says 75% of control systems are not adding value (30% increasing variation, 15% out of range and 30% in manual operation).

The steady performance of the Lebanon control system (more than seven years without manual retuning) is setting a new standard for the industry.

ABOUT THE AUTHOR

Tanner Devlin (tdevlin@nexom.com) is an applications engineer with Nexom, a brand of Environmental Dynamics International. tpo

A Great Fit

ELI JENNINGS TURNED A FIX-IT BACKGROUND AND A LOVE OF ENGINEERING INTO A HATFIELD AWARD-WINNING CLEAN-WATER CAREER IN HIS NATIVE COLORADO

STORY: **Steve Frank** | PHOTOGRAPHY: **Erica Duda**

What do you do with a guy who fixes old pickup trucks for fun? Send him to engineering school, of course.

Eli Jennings, operations manager at the Clifton (Colorado) Sanitation District, grew up in the small western Colorado town of Collbran. As a youngster, he was always welding, tinkering with pick-ups and building things. When his 15-person class graduated from high school, off he went to the Colorado School of Mines in Golden, one of the premier engineering schools in the West.

"I knew I wanted to get into an engineering-related field," Jennings says. He began in mechanical engineering but switched to civil: "I was exposed to wastewater treatment in school when one of my elective classes toured a facility and I got some baseline interest."

Upon graduation, he took a job with a concrete supplier in Glenwood Springs, where he was involved with construction jobs. He soon heard about an operations opening at a wastewater treatment plant, applied for the job and got it. "I knew I had a good background for it from school," he recalls.

Eli Jennings, operations manager at the Clifton (Colorado) Sanitation District.

"The field is stable, and the job was close to home. I'd be protecting the environment, and it was a good fit."

SINGLE-SHOP OPERATION

The job was in New Castle, an old mining town of 4,500 about 15 miles west of Glenwood Springs. He was hired mainly as a wastewater operator; he and three other operators handled wastewater collection and treatment, as well as water treatment and distribution. He even plowed snow: "I got to see how everything worked. I used my degree more there than I did working as an engineer."

He also liked working for the town where he was living. He got busy earning his licenses and soon had his Class A wastewater operators and Level 4 collection systems (highest) licenses. He also earned Class B water operator and Class 2 water distribution licenses.

About five years later, opportunity knocked again, and Jennings took a job as an operator at the Clifton district's 2.5 mgd (design) activated sludge plant, which processes about 1.2 mgd. The plant provides wastewater services to about 21,000 people in an unincorporated suburb just east of Grand Junction. "It's a bigger organization, so I saw it as a bigger challenge with more opportunity to advance," Jennings says.

ABOVE: Jennings (right) observes as Trevor Workman (left) and Mike Brammer clean and inspect a tank. BELOW: The Clifton Sanitation District oxidation ditches are in the foreground; the return and waste activated sludge building is at back left, and the solids building is at the back right.

NEW OPPORTUNITIES

He spent his first year and a half at Clifton working in the lab as an environmental analyst. He passed the Rocky Mountain Water Quality Analysts Association's certification exam for Analyst Level 1 (lowest). On the job, he did all the state-required lab sampling, analysis and reporting while also completing the discharge monitoring reports and compiling the biosolids annual report.

Working for a special district rather than as part of a city organization, Jennings observes, "I have to do more, and I get to do more." A couple of promotions later, Jennings stepped up to his current position as operations manager.

Eli Jennings, Clifton (Colorado) Sanitation District

POSITION:
Operations manager

EXPERIENCE:
7 years with Clifton district, 5 years at New Castle (Colorado) Wastewater Treatment Plant

EDUCATION:
Bachelor's degree, civil engineering, Colorado School of Mines

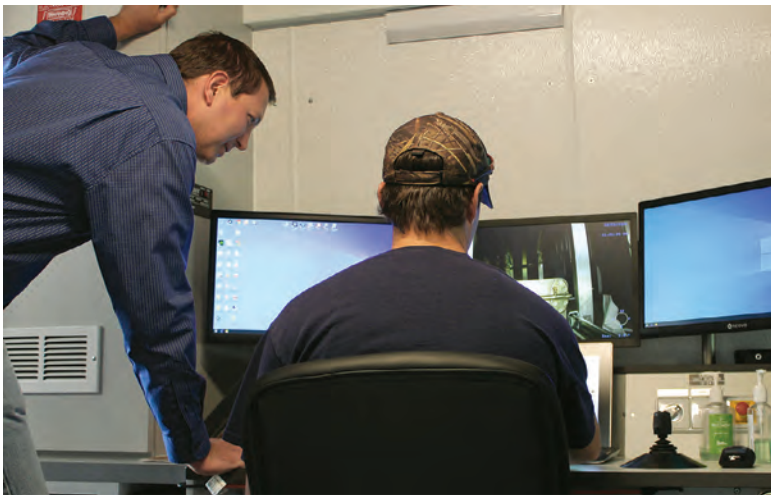
CERTIFICATIONS:
Class A wastewater operator, Class B water operator, Class 4 collection system operator, Class 2 distribution system operator, water quality analyst

AWARDS:
2019 William D. Hatfield Award, Rocky Mountain Water Environment Association

GOAL:
Continue his organization's success as district manager

> "It's the operational side that excites me. ... Operators deserve all the credit they get because when the keys are turned over to them, they make it work."
> **ELI JENNINGS**

The staff at the Clifton Sanitation District includes, from left, Tyler Brumback, operator; Pam Smith, administrative assistant; Jeff Duda and Matt Jones, operators; Eli Jennings, operations manager; Matt Talley, operator; Andrew Casano, facility maintenance; and Trevor Workman, Travis Dilley, and Mike Brammer, operators.



Jennings (left) works with operator Tyler Brumback to set up for a camera inspection on a pit at the wastewater treatment plant.

His duties are broad and varied. Brian Woods, Jennings' boss and the district manager, says Jennings exercises considerable independent judgment, using his own discretion in planning, developing, analyzing, coordinating, implementing, conducting and administering water-quality control programs that meet state and federal standards and permit requirements.

In addition, Jennings oversees the laboratory and the industrial waste pretreatment programs and has added safety responsibilities to his portfolio. His attention to continuing the safety culture that Woods established netted the utility the 2017 George W. Burke Jr. Facility Safety Award, a prestigious Water Environment Federation honor. The district also won the 2017 Colorado Special Districts Association's Safety District of the Year award.

LEADING FROM THE FRONT

As operations manager, Jennings doesn't just watch from the sidelines: He leads his organization toward continued excellence by doing. "We think of ourselves as doing everything a city would do," he says. "We have an 80-mile collections system and a treatment plant. Our main property is 65 acres. We also maintain the grounds."

The Clifton team includes collections system and wastewater operators Jeff Duda, Matt Jones, Matt Talley, Mike Brammer, Travis Dilley, Trevor Workman and Tyler Brumback; Andrew Casano, grounds maintenance; and Pam Smith, administrative assistant.

Clifton is in the middle of Colorado's wine-producing area, and the district added 3 acres of vineyards several years ago, fertilizing the ground with biosolids. "Brian worked with the Colorado State University Extension and the local farmer to design and plant something that was manageable for the organization and this climate," Jennings says. "The cabernet franc strain of grapes we grow is particularly hardy and cold resistant. It's a red wine, a little on the dry side."

Clifton is an activated sludge extended aeration oxidation ditch plant with simultaneous nitrification and denitrification. In 2015, as the new operations manager, Jennings took part in a project to install anaerobic selectors for biological phosphorus removal and filament control. "As a team, we're able to complete a lot more projects than any other similar-sized organization with the talent we have in-house," he states.

They process biosolids using conventional aerobic digestion followed by centrifuge dewatering. When air-drying solids in the summer months, the biosolids are windrowed and turned with a skid-steer-mounted Brown Bear. In summer, they apply the Class B biosolids to agricultural property the district owns. During the six winter months, they deliver their biosolids to a local farmer's property to boost his hay production.

A LITTLE OF EVERYTHING

Grass hay is grown on both the district's and the farmer's property: "We do all the biosolids sampling, analysis and application management. The farmer applies the material with a spreader the district owns."

The district does development design reviews, inspections on new construction and oversight on its own capital projects. Jennings' engineering background gives him a "good level of understanding of what we're talking about on these projects. Integration into projects has been pretty seamless, and that's been enjoyable."

He's pleasantly surprised at being able to identify, plan, budget for, design, build and operate projects all the way through: "For the projects I worked on before this, I felt I just carried them about two-thirds of the way to completion. But it's the operational side that excites me."

He praises his crew's can-do attitude and what they have accomplished in process control and operations. "Our district manager selected all the right equipment, built the plant and put it all in place," Jennings says. "The final step is operating it. We've put in a lot of effort, including ORP control. It's the best measure of current condition in a treatment basin to determine the nutrient removal processes taking place."

MANY AWARDS

His efforts are paying off. The district was named a Colorado Environmental Leadership Program Gold Leader in 2018, and the Rocky Mountain Water Environment Association presented Jennings with its William D. Hatfield Award in 2019.

He was also part of the team that earned other awards, including Colorado Rural Water Association Wastewater System of the Year in 2015 and the Rocky Mountain association's Plant Performance Award in 2016.

Never content to just let things be, Jennings has added process instrumentation to the plant's effluent train. The plant now has real-time monitoring of nitrates, phosphorus and ammonia. "It was a great step to get everyone to see, on a day-to-day basis, what our output was instead of just grabbing samples," he says. "Periodic sampling doesn't give you the full picture, and it's too late to fix it when you get the answer."

(continued)

SMALL DISTRICT, BIG OUTREACH

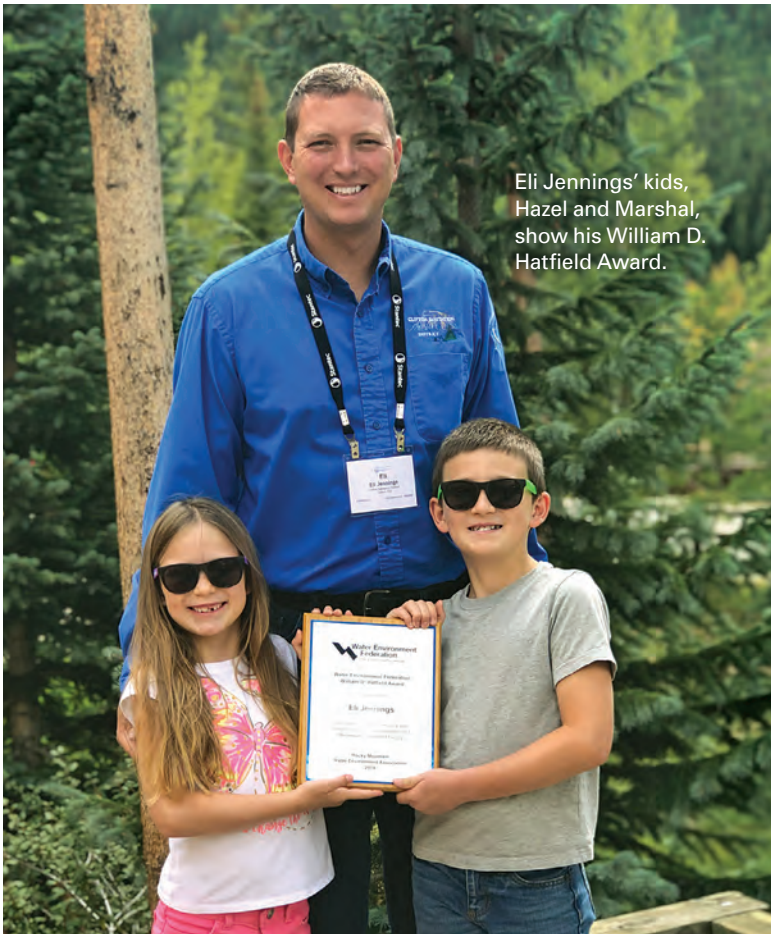
For a relatively small clean-water plant and staff, the Clifton (Colorado) Sanitation District runs a substantial outreach program.

"Our biggest outreach effort is with school tours," says Eli Jennings, operations manager. "We've provided tours to a variety of schools, from Colorado Mesa University to first graders. We've had as many as 100 kids out here. Our team just steps up. We divide them into manageable groups and station operators throughout the plant, and they rotate through."

Clifton also takes part in an annual water festival for fifth graders produced by the Ute Water Conservancy District at Colorado Mesa University. "We have a booth there, and we teach them about wastewater treatment," Jennings says. "Many of the other agencies contribute, too. It all works together."

Jennings and staff see a before-and-after effect as kids get interested at the water festival and then come to the plant for a tour. "By the end of the tour, we have teachers asking if we're hiring," he says. "They want to come work here."

The district also provides information about the plant and what it does through brochures, a newsletter and a website, "but our most successful outreach is through school tours."



Eli Jennings' kids, Hazel and Marshal, show his William D. Hatfield Award.

The team's most recent hurdle involved the aeration system. They studied the air demand and knew how they could reduce it even more, but the blowers they had wouldn't let them. So they did a retrofit project that included three new 200 hp Eaton PowerXL DG1 Series variable-frequency drives and a new control system using Allen-Bradley CompactLogix 5380 Series controllers (Rockwell Automation).

> "I got to see how everything worked. I used my degree more there than I did working as an engineer."
> **ELI JENNINGS**

The equipment was installed in April and May. They also had a complete control system revision to operate. "We upgraded all the PLCs and rewrote the logic," Jennings says. "We need to do it anyway, but this was our chance to write in the control systems to manage the VFDs and provide flow-based aeration control to replace the pressure-based systems."

While he and his facility rack up recognition, Jennings is unsparing with praise for his team and for the operations profession in general: "Operators deserve all the credit they get because when the keys are turned over to them, they make it work." **tpo**

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2020 directory

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			X	X	X	X	X	X		X	X	X	X	X		
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The LEED Gold-certified Sechelt Water Resource Centre releases no odors to the community.

Clean and Green

A SMALL CANADIAN CITY'S WATER RESOURCE FACILITY COMBINES SBR TECHNOLOGY WITH GREENHOUSE PLANTS THAT ENHANCE TREATMENT AND HELP ELIMINATE ODORS

By Steve Lund

The Water Resource Centre in Sechelt has a small footprint but a big impact on its British Columbia coastal city, known for beaches and outdoor recreation.

Designed to LEED Gold standards by Vancouver-based PUBLIC: Architecture + Communication, the plant occupies about half the space of the two treatment facilities it replaced, even though it has twice the capacity (1.1 mgd design, 0.6 mgd average flow).

The plant has won numerous design awards, and it won the 2016 Sustainable Communities Award – Water Project from the Federation of Canadian Municipalities and an Architectural Innovation Award from the Architectural Institute of British Columbia in 2018.

The plant incorporates a greenhouse as part of the treatment process and has solar panels with 12-kW capacity, a system that recovers heat from the wastewater, tertiary treatment with membrane filtration, and UV disinfection. It looks like a botanical garden rather than a wastewater treatment plant — and, in fact, it is both.

A residential neighborhood sits next to the Sechelt Water Resource Centre, making odor control a priority.

ODORS CONTROLLED

Sechelt (population 9,500) lies northwest of Vancouver on an isthmus between Sechelt Inlet and Trail Bay. The community's interest in environmental stewardship is reflected in the Water Resource Centre, which sits next to a residential neighborhood.

The homes next door made odor control important. "The greenhouse functions to fit into the urban environment, but it also contains odors," says Christine Miller, wastewater supervisor for the District of Sechelt. "There's an odor control system within the greenhouse. Any odors are picked up and go through a chemical scrubber and then to carbon beds before release. There's no odor in the community."

For now, some of the effluent is used for toilet flushing and other in-plant purposes, but most is discharged to the Pacific Ocean in Trail Bay. The long-term plan is to reuse the tertiary-treated water to irrigate parks and golf courses, but the purple-pipe infrastructure is not completely developed.

"We're working on it," Miller says. "Whenever a new road is built, we always put in the pipes to prepare for that future reuse."

COMPACT PROCESS

The Water Resource Centre achieves its relatively small footprint by combining all secondary treatment in sequencing batch reactor tanks that sit under the greenhouse. The process was developed by Organica Water.

After solids and grit removal and aerated primary treatment, the influent moves into four SBR tanks where the activated sludge process includes aeration, settling and decanting. The roots from plants in the greenhouse hang down into the batch reactor tanks to provide media for a diversity of water-cleaning microbes. Fixed-film media for microbes could be added to the tanks to increase treatment capacity if needed in the future. Fine-bubble aerators are at the bottom of the tanks.

> "Any odors are picked up and go through a chemical scrubber and then to carbon beds before release. There's no odor in the community."
> **CHRISTINE MILLER**

The effluent doesn't flow out of the tanks; it is decanted off the top. "Decanters sit on the surface," Miller says. "They work kind of like a siphon, drawing off the top of the batch reactor." The siphoned effluent goes to tertiary membrane filtration and then UV disinfection. The solids that settle to the bottom are ultimately collected by a local company and composted to produce Class A biosolids.

The Water Resource Centre replaced one treatment plant near the present site and another on the edge of the city that now functions as a septage receiving station. The solids are removed there, and the liquids flow to the new facility.

DIVERSE BENEFITS

In its report when the sustainability award was announced, the Federation of Canadian Municipalities described the facility as the first in North America to use plants suspended over treatment tanks in a greenhouse in the SBR process.

The report says the plants make the biological treatment process more efficient, reduce energy usage, save space and control odors. The report also cited the project for the landscaping of the grounds to make them fully accessible to the public, restoring the habitat of a small stream and hosting educational tours.

According to the report, the project's environmental benefits include reducing suspended solids by 95%, reducing effluent ammonia and fish toxicity, eliminating effluent chlorine, cutting energy consumption by 38% and reducing potable water consumption by 88%.

A wide variety of plants grow in the greenhouse at the Sechelt Water Resource Centre. The roots hang down into the sequencing batch reactor tanks and enhance the treatment process.

There were economic benefits as well. The project doubled treatment capacity with minimal increase in operating costs. The $25 million project was funded in part with federal grants, support from the Federation of Canadian Municipalities' Green Municipal Fund and a contribution from the Sechelt Indian Government District.

HIGHEST QUALITY

The Water Resource Centre is classified by the provincial Ministry of Environment as a Level 4 facility (the highest). It is run by a staff of five certified operators. The facility went online in 2016; the planning began in 2012, when the old plants were at capacity.

"The community was interested in treating the effluent to the highest quality," Miller says. "That's what led them to this." tpo

Celebrating Water

PHOTOGRAPHY BY BRIAN GODDARD

STATIC DISPLAYS, INTERACTIVE ACTIVITIES, STORYTELLING AND MUSIC MARK THIS AREA'S CELEBRATION OF INDIGENOUS CULTURE AND CANALS

By Jeff Smith

Not far from Mesa's Northwest Water Reclamation Plant in Arizona is the 2,100-acre Riverview Park. More than 200 years ago, a series of canals traversed the site as a source of water for Native Americans in Arizona.

For 10 days in November 2019, it was the site of a unique public art display celebrating that history and emphasizing the role of water in everyday life today.

Named "Water = Life" by its primary creator and lead artist, Tony Duncan, the exhibition was designed to engage and inspire the public to think about the sustainability of water. Static displays, interactive activities, storytelling and music served to educate attendees about the area's ancient Indigenous civilization and canals. More than 6,000 people attended.

PHOTOS ABOVE: 1) The aqua-colored "stream of water" leading to the circular display area where exhibition attendees viewed the water-themed artworks; 2) Tony Duncan, lead artist for the Water = Life public art exhibit, performed a hoop dance as one of many musical presentations; 3) parents help children with a sidewalk art project; 4) a water-bar kiosk for refilling visitors' bottles (from left, Jose Cabral, water/wastewater utility systems crew leader; Miki Zmolek, water resources program assistant, and Jake West, director of the Water Resources Department).

> "Visitors were asked to immerse themselves in the stories, sounds and community art to consider their own history with and relationship to water."
> **KATHY MACDONALD**

MULTIMEDIA CREATION

"It was a tremendous success, even though Mother Nature didn't cooperate and kept many people away," says Kathy Macdonald, water resources planning adviser. A "stream" created with ribbons of aqua-colored textile led visitors to the center of a circular display representing the canals.

Defining the circle and mounted between individual posts were a series of water-themed paintings with related historical dialog. A soundscape and storywalk emphasized people's relationship with water. It all served to highlight the legacy of the canal system as the foundation of the modern water system.

Ceramic pieces created by community members lined the outside of the circle. At its center, mounted on a pedestal, was a large clay vessel made by renowned potter Ron Carlos, a member of the Salt River Pima-Maricopa Indian Community. Through art, Carlos follows his elders' tradition of telling stories.

"Visitors were asked to immerse themselves in the stories, sounds and community art to consider their own history with and relationship to water," Macdonald says. Other activities included live painting and performances of hoop dancing by Duncan. A mobile screen-printing kiosk inscribed blank T-shirts that attendees brought to the event.

Members of the Mesa Water Resources Department manned a water-bar kiosk to refill visitors' water bottles. The water bar keeps about 30,000 plastic bottles out of the landfill each year.

DIVERSE FUNDING

An Arizona Community Foundation program called the Arizona Water Public Art Challenge, aimed at raising awareness about water, inspired and partially funded the project. Mesa was one of five $50,000 winners of a contest to create a temporary art project honoring the legacy of the ancestral Sonoran Desert people.

The Mesa Arts Center also secured a grant from the National Endowment for the Arts to support the project. The Mesa Water Resources Department provided technical support to a task force charged with designing the project.

"The art center was the lead partner on the project," says Casey Blake, the center's director of marketing and public relations. "The Water Resources Department worked closely with us, along with several other city departments." Blake says the project highlighted a separate "Water, Use It Wisely" campaign in Mesa.

EMBRACING HISTORY

Tracing the history of the canals that first brought water to the community was the foundation of the art challenge, but the Mesa team wanted a project that also inspired residents to think about the role of water in their lives, now and in the future.

The entire community was encouraged to offer ideas for the project. A dozen workshops engaged people in art, storytelling, pottery and hoop dancing. More than 200 collaborated. After the opening celebration, the Water = Life exhibit remained in place for nine more days.

"The project was an overwhelming success," Macdonald says. "It met everyone's goals and heightened awareness about the environment in general and water in particular." **tpo**

New Technology Slated for WEFTEC Connect

By Craig Mandli

WEFTEC, the Water Environment Federation's annual Technical Exhibition and Conference, offers municipal and industrial water and wastewater professionals from around the world exposure to the newest products, as well as opportunities for professional development. This year's virtual event, WEFTEC Connect, will be live Oct. 5-9 and features an exhibitor showcase, education and networking components of the WEFTEC experience. Below is a preview of some of the latest offerings from exhibitors who would have displayed them in person, as well as products that will be highlighted at the 2020 virtual event.

Aerzen Rental temporary oil-free blowers

Aerzen Rental provides **temporary oil-free blower packages** engineered for aggressive rental environments with onboard variable-frequency drives, remote monitoring and outdoor builds with sound-attenuating enclosures. The rental units are available for immediate deployment in the event of a production failure or shortfall to longer-term operational leasing and rent to own.

844-400-2379; www.aerzenrentalusa.com

Alfa Laval Aldec G3 VecFlow

Alfa Laval's Aldec G3 VecFlow decanter centrifuge offers high performance and low operating cost. The unique feed zone minimizes turbulence, resulting in exceptional separation and 30% lower power consumption versus traditional decanters. It also offers the flexibility to optimize the process by minimizing polymer consumption, increasing cake dryness or boosting capacity, all based on your unique conditions. Plants can often realize a full return on their investment in less than a year due to its high separation performance and low power consumption. Meet Alfa Laval at WEFTEC Connect to discuss if VecFlow is the right solution for your dewatering and thickening process.

866-253-2528; www.alfalaval.us

WEFTEC Connect virtual exhibitor

AllMax Software Antero CMMS version 7

Antero CMMS version 7 from **AllMax Software** includes asset mapping, asset criticality scoring, improved workflow and work order management, and procedure scheduling for detailed plant inspections and rounds. Improvements have been made to the reporting, calendar and equipment sections, ensuring users have access to their most critical asset and maintenance information in order to make informed, data-driven decisions. It accurately tracks maintenance data, allowing the user to streamline his or her maintenance program to save time, effort and money, all while providing the peace of mind that the equipment is being maintained efficiently and effectively.

800-670-1867; www.allmaxsoftware.com

WEFTEC Connect virtual exhibitor

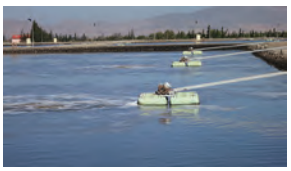
Applied Felts CIPP liners

Using only the highest-quality raw materials available, **Applied Felts** manufactures world-class **CIPP liners** based on unique job requirements. Their vertically integrated offering of classic felt liners include flame-bonded or sewn-seamed, highly durable, polyurethane- and polypropylene-coated liners for more extreme environmental and installation requirements. They also provide maximum flexibility in the field. The fiberglass-reinforced liners provide a strong, robust liner for gravity sewer, pressure pipe and potable water applications.

276-656-1904; www.appliedfelts.com

Aqua-Aerobic Systems OxyStar

The **OxyStar** aerator from **Aqua-Aerobic Systems** has been a leading aspirating aeration technology for 50-plus years and has effectively aerated and mixed more than 4,000 municipal and industrial wastewater treatment systems across the globe to introduce oxygen into lagoons, equalization basins, aerobic digesters, sludge holding basins and/or activated sludge systems. Known for its efficient oxygen transfer and intense directional mixing pattern, which results from its three-blade helical propeller, the aspirating aerator is a suitable solution to improve aeration systems in aerated lagoons, oxidation ditches and other activated sludge processes, equalization basins and aerobic digesters.



815-654-2501; www.oxystaraerator.com

WEFTEC Connect virtual exhibitor

Atlas Copco ZS

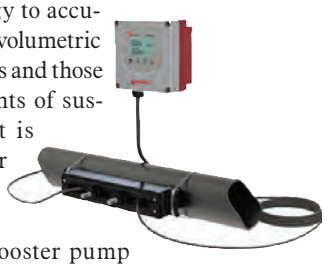
The **ZS** blower range from **Atlas Copco** is designed to guarantee a continuous, long-term supply of oil-free air. The models in the range provide reliable, energy-efficient packages, which are suitable for a wide array of wastewater applications, ensuring low-operating costs and maximizing your total cost of ownership. Maintenance costs and downtime are minimized due to the innovative technology of the screw blower. The range also boasts low noise levels, meaning they can be installed at the point of use. The flow range is 120 to 5,500 cfm, with a pressure range of 0-22 psig.

866-546-3588; www.atlascopco.com

WEFTEC Connect virtual exhibitor

Badger Meter Dynasonics TFX-5000

The **Dynasonics TFX-5000** ultrasonic clamp-on meter from **Badger Meter** uses transit time technology to accurately measure the volumetric flow of clean liquids and those with small amounts of suspended solids. It is suitable for water and wastewater applications, such as lift stations, booster pump stations and water mains. Designed to clamp onto the outside of pipes, it doesn't contact



the internal liquid, allowing for installation without shutting down operations in new and retrofit applications. It is equipped with an internal clock and built-in 8 GB data-logging capabilities to log water flow down to one second.
877-243-1010; www.badgermeter.com

BDP Industries 3DP belt press

The 3DP belt press from BDP Industries is designed to provide high discharge cake solids at high flow rates. It has a 25-year track record of low operation and maintenance costs while providing suitable performance. It has been continually improved with the latest features and automation and is a rugged, durable machine designed to provide years of reliable service. With its history of dewatering aggregates and minerals, as well as wastewater treatment plant solids, it is also especially suited for water treatment plant residual dewatering.
518-695-6851; www.bdpindustries.com
WEFTEC Connect virtual exhibitor

Bright Technologies, Division of Sebright Products, belt filter press

The compact 0.6-meter skid-mounted **belt filter press** from **Bright Technologies, Division of Sebright Products,** has stainless steel frame and roller construction, as well as radius wedge zone and wing roller for sludge dewatering. Components include a sludge pump, polymer system and wash-water booster pump. Options include a sludge flowmeter, air compressor and discharge conveyors. The compact walk-around skid design can be utilized in as little as a 10-by-20-foot floor area. Rates of 25 to 50 gpm make it ideal for small applications or when a processor has outgrown dewatering containers.

800-253-0532; www.brightbeltpress.com

Brown Bear Model R-31-10

Model R31-10 compost aerator attachments for skid and compact track loaders from **Brown Bear** mix and aerate compost windrows of organic yard waste, green waste, food waste, dry wastewater and potable water biosolids quickly and efficiently. They are quick attachable with a quick coupler system, and the rotor is powered by the implement's high-flow hydraulics. The 31-inch paddle-type rotor provides a fast mechanical solution for accelerated solar drying of biosolids, forming windrows, blending bulking agents or additives, pulverizing, aeration and water addition for aerobic windrow composting.
641-322-3169; www.brownbearcorp.com

Centrisys/CNP THK

The **Centrisys/CNP THK** sludge thickener is engineered for high-performance biosolids thickening. Compared to other centrifugal sludge thickening technologies, it uses 50% less power and dramatically reduces or even eliminates the need for polymer conditioning. Thanks to these savings, it represents a low total cost of ownership. With an all-cylindrical design for maximum capacity, it has a small footprint for its throughput. Air injection for precise control of sludge thickness makes operation easy and reliable. It is an enclosed system, allowing for safe, hygienic operation and simple cleaning.
262-654-6006; www.centrisys-cnp.com
WEFTEC Connect virtual exhibitor

Cretex Specialty Products LSS Internal Manhole Chimney Seal

Cretex Specialty Products LSS Internal Manhole Chimney Seal is a mechanical seal installed on the frame and grade ring sections of sanitary sewer manholes. These seals eliminate and prevent manhole frame-chimney inflow. During wet weather, clearwater (inflow) enters manholes through deteriorated and broken frame-chimney joints, which may burden the collections system. Each seal is made up of a high-grade rubber sleeve and stainless steel expansion bands, which can be easily removed and reinstalled to allow for future manhole adjustments. The chimney seal has a 50-year design life and is available in four widths, allowing complete chimney coverage of up to 24 vertical inches with a single seal.
800-345-3764; www.cretexseals.com
WEFTEC Connect virtual exhibitor

CUES GraniteNet WebInspect

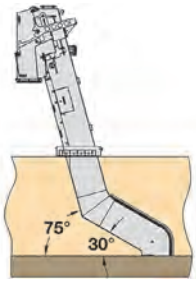
GraniteNet WebInspect from **CUES** is a browser-based inspection app designed to perform inspections and collect information about municipal assets, such as manholes, including Manhole Assessment and Certification Program v7 Level 1, hydrants, lift stations, grease traps, light poles and signage. It can be used to help perform and track tasks such as valve turning, smoke tests, brush cutting and snowplowing. It allows the tech to collect GPS points, water-quality samples, flow tests and assess sewer backups, as virtually any type of asset assessment or task can be quickly deployed for the organization, with or without existing GIS maps. All that's needed is an internet connection and virtually any device with a browser, such as a mobile phone or tablet. There's no software to install on any user device.

800-327-7791; www.cuesinc.com
WEFTEC Connect virtual exhibitor

Duke's Root Control Razorooter II

Razorooter II from **Duke's Root Control** is a herbicide-laden, thick foam with the consistency of heavy shaving cream that is a cost-effective way to kill tree roots in sewers. Duke's crew inserts a hose from manhole to manhole. The hose releases and sprays the foam in all directions, allowing it to adhere to roots and penetrate through wye connections to kill roots, even in lateral lines. The entire system is treated as the foam compresses against pipe surfaces and penetrates cracks, joints and connecting sewers. Roots are killed on contact inside and outside the pipe walls, decay naturally and slough away, with regrowth delayed for two to three years. Trees and other aboveground vegetation are not harmed.
800-447-6687; www.dukes.com

Enviro-Care FSM



The **FSM** multiangle, perforated-plate belt filter screen from **Enviro-Care** increases the flow capacity by almost 100% while maintaining the original channel footprint. The first section of the screen sits at a 30-degree angle that doubles the wetted screen area while reducing the velocity through the screen. The screen then transitions into a 75-degree transport area. It can be the solution to upgrading to a high-capture screen and handling more flow in an existing channel.
815-636-8306; www.enviro-care.com
WEFTEC Connect virtual exhibitor

(continued)

FerraTex Solutions wet-out liners

FerraTex Solutions provides CIPP **wet-out liners** and services for demanding trenchless pipe rehabilitation projects, reducing time and costs for CIPP installers. With six locations across the U.S., they offer logistic advantages and customer service throughout the U.S., Canada and parts of Mexico. Each wet-out liner undergoes a rigorous ISO 9002 certified quality-assurance inspection. Once resin impregnation is completed, the resin-saturated liner is loaded into a climate-controlled trailer for delivery and is tracked through GPS.

844-433-7728; www.ferratex.com

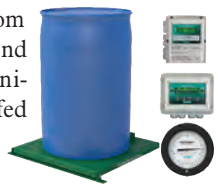
Flomatic Valves Model 745 AIS

The **Flomatic Valves Model 745 AIS** swing check valve has a valve body with full flow area equal to nominal pipe diameter and a 45-degree angle seat providing short disc travel with faster closure for nonslam performance. An EPDM molded one-piece disc has an integral molded O-ring on the seating surface, which is reinforced with steel. It is available with accessories such as a backflush device, position indicator and limit switch. It has NPT threaded and plugged side ports for easy installation of gauges or accessories. It is designed and manufactured according to the ANSI/AWWA C508 Standard.

800-833-2040; www.flomatic.com
WEFTEC Connect virtual exhibitor

Force Flow Drumm-Scale

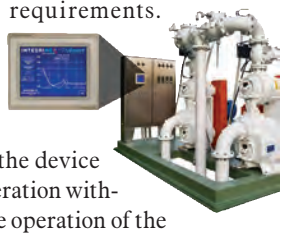
The **Drumm-Scale** from **Force Flow** is a simple and reliable way to accurately monitor the amount of polymer fed from a day tank, and it enables accurate compliance with government-required documentation of chemical use. It helps maximize solids yield with minimal polymer use. The low-profile Tuf-Coat steel platform permits easy on-loading and offloading of tanks without the need to pit-mount the scale. The unit is available with any of the company's indicators, including the economical SOLO G2, advanced multichannel Wizard 4000 and rugged Century hydraulic dial.



800-893-6723; www.forceflowscales.com

Gorman-Rupp Integrinex Advanced

Gorman-Rupp's Integrinex Advanced lift station controls are custom-engineered to meet unique system requirements. When equipped with FloSmart technology, the control system can detect a pump obstruction. Upon detection, the device initiates a cleaning operation without interfering with the operation of the pump station. When the cycle is complete, the pump is ready to return to normal operation. If the clog remains, the cleaning sequence repeats until the blockage is cleared. FloSmart helps maximize uptime while reducing maintenance costs.



419-755-1011; www.grpumps.com

Hach EZ Series online analyzers

EZ Series online analyzers from **Hach** provide a solution for continuously monitoring parameters that are critical to risk mitigation, compliance, safety and process uptime. They offer five different technologies: titration, colorimetry, chemiluminescence, ion-selective electrode and voltammetry. They include a wide analytical range; a variety of measuring ranges, multistream capabilities and multiple parameter options; and reliable monitoring of remote locations or unmanned plants, which allows staff to focus on other tasks.

800-227-4224; www.hach.com
WEFTEC Connect virtual exhibitor

Hayward Flow Control HLS Series level sensor

The **HLS Series** level sensor from **Hayward Flow Control** provides a broad chemical resistance to acids, bases and oxidizers, like sodium hypochlorite, with its CPVC body and construction. It is typically placed at the bottom of a liquid storage tank or sump where the hydrostatic pressure is sensed and converted to an analog output signal (4-20mA). Pressure level sensors are not affected by liquid surface conditions like waves or foam or tank headspace conditions like vapors or thermal layers. No stilling well is required for accurate measurements. The sensors are provided in two measurement ranges: 0-15 and 0-33 feet of water column. Controllers and indicating transmitters for the unit are also available.

888-429-4635; www.haywardflowcontrol.com

Keller America Econoline

The **Econoline** pressure transmitter from **Keller America** combines a media-isolated piezoresistive silicon sensor with signal conditioning electronics to provide a compact pressure transmitter with less than plus or minus 1% total error band accuracy over 32 to 122 degrees F. The industry-standard 4-20mA analog output is compatible with most existing monitoring infrastructure and SCADA systems and provides meaningful output in ranges from 30 to 10,000 psi. The design makes it suitable for use under harsh environmental conditions, including those with high levels of electromagnetic radiation and/or those involving aggressive media where small size, low weight and reasonable cost are required. Modular production provides short lead times and maximum versatility for specific applications.

877-253-5537; www.kelleramerica.com

Komline-Sanderson Biosolids Drying System

Biosolids Drying Systems from **Komline-Sanderson** are capable of handling in excess of 1,000 tons of wet cake per day. Excess heat from combustion engines or turbines can be used to heat thermal fluid or produce steam. The dryer's shaft, hollow paddles and trough are all heated. The robust design and low speed with minimal rotating parts result in reduced maintenance costs. Indirect drying using the airtight dryer results in minimal off-gas volume, which allows simplified odor control systems and safe operation resulting in reduced disposal costs for the beneficial reuse of biosolids as fertilizer and green fuel.

800-225-5457; www.komline.com
WEFTEC Connect virtual exhibitor

Lakeside Raptor FalconRake bar screen

Protecting downstream equipment in municipal and industrial applications, the **Raptor FalconRake** bar screen from **Lakeside** achieves high removal efficiency and low headloss, without the need for lower bearings, sprockets, bushings or guides that could foul or jam conditions in the channel. The all stainless steel, corrosion-resistant construction is designed with multiple rakes that continuously remove captured material. It is available in a range of bar shapes and depths so that it can create an efficient, durable and dependable rapid debris removal system for a range of applica-

tions. In addition, its design and construction means a low horsepower, energy-efficient drive system.
630-837-5640; www.lakeside-equipment.com
WEFTEC Connect virtual exhibitor

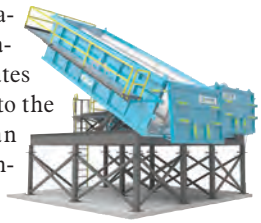
Lovibond PTV Series

The **Lovibond PTV Series** of process turbidimeters is optimized for drinking water applications. They include a long-lasting LED light source and bubble exclusion system that deliver accurate and ultrastable measurements. Combined with the heated optical assembly, the chance for condensation and fogging is eliminated. The low-volume flow body provides faster response to turbidity spikes and uses far less water and calibration standards. It is easy to clean and can be easily drained with quick-connect fixtures. The instruments meet Environmental Protection Agency and ISO regulatory requirements.
941-756-6410; www.lovibond.com
WEFTEC Connect virtual exhibitor

MaxLiner USA MAX CalTube

MAX CalTubes from **MaxLiner USA** provide optimum flexibility and durability. The yellow version is engineered from ultraflexible, lightweight polyethylene fabric with PVC coating that is closed with a high-frequency welded overlap. It is intended for use in open-end liner and pull-in-place applications. They are ideal for lower pressure and heat curing up to 135 degrees F unsupported.
877-426-5948; www.maxlinerusa.com

Park Process Big Tipper



The **Big Tipper** from **Park Process** allows the user to mount dewatering boxes on a permanent stand and eliminates hauling the containers to the landfill where they can become damaged in transit and when emptying. Having the containers dump into a containment area also allows for extra drying of the filter cake. Using more than one dewatering container allows the units to handle a continuous flow of wastewater. While one container is filling, the other one is sitting idle and draining. Units are available in a multitude of capacities and tipping heights and come complete with handrails, walkways and stairs and/or ladders.
855-511-7275; www.parkprocess.com

Penn Valley Pump double disc pumps

Double disc pumps from **Penn Valley Pump** are based on free disc technology and operate on the principle of induced flow. This positive displacement pump's discs work in unison to perform the duties of both the pumping and valving element, creating a double-acting, nonclogging pumping action suitable for handling sludge, slurry, scum and other waste liquids with up to 2-inch solids. Thanks to a nonclose tolerance design, they have less wear for longer operating life and can run dry without damage. When maintenance is required, the maintain-in-place system allows the pump to be serviced without disturbing piping.
215-343-8750; www.pennvalleypump.com

Sauereisen SewerGard Roll Applied 210XROL

Sauereisen SewerGard Roll Applied 210XROL is an epoxy lining system designed to protect concrete surfaces of municipal wastewater treatment structures and collections systems from chemical attack and physical abuse. Roll applied ensures ease of application on vertical surfaces, does not require a primer, zero VOCs and prohibits water inflow and infiltration. It is resistant to corrosive conditions common to the municipal wastewater treatment industry and suitable for application over damp or dry concrete surfaces. Depending of surface temperatures and substrate conditions, it can be applied up to 25 mils per coat.
412-963-0303; www.sauereisen.com

Sealing Systems Flex-Seal 2.0

Flex-Seal 2.0 from **Sealing Systems** is an all-purpose, single-component sealant that adheres to many surfaces and has more than 800% elongation. It is designed to prevent I&I and to provide corrosion protection at the grade-adjustment ring section or joint section of manholes and catch basins. It is 100% safe and Prop 65 compliant. The internal seal is manually applied using a paintbrush, and the kit is designed to cover 12 vertical inches on a 27-inch-diameter manhole.
800-478-2054; www.ssisealingsystems.com

Vaughan chopper pumps

Wastewater professionals work hard to keep the water flowing. To do their jobs effectively, they need pumps and equipment made to handle the new sewage reality. When standard nonclog pumps come up short, bring in pumps that make sure wipes and heavy solids don't cause any harm down the line. By installing a reliable, heavy-duty **chopper pump** from **Vaughan,** solids are easily handled and broken apart to keep operations running smoothly.
888-249-2467; www.chopperpumps.com
WEFTEC Connect virtual exhibitor

VEGA Americas VEGAPULS C

The **VEGAPULS C** series from **VEGA Americas** is a stand-alone, loop-powered sensor with an IP68 housing and fixed cable connection, complete with NSF/ANSI/CAN 61 approvals. The 80 GHz radar sensors use precision focusing to deliver reliable measurements regardless of internal obstructions, changing temperatures, condensation or dust. These sensors can easily be adjusted via Bluetooth with a smartphone or tablet, making setup and diagnostics significantly easier.
800-367-5383; www.vega.com

YSI, a Xylem brand 3017M Chlorine Analyzer

The **3017M Chlorine Analyzer** from **YSI, a Xylem brand** is a DPD colorimetric analyzer used for continuous measurements of free or total chlorine in municipal drinking water and wastewater samples. It uses an EPA-approved method that makes it suitable for drinking water permit reporting in the U.S. It is accurate, simple, and low maintenance, with features like flow injection analysis, factory calibration and simplified tubing. Low reagent use reduces maintenance frequency. It can operate as a standalone unit or be integrated into the IQ SensorNet system of online controllers, analyzers and sensors for better visibility and process control.
937-767-7241; www.ysi.com
WEFTEC Connect virtual exhibitor tpo

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2

1. Eradicator upgrade kits are part of this existing Super T Series installation in a wastewater treatment plant. The complete assembly can be installed in 15 minutes with common hand tools.
2. These return and waste activates sludge Super T Series pumps with the Eradicator solids management system replaced dry-pit submersibles and eliminated clogging issues.
3. The Eradicator system with Super T Series pumps at a poultry processing plant.

3

Moving It Down the Line

AN UPGRADE TO PROVEN SELF-PRIMING CENTRIFUGAL PUMPS HELPS PREVENT CLOGGING FROM THE GROWING INFUSION OF WIPES TO SEWER SYSTEMS

By Ted J. Rulseh

Any clean-water plant operator knows the challenges posed by wipes and other nondispersible items coming in through the collections system.

These solids can clog lift station centrifugal pumps, as well as check valves and screens, driving up costs for maintenance, repair and operations. While screening systems remove much of this debris, they cannot keep all harmful materials from reaching treatment plant pumps. Therefore, many facilities resort to grinders, shredders and choppers.

Now pump manufacturer Gorman-Rupp is offering the Eradicator solids management system for its Super T Series self-priming centrifugal pumps. The technology, offered as original equipment and as an upgrade to pumps already in the field, helps to reduce clogging by efficiently passing stringy materials through the pump.

Vince Baldasare, sales manager for engineered systems, and Jeff Hannan, product manager for centrifugal pumps, talked about the technologies in an interview with *Treatment Plant Operator.*

tpo: How do the Super T Series pumps fit into the wastewater collections system?

Baldasare: The pumps are available in discharge sizes from 3 to 10 inches and deliver flows up to 3,400 gpm. Pumps 4 inches and larger are engineered to allow up to 3-inch-diameter spherical solids to pass through. Pumpout vanes on the two-vane impeller shroud reduce foreign material buildup behind the impeller and reduce pressure on the seal and bearings.

> "Engineers told us they wanted those wipes to pass through as whole as possible so that they could get caught in the screens at the headworks of the treatment plant."
> **VINCE BALDASARE**

tpo: What market need drove the development of the Eradicator system?

Baldasare: In talking with industry experts, we learned that running wipes through a chopper pump is not necessarily a good thing, because they can re-form into balls later on in the system. Engineers told us they wanted those wipes to pass through as whole as possible so that they could get caught

in the screens at the headworks of the treatment plant. For us, it was easier to come up with a technology to adapt our Super T Series pumps than to develop a whole new pump or a whole new rotating assembly. The Eradicator system doesn't chop or shred; it lets the wipes go through and continue down the force main.

tpo: What sorts of materials have tended to cause trouble for centrifugal pumps?

Hannan: As the wipes break down, they get into strands and fibers. That is what starts to congregate at the eye of the impeller and block up the pump. It balls up, and once that starts, it accumulates almost exponentially. The Eradicator is designed to dislodge the material from congregating at the eye and move it through the pump.

> "With our upgrade kit, we can easily adapt the Eradicator to 10- and 15-year-old Super T Series pumps already installed in lift stations."
> **VINCE BALDASARE**

tpo: What does the system consist of?

Hannan: It has three components. There is a back cover on the suction side. There's a wear plate that has a tooth and also has notches and grooves cut into it, as opposed to a smooth surface in the typical design. Then we have a lightweight inspection cover that the user can easily pull off if something were to get lodged inside or if they want to check clearances. It gives access right to the eye of the impeller without having to remove the cover plate.

tpo: How does this design prevent pump clogging?

Hannan: The flow enters the pump through the suction side and drops down into the eye of the impeller, which centrifugally throws the water to the outside of the casing; it discharges through the top of the pump. As stringy material catches on the leading edges of the impeller vanes, the notches and grooves in the wear plate pull at it to dislodge it. Meanwhile the tooth has a fairly close clearance to the leading edge of vanes. When the impeller vanes pass by the tooth, anything that has collected on the leading edges gets pushed off and moved on through the system. In every rotation there are two wipes, because there are two impeller vanes.

tpo: Has demand for this technology increased recently?

Baldasare: Yes. With what we call the new sewage, everybody is flushing wipes. Now because of COVID-19, that has increased. With all the concern about cleanliness, people are using wipes more than ever, and sewer systems are even more laden with them than before. With our upgrade kit, we can easily adapt the Eradicator to 10- and 15-year-old Super T Series pumps already installed in lift stations. Someone who starts to have clogging issues who did not have them before can purchase an upgrade kit.

tpo: What is involved in retrofitting a pump?

Hannan: They basically just remove the back-cover assembly and bolt in the new one with the inspection cover and the redesigned wear plate. They can be up and running in a few minutes.

tpo: In what kinds of facilities has this product been deployed?

Hannan: About 3,600 of these pumps and upgrade kits have been installed in this country and around the world. Besides municipal lift stations and wastewater treatment plants, they are in use in poultry, pork and beef processing plants; wineries that have to deal with skins, seeds and stems from the grapes; and other industrial applications. tpo

exam STUDY GUIDE

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

WASTEWATER

By Rick Lallish

What is the most common type of lagoon in use to treat municipal wastewater?

A. Anaerobic lagoon
B. Aerated lagoon
C. Polishing lagoon
D. Facultative lagoon

ANSWER: D. The most common lagoon treatment system is the facultative lagoon. These lagoons are typically 3 to 8 feet deep. They have dual layers: an upper aerobic layer and bottom anaerobic layer. The algae in the aerobic layer supply dissolved oxygen. Light penetration determines the aerobic layer's depth. The waste byproducts from the aerobic layer trickle down to the anaerobic layer, where digestion takes place. The layers supplement each other. Controlled discharges from these lagoons may provide detention times of up to 180 days. More information may be found in the Office of Water Programs California State University, Sacramento textbook: *Operation of Wastewater Treatment Plants,* volume one, eighth edition, Chapter 8.

DRINKING WATER

By Drew Hoelscher

What is the purpose of a rate-of-flow controller on a gravity filter?

A. Gradually close as the headloss increases during a filter run
B. Gradually close as the headloss decreases during a filter run
C. Gradually open as the headloss increases during a filter run
D. Gradually open as the headloss decreases during a filter run

ANSWER: C. During a filter run, the water depth above the media remains constant due to the rate-of-flow controller on the filter effluent piping. As the filter run hours increase, the media becomes more clogged, resulting in higher headloss. As the headloss increases, the rate-of-flow controller gradually opens so that constant depth of water above the media is maintained. In other words, a rate-of-flow controller is mostly closed when headloss is low and is mostly opened when headloss is high. The filter should be backwashed when the rate-of-flow controller is completely open, because at that point, future increases in headloss cannot be compensated for.

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

Clarifiers, Digesters, Water Towers, Structures and Components

By Craig Mandli

Buildings/Structures

GALENE WATER TREATMENT CCS SERIES

CCS Series package wastewater plants from Galene Water Treatment

CCS Series plug-and-play package wastewater plants from Galene Water Treatment offer high process stability and effluent quality; a corrosion-resistant, fiber-reinforced polymer design; retractable components that minimize downtime and maintenance costs; flexibility for additional features like biological nutrient removal, tertiary filtration and chlorine/UV disinfection; and fast startup, a reduced footprint and lower CAPEX cost. The plants are delivered to the site with all electromechanical, mechanical and electrical equipment preassembled, reducing site work, change orders, civil works and installation time. **844-942-5363; www.galenewt.com**

Tension fabric buildings from Legacy Building Solutions

LEGACY BUILDING SOLUTIONS TENSION FABRIC BUILDINGS

Tension fabric buildings from Legacy Building Solutions provide a high level of flexibility for a variety of building applications. They use a durable, rigid frame in place of hollow-tube, open web truss hoop framing. The strength of the structural steel frame provides 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 the ability to add lean-tos, mezzanines and sidewall doors. The structures are engineered to provide desired overhangs or handle additional loads for items such as sprinklers and conveyors. The solid structural steel I-beams are not vulnerable to unseen corrosion originating inside a tube. There are multiple coating options available for all steel components, including hot-dip galvanizing, primer and powder-coat paint. **877-259-1528; www.legacybuildingsolutions.com**

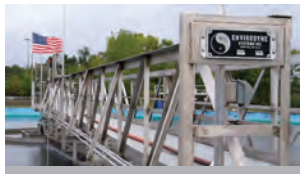
Clarifiers

BIOMICROBICS ABC CLARIFIERS

ABC (Anoxic Bio[logical]filter Clarification) clarifiers from BioMicrobics

ABC (Anoxic Bio[logical]filter Clarification) clarifiers from BioMicrobics are a family of products used in tertiary treatment systems to remove excess nitrogen (ABC-N), phosphorus (ABC-P) and additional solids (ABC-C) for specialty applications requiring exceptional effluent quality. The most popular is the ABC-N denitrification device used with a carbon feed system that supplies a carbon source; the ABC-N promotes the growth of bacteria that denitrifies nitrified wastewater from most wastewater flows. The recirculation pump and assembly mixes nitrates and carbon throughout the media inside the tank. Bacteria grows on the media and uses the nitrates as oxygen, transforming the nitrates into harmless nitrogen gas. This continuous processing of the biomass with food and oxygen is efficient in a suitable environment to achieve high levels of nitrogen reduction. **800-753-3278; www.biomicrobics.com**

ENVIRODYNE SYSTEMS 21ST CENTURY CLARIFIERS



21st Century Clarifiers from Envirodyne Systems

21st Century Clarifiers from Envirodyne Systems are equipped with Hercules drives, true full-radius scum troughs, RAS Booster Rings with spiral blades or suction headers, and algae control systems. Hercules drives are rated for both 100-year gear life and 100-year bearing life. The full-radius scum troughs include durable dual skimmers that clean both outside and inside the feedwell. The RAS Booster Ring creates highly concentrated, uniform return activated sludge to save pumping energy. The ring is also self-cleaning and features maintenance-free seals. Sealless designs are also available. The algae control system consists of an algae brush cleaner and/or algae spray cleaner. **717-763-0500; www.envirodynesystems.com**

Spiraflo clarifier from Lakeside

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 perimeter 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**

PARKSON CORP. LAMELLA ECOFLOW INCLINED PLATE SETTLER

Parkson Corp. Lamella EcoFlow

The Parkson Corp. Lamella EcoFlow inclined plate settler eliminates the area of interference at the bottom of plates and allows for 100% utilization of the plate settling area, translating to an increased capacity of up to 25% of the existing footprint. When compared to traditional clarifiers, it provides higher effluent quality, enhanced sludge thickening, less chemical usage downstream and an easy, cost-effective option to retrofit/upgrade older installations. In this process, chemically treated and flocculated water enters a tank and flows upward between a pack of inclined plates. Solids fall to the plate surface and, by gravity, slide down to a sludge collection hopper. Clarified effluent flows through orifice holes and exits the top of the settler. It can be

used in municipal and industrial applications such as potable-water clarification, industrial process water, sand filter backwash, metal finishing and mining. **888-727-5766; www.parkson.com**

SMITH & LOVELESS MODEL R OXIGEST

Model R OXIGEST treatment system from Smith & Loveless

The Model R OXIGEST treatment system from Smith & Loveless provides stable operation and flexible process options for high-strength wastewater or larger flows up to 5 mgd. The field-erected design encompasses complete aeration, clarification and advanced treatment processes while allowing these units to be individually separated and controlled. The system achieves advanced nutrient removal and produces pristine effluent quality suitable for water reuse and direct or indirect discharge. Its concentric tankage maximizes space efficiency in its footprint, thereby preserving facility land for other key plant operations. Multiple aeration zones can be employed to provide specific activated sludge processes for desired treatment levels, including multistage aeration, complete mixed, plug-flow and nitrification/denitrification. Integral treatment process steps can include grit removal, flow equalization, reaeration, tertiary filtration, chlorination, dechlorination and sludge storage. **800-898-9122; www.smithandloveless.com**

Coating and Lining

DuraChem 500 series lining systems from AmTech Tank Lining & Repair

AMTECH TANK LINING & REPAIR DURACHEM 500 SERIES

DuraChem 500 series spray-up elastomeric polyurethane lining systems from AmTech Tank Lining & Repair are formulated for the containment of wastewater, potable water, abrasive materials, chemicals and select corrosives. These 100% solids high-build lining systems have maximum flex modulus and extreme adhesion characteristics to permanently bond to most materials at the molecular level. They are compliant with requirements such as ANSI, NSF, NLPA, API and UL for specific immersion and containment applications. **888-839-0373; www.amtechtanklining.com**

Covers/Domes

JDV EQUIPMENT DOUBLE MEMBRANE BIOGAS HOLDER

Double Membrane Biogas Holder from JDV Equipment

The Double Membrane Biogas Holder from JDV Equipment is easy to install, has low upfront capital costs and requires low operating capital. Its design allows for variable biogas storage within the inner membrane at constant pressure during gas production and utilization, while the air-inflated outer membrane provides gas pressure and protection. The outer membrane is constructed of a high-tech, cross-woven fabric that's coated with PVC- and UV-ray protection, proven to endure the weather elements. Sensors monitor the volume of gas present, giving operators full control of optimizing

the utilization of biogas to feed generators and/or heating systems. Storing digester biogas can eliminate flaming from the digester, and it can help reduce or completely eliminate the need for electric grid power when generators and/or hot-water boilers are incorporated into the facility design. **973-366-6556; www.jdvequipment.com**

PEABODY ENGINEERING & SUPPLY PCS-PLUS 4

Peabody Engineering & Supply's PCS-PLUS 4 enclosure

Peabody Engineering & Supply's PCS-PLUS 4 enclosure can be designed for pumps and equipment that need secondary containment in a safe, secure, weatherproof and lockable cabinet. Durable UV-stabilized polyethylene construction makes it suitable for securing storage of chemicals, hazmat collection/response kits or other supplies in remote locations, treatment facilities, warehouses or construction sites. Its footprint allows for a large pump or multiple pumps. It includes standard internal grating to elevate equipment above the containment sump. Its large capacity with optional drain for overflows allows for Environmental Protection Agency-compliant storage of up to two 55-gallon-capacity drums or 60-gallon tanks. It includes a sturdy back wall for mounting pipe manifolds, control panels, coupon racks, calibration columns and an optional Unistrut mounting package for easy attachment of pipe manifolds. It offers flexibility in piping configurations, with multiple flat surfaces for installation of bulkhead fitting on the sides and back of the unit. **951-355-7724; www.4peabody.com**

Media

FiltraFast media filter from SUEZ Water Technologies & Solutions

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 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**

Mixers

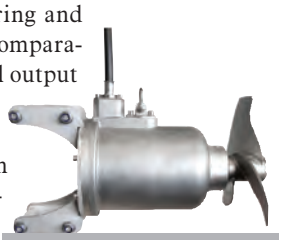
PARK PROCESS VORTAFLO

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 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**

VortaFlo static mixer from Park Process

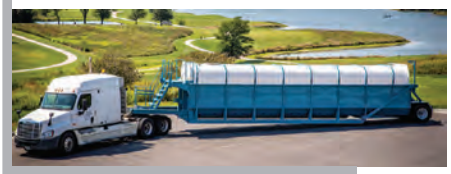
SUMA AMERICA OPTIMIX 2A

The Optimix 2A from SUMA America is a low-power agitator mixer made entirely of stainless steel. It completely meets the requirements of energy-efficient mixing technology for stirring and homogenizing aggressive media. It offers comparatively high thrust regarding the low nominal output of 1.0/2.0/3.0 hp, with a three-bladed, stainless steel propeller manufactured in a complex embossing process. It is available in diameters of 8.6 to 11.0 inches. The submersible mixer masters dry matter contents of up to 4% and aggressive media with pH values between 5.5 and 8.2 effortlessly. The application range includes various industrial sectors such as water and wastewater management, but it can also be used in the biogas sector. **312-945-9049; www.gosuma.com**



Optimix 2A from SUMA America agitator mixer

Tanks



Houston PolyTank storage tanks

HOUSTON POLYTANK RECTANGULAR PLASTIC TANKS

Houston PolyTank fabricates industrial-strength plastic storage tanks to handle a comprehensive range of water, wastewater and chemical storage, including process tanks and reactor tanks. The tanks are designed and extruded to handle harsh chemical (pH levels of 0-14) and environmental conditions. Molds produce rectangular plastic tanks up to 18,000 gallons in capacity. The rectangular tanks are structurally sound, require little maintenance, and have 1-inch-thick sturdy walls and 1.5-inch-thick end walls. Because of their shape, rectangular tanks can offer cost savings for shipping compared to cylindrical tanks. Popular rectangular tank design options include insertion into frac tanks, metal caged trailer tanks and standard shipping containers. **800-852-8265; www.houstonpolytank.com**

IMPERIAL INDUSTRIES 12,500-GALLON STORAGE TANK

12,500-gallon storage tank unit from Imperial Industries

The 12,500-gallon storage tank unit from Imperial Industries includes a 6-inch dump, 4-inch intake, heavy-duty pull skid attachment and level indicator. Available options include custom tow, hitch and axle packages, and intake agitation. It is designed for various applications, including field edge load and unloads, shop or yard storage, and grease separation. **800-558-2945; www.imperialind.com** tpo

case studies

By Craig Mandli

CLARIFIERS, DIGESTERS, WATER TOWERS, STRUCTURES AND COMPONENTS

Digester helps eliminate FOG, corrosion, odor, matting and insect infestation

Problem

For 15 years, a West Coast university had battled FOG, corrosion, odor, matting and insect infestation in all 29 lift stations. Twenty-four were in the basements of buildings, and the others were located around the campus. Chemicals were ruled out due to hazards, cost and storage requirements.

Solution

After testing five products for two weeks, the university chose the **DO2E Wastewater Treatment Little John Digester.** Within the first hour, the unit had eliminated all issues, including the insect infestation.

RESULT:

After 12 months, none of the issues had reoccurred. **850-698-6805; www.do2e.com**

Outage wash wastewater treatment requirements achieved after upgrade

Problem

A Midwest electric utility had difficulty meeting effluent standards at one of its coal-fired power plants. After closing its coal combustion residual ponds, the utility needed an economical way to treat boiler, precipitator and air preheater wash water. After several pilot attempts by various vendors, the NPDES permit requirements for TSS, pH and heavy metals were not being met.

Solution

United Conveyor designed, installed and operated an **outage wash** pilot test for non-chemical water cleaning of air heaters on two units and a precipitator on one unit. The company used an existing remote submerged flight conveyor, clarifier and chemical injection skids along with temporary equipment, including additional injection skids, a clarifier/thickener, sludge tanks and a belt press.

RESULT:

The pilot test was a success; the system was installed within two weeks and operated 24 hours a day for seven days. Samples of untreated and treated water were taken to monitor the solids removal efficiency and ensure that effluent limits were met. The temporary system proved that the existing bottom ash dewatering system could be used to treat outage wash wastewater. Due to the successful test, the plant will make permanent modifications to the bottom ash dewatering system to accommodate outage wash wastewater treatment. **847-473-5900; www.unitedconveyor.com**

Biotrickling filter helps city get odor issues under control

Problem

The City of Saline, Michigan, needed a system to control hydrogen sulfide gas emissions from its wastewater treatment process as odor complaints mounted.

Solution

ECS Environmental Solutions installed a **BioPac-VTS bioscrubber system,** including a fan with acoustical enclosure and thermostat-controlled ventilation, insulated bioscrubber vessel, and interconnecting ductwork. A radial, activated carbon odor control system was used to treat odorous air from rotating biological contactors. It included an insulated carbon adsorber vessel with two independent internal support columns to allow dual media utilization in the future.

RESULT:

The solution removed 99.4% of the hydrogen sulfide and 94% of all organic sulfides from the wastewater process. The system reduced gas emissions and odors and met the city's regulatory goal for air pollution control safety. "We appreciated the prompt response and the company going above and beyond in standing by its product," says Steve Wyzgoski, water and wastewater superintendent. **254-933-2270; www.ecs-env.com**

Venturi system enables city to meet dissolved oxygen requirements

Problem

The LeSourdsville (Ohio) Wastewater Treatment Plant must meet dissolved oxygen levels at the outfall. During normal operations, oxygen is added in a cascade basin, but during storms, the river can rise to levels that flood the basin, rendering it useless.

Solution

Due to confined space in the cascade basin and limited access to the site, the city chose the **Mazzei Injector venturi wastewater aeration system,** eliminating blowers/diffusers and their accompanying footprint and maintenance. The modular drop-in design includes a vertical turbine pump to recirculate wastewater through a Mazzei 12050 venturi injector, which mixes air in. The resulting mixture returns to the basin through a Mazzei MTM nozzle manifold, increasing oxygen transfer and basin mixing from the bottom up. This system was designed to raise dissolved oxygen at the outfall from 3.5 to 5.6 mg/L under storm flows up to 26 mgd.

RESULT:

Soon after the system was installed, a storm caused the river to rise and flood the cascade basin. The post-aeration system maintained the outfall dissolved oxygen level above 5.6 mg/L at flows up to 31 mgd — 20% higher than the aeration system's peak design flow. The quiet, efficient and reliable aeration system maintained the outfall oxygen requirement and continues to do so. **661-363-6500; www.mazzei.net**

Updated receiving station increases plant's efficiency

Problem

The Metropolitan St. Louis Sewer District Bissell Point Wastewater Treatment Plant had Schwing Bioset piston pumps and a live-bottom receiving station. The pumps, in service since 1993, conveyed biosolids cake at 25% solids to multiple hearth incinerators. The city sought a new receiving station using push-floor technology to allow dewatered biosolids to be received from other district facilities for incineration.

Solution

Schwing Bioset and Donohue & Associates designed and provided the **receiving station.** Push-floor technology was chosen over the live bottom for efficiency, low maintenance and improved material flow. A new piston pump and piping system transport solids into the facility. The push-floor bunker design consists of two hydraulically driven push frames that reciprocate along the bunker floor. The frames' action breaks material bridging and feeds solids to an extraction conveyor. Rectangular bunkers allow multiple trucks to unload simultaneously. The bin includes a retractable bi-fold cover integral to the system. When not receiving biosolids, this helps contain odors and excludes rain, snow and tramp materials.

RESULT:

The station began operating in July 2020 and has met the district's objectives. **715-247-3433; www.schwingbioset.com**

Clarification system helps city meet phosphorus limit

Problem

The 10.85 mgd Bristol (Connecticut) Water Pollution Control Facility discharges to the Pequabuck River. The state Department of Energy and Environmental Protection issued a nutrient management strategy for freshwater nontidal streams focusing on seasonal phosphorus limits of 0.1 mg/L. To achieve this limit, the city chose ballasted clarification.

Solution

The city chose the **ACTIFLO** high-rate ballasted **clarification process** from **Veolia Water Technologies (dba Kruger),** proven to effectively treat secondary effluent to reduce TSS and remove phosphorus to the required level. The system delivered the smallest footprint and lowest net present value over 20 years of operation. The compact system combines coagulation, flocculation and sedimentation using microsand as a seed for floc formation. The microsand enhances flocculation and acts as ballast to enable rapid settling.

RESULT:

The ACTIFLO process achieves a seasonal average effluent total phosphorus of 0.06 mg/L, 40% lower than the permit level, helping improve the quality of the Pequabuck River. The system will meet evolving permit standards for years to come. **800-337-0777; www.veoliawatertech.com** tpo

Parkson Corp. IGNITE integrated nitrification process

Parkson Corp. offers a nonactivated sludge lagoon treatment solution, the IGNITE integrated nitrification process, that combines Parkson Corp.'s Biofuser lagoon aeration system with the TumbleOx nitrification reactor. The IGNITE offering provides an option to achieve low effluent biochemical oxygen demand, total suspended solids and ammonia limits from existing lagoons without converting to an activated sludge process.

888-727-5766; www.parkson.com

Sanitaire - a Xylem Brand Digital Pressure Monitor

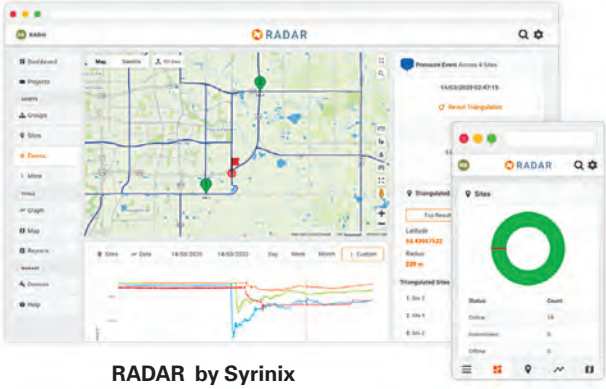
Xylem's new Sanitaire - a Xylem Brand Digital Pressure Monitor transforms wastewater diffusers into smart diffusers. The DPM maximizes diffuser operation and increases energy savings through strategic fine-bubble aeration system monitoring and intelligence. The solution offers users an enhanced digital interface that provides diffuser health data, engineering and economic calculations, and asset management recommendations. The DPM monitors pressure in the aeration system and provides asset recommendations via a user-friendly human-machine interface, providing a continuous measurement of aeration pressure. Sanitaire's DPM also enables utilities to extend the useful life of system blowers by optimizing diffuser performance.

855-955-4261; www.xylem.com/treatment

product spotlight
water

A data analysis evolution

By Craig Mandli



RADAR by Syrinix

Automated systems in a water or wastewater treatment system typically rely on data in order to make the slight adjustments needed to keep those systems running at top efficiency. **Syrinix** has launched the next-generation version of its **RADAR cloud-based water and wastewater network data analysis platform** that analyzes data collected from installed PIPEMINDER monitoring devices and displays and notifies utilities in a format that is not only customizable, but easy to absorb.

RADAR delivers network intelligence with a simple, fast interface. Featuring zone alarms that notify of a high- or low-pressure breach, elevation options for plotting total head pressures, automated triangulation of major events and pattern recognition so users can easily focus on key events, the platform provides deep network insights to save time, increase operational efficiency and build resilience by reducing disruptive pipeline leaks and bursts.

"Our utility partners around the world can access deeper network intelligence instantly with customized warnings and alerts in an easy, intuitive platform," says James Dunning, Syrinix CEO. "Comprehensive remote monitoring that is easily accessible, even from home, prioritizes worker safety and data visibility that is more aligned than ever with today's changing utility workforce and working environment. It's pipeline monitoring for a new world."

Multizone alarms alert the utility when a minimum network pressure level is breached, automatically switching to more frequent data updates so customers can address network issues in real time. While previous versions of RADAR identified that a transient had occurred, a new triangulation feature now automatically pinpoints the location of major transients so network events, like bursts, can be found more quickly. A pattern recognition feature compares and classifies transient waveforms against a standard set of reference transients specific to that network. By classifying similar shapes into actions, like a pump stop or pump start, RADAR determines which events are typical and those that are unusual or abnormal and need urgent attention. This advanced level of intelligence empowers users to focus on the uncommon network events, saving time and money.

"This new version of RADAR is a great evolution of the existing functionality provided by Syrinix," says Richard Fielding, Smart Water Systems engineer, Anglian Water. "RADAR will enable our analysts to work more efficiently, improve insight generation and reduce operational maintenance requirements of our fleet of devices." **844-279-7464; www.syrinix.com**

Aquatic Informatics web-based Linko cloud service

The web-based version of Aquatic Informatics' Linko ensures compliance for FOG management. The cloud-based solution is simple to use and uniform across any connected device, and data integrity is maintained with the latest security. Linko tracks food service establishments' compliance, giving program administrators clear visibility into a city's FOG program and centralized access to FSE details like compliance history and cleaning schedules. Linko's web-based solution automatically determines noncompliance by analyzing inspection results and other data to prioritize facilities that require the most attention.

877-870-2782; www.aquaticinformatics.com

Badger Meter Dynasonics TFX-5000 ultrasonic clamp-on meter

The Dynasonics TFX-5000 ultrasonic clamp-on meter from Badger Meter accurately measures the volumetric flow of clean liquids and those with small amounts of suspended solids or aeration, such as surface water or raw sewage. It is ideal for water and wastewater applications such as lift stations, booster pump stations and water mains. The meter provides accuracy up to plus or minus 0.5% and flow rates ranging from 0.07 to 33,000 gpm on pipes from 1/2 to 48 inches. Designed to clamp onto the outside of pipes, the TFX-5000 meter does not contact the internal liquid, allowing for installation without shutting down operations in new and retrofit applications. It is equipped with an internal clock and built-in 8 GB data-logging capabilities to log water flow down to one second. The TFX-5000 meter is also compatible with BEACON Advanced Metering Analytics and AquaCUE Flow Measurement Manager from Badger Meter.

877-243-1010; www.badgermeter.com/clamp-on

Endress+Hauser Turbimax CUS50D sensor

The CUS50D sensor from Endress+Hauser is a reliable absorption sensor for turbidity and suspended solids measurement in unfavorable environments. Its design is made to withstand aggressive media and is an ideal solution for applications in industrial wastewater or processes. Digital signal processing in the sensor and Memosens protocol provides reliable measurement results. The measuring principle is based on the attenuation of light and provides reliable measuring values. The measurement results can be achieved, for most applications, from a single-point calibration. The sensor is also already precalibrated from the factory for turbidity and absorption measurements and includes various application models.

888-363-7377; www.endress.com

CAS DataLoggers dataTaker DT90 Series data loggers

The dataTaker DT90 Series of compact, cost-effective and low-power data loggers from CAS DataLoggers are designed to provide an all-in-one data collection system with an integrated modem, specifically for remote applications. The rugged enclosure and wide operating temperature range provides reliable operation in virtually any environment. There are two models available, the DT90N and DT90L. The DT90N is perfect for smaller applications with digital or multiparameter sensors with a serial output. The DT90L is designed for larger applications with the ability to measure both analog and digital output sensors.

800-956-4437; www.dataloggerinc.com

(continued)

Flomatic Valves break-off plugs

Flomatic Valves expanded its break-off plug selection on its stainless steel Model PLG and composite Model PPLG. Designed for domestic well water pump systems, municipal well water systems, and irrigation and sprinkler system applications, the plugs are available in sizes 1/8-, 3/8-, 1/2- and 3/4-inch, all in an NPT male connection. The plugs are designed to drain the well water in the riser pipe to make the pulling of a submersible pump lighter and more convenient. The break-off plugs are field replaceable after use and made of corrosive-resistant materials.
800-833-2040; www.flomatic.com

Asahi/America wafer check valves

Asahi/America's wafer check valves are installed on the discharge side of pumps to prevent backflow flooding that could seriously damage pump systems. The wafer check valve's body, disc and stopper assembly are machined from solid PVC plate stock, which conforms to ASTM D1784 Cell Classification 12454A. This material was selected based on its excellent chemical resistance and mechanical properties. The valve body automatically centers on the mating flanges, once the stud pack is installed. A directional flow arrow on the valve body indicates the upstream and downstream sides of the valve. The design of the disc and stopper permits the disc to fully open when upstream flow is present, without interfering with schedule piping and mating flanges.
800-343-3618; www.asahi-america.com

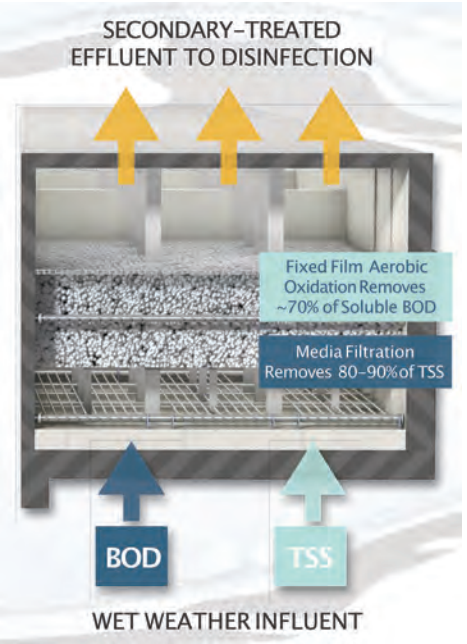
Watson-Marlow Fluid Technology Group pumps with EtherNet/IP control

The 530, 630 and 730 peristaltic pumps from Watson-Marlow Fluid Technology Group now feature EtherNet/IP control. This protocol provides access to fast, accurate performance data and seamless connectivity to modern PLC control systems and the Internet of Things. Real-time communication makes processes secure and flexible. The pumps also include a direct interface to third-party pressure and flow sensors, which provides network access to sensor data. Local limits on pump operation can be set, providing a solution for safeguarding process integrity by independently monitoring performance. The sensors can bring the pump to a safe stop should the predefined limits be exceeded.
800-282-8823; www.wmftg.com tpo

product spotlight
wastewater

Combining filtration and biological treatment

By Craig Mandli



Proteus by Tomorrow Water

During the wet-weather season, influent wastewater flow to many wastewater treatment plants increases significantly. The water quality of influent during the wet season is typically high in both BOD and suspended solids concentration. Municipal wastewater treatment plants can usually handle the increased influent, but during those times when plants are overwhelmed and cannot handle the additional flow conditions, they sometimes need to bypass the wet-weather flow, risking serious contamination to nearby bodies of water.

Seeing this issue as unacceptable, **Tomorrow Water** has introduced the **Proteus high-rate filtration system** for wastewater treatment. The system uses Tomorrow Water's BBF floating media to effectively remove suspended solids and soluble organic compounds through physical filtration and biological treatment. As a replacement for primary clarifiers, it can shrink process footprints while increasing carbon capture and biogas production. The expanded polypropylene media design boasts a high solids loading rate, providing the ideal surface area to build biofilm.

Through carbon diversion, BBF facilitates the effective removal of solids and soluble organics by performing biological treatment and physical filtration simultaneously. The process begins when the influent enters the BBF reactor from the top through the influent pipe, then gravity reaches the bottom and then flows upward through both media layers. Particles are filtered by the media, and soluble pollutants and nutrients that pass through the media layer are removed by the media's biofilm. The treated water then exits the reactor through the effluent waterway on top of the reactor. As the upflow treatment process continues, headloss will be increased by the excess solid deposits.

The expanded polypropylene media provides a high solids loading rate with a unique shape and a high void ratio. Gravity-based, zero-energy backwash uses only process water for cleaning. With continuous aeration capability and no settling required, the system can manage high peaking factors and variable flow rates, simplifying treatment of dilute flows.

The process can be applied for treatment of primary and wet-weather flows, secondary treatment without clarifiers, tertiary filters and nitrification/denitrification. It can be used for retrofits and plant expansions. With continuous aeration capabilities and no settling required, the system can manage high peaking factors and variable flow rates, simplifying the treatment of diluted flows.
714-578-0676; www.tomorrowwater.com

ClearSpan Structures expands, now offers rentals

ClearSpan Structures now offers commercial building rental offerings. Previously, the company's structures were only available for purchase, but now customers can use ClearSpan's fabric structures on a temporary basis. The structures are rented on a monthly basis, providing an option for operations who need temporary support for both short- and long-term projects. The rental buildings are available in 30-, 45- and 60-foot widths, and they can be built as long as 500 feet.

Tuthill Corp. announces Thill as president of Tuthill Springfield


Tony Thill

Tuthill Corp. named Tony Thill as president of Tuthill Springfield of Missouri. Thill is a senior executive leader with more than 30 years of experience with industrial manufacturing companies. He will lead Tuthill's commercial and operational strategies for the Kinney vacuum pump and M-D Pneumatics industrial blower product lines. Thill's experience will guide market share growth, lean manufacturing advancement and support Tuthill's enterprisewide digital expansion and realization. He graduated from the University of Kansas with a bachelor's degree in business administration and completed the Executive MBA program.

Aquatic Informatics joins Danaher's Water Quality platform

Aquatic Informatics was acquired by Danaher's Water Quality platform from XPV Water Partners. Aquatic Informatics provides water management software solutions to more than 1,000 organizations around the world that collect, manage and make decisions with large volumes of water data.

Asahi/America ISO certificate renewed

Asahi/America has its ISO 9001:2015 certificate renewed. The Massachusetts-based company has received continuous ISO certification since 1996. The standards outlined in ISO 9001:2015 help companies deliver consistent products and services; measure, analyze and improve all aspects of their business; and ensure customer satisfaction.

Griffco Valve appoints Lucas as Western sales manager


Gregory Lucas

Griffco Valve announced the appointment of Gregory Lucas as U.S. Western regional sales manager. He will be responsible for providing training and sales support for the company's distributors, as well as expanding the company's distributor network. Lucas joins the company from NETZSCH, where he served as regional sales manager for Texas and Oklahoma. During a career spanning more than 30 years, he has held sales and sales management positions at Grundfos, Oliver Equipment Co. and other companies in the chemical and petrochemical processing industries.

KKR and XPV Water Partners acquire EDI - Environmental Dynamics International

KKR and XPV Water Partners announced the acquisition of EDI - Environmental Dynamics International. The addition of EDI accelerates the growth of the water-quality platform's nutrient management offerings through Nexom and Environmental Operating Solutions Inc. (EOSi). In connection with the acquisition, EDI will integrate into Nexom, combining EDI's expertise in serving medium- to large-scale treatment facilities with Nexom's expertise in serving small- to medium-sized treatment facilities. As CEO of Nexom, Martin Hildebrand will lead the combined entities.

Water Environment Federation names Sanderson as chief medical officer

To ensure protection of the health and safety of wastewater workers during the coronavirus pandemic and into the future, Dr. Andrew Sanderson, M.D., MPH, of Howard University has been named chief medical officer for the Water Environment Federation. As CMO, Sanderson will guide and assist WEF in providing reliable medical information to wastewater utility managers and workers, as well as conduct research and serve as a spokesperson on medical issues for the sector. tpo

people/awards

The Birmingham (Alabama) Water Works Board had three women engineers on its staff earn doctorate degrees. Engineers **April Nabors** and **Jaquice Boyd,** along with newly hired engineer Ashlyn Manzella, hold doctorates in civil engineering and work in water filtration for the utility.

Two AWWA leaders were appointed to the boards of nonprofit water organizations. **David LaFrance,** CEO, was appointed to the board of Water Education Colorado; and **Tracy Mehan,** executive director of government affairs, was elected to the board of directors of River Network.

EPCOR received 2020 awards from the AZ Water Association:

- Awards for operational safety and excellence went to two EPCOR Water facilities: **Chaparral District** water treatment facility and to the water distribution system for the town of Fountain Hills, as well as the former **Rio Verde** Utilities systems. Rio Verde was also recognized for wastewater treatment facilities and the collections system.
- The 2020 Water Project of the Year award was presented to **EPCOR USA** for the $29.4 million expansion of the White Tanks Regional Water Treatment Plant in Surprise.

Blake Lukis, a 15-year licensed water and wastewater professional and former Framingham (Massachusetts) Department of Public Works deputy director, was named DPW director for the Framingham.

Middlesex Water has been selected as one of the New Jersey Top Workplaces by NJ.com.

Ray Pardee, who was water treatment plant superintendent in Cottage Grove, Oregon, for 20 years, has retired.

Mid-Dakota Rural Water received the Secretary's Award for Drinking Water Excellence from the South Dakota Department of Environment and Natural Resources.

Judith Hansen, superintendent of the Kingston (New York) Water Department, received the George Warren Fuller Award from the AWWA.

TPO *welcomes your contributions to Worth Noting. To recognize members of your team, please send notices of new hires, promotions, certifications, service milestones or achievements as well as event notices to editor@tpomag.com.* tpo

classifieds

October 2020

POSITIONS AVAILABLE

CITY OF SANTA MARIA SEEKING QUALIFIED CANDIDATES FOR **WATER RESOURCES MANAGER, UTILITIES DEPARTMENT.** Salary: $9,800.31 - $11,912.29 Monthly. Closing Date: September 16, 2020 OR when 75 applications have been received. Interview Date: October 5, 2020. Desired Start Date: November 9, 2020. The Utilities Department is seeking a qualified candidate to join its management team and lead the Water Resources Division. The Water Resources Division provides water and wastewater services to over 23,000 residential and commercial accounts. These services include water production and distribution and wastewater collection and treatment. Under general direction of Department Director, the Manager plans, organizes, and directs the operation and maintenance of the water, stormwater and wastewater systems, including storage, treatment, distribution, collection, and disposal. This position supervises other department professional and technical staff. For more information or to apply, visit: **http://www.cityofsantamaria.org/hr** (Must apply online.) (011)

events

Oct. 5-9
Water Environment Federation Technical Exhibition and Conference (WEFTEC) Connect, virtual. Visit www.wef.org.

Oct. 5-23
AWWA High-Tech Operator Course 2 – Fall 2020, virtual. Visit www.awwa.org.

Oct. 7
AWWA webinar, "Adding Utility Benchmarking to Your Continuous Performance Improvement Toolbox." Visit www.awwa.org.

Oct. 13-15
AWWA-Iowa Section Annual Conference, virtual. Visit www.awwa-ia.org.

Oct. 13-15
North Dakota AWWA Section Annual Conference, Fargo, North Dakota. Visit www.awwand.org.

Oct. 14
AWWA webinar, "Applying Real-Time Hydraulic Models to Everyday Operations." Visit www.awwa.org.

Oct. 15
AWWA webinar, "Innovation Roadmap for Utilities." Visit www.awwa.org.

Oct. 19-Nov. 20
AWWA Water Treatment Operator Course Level 3, virtual. Visit www.awwa.org.

Oct. 20
AWWA webinar, "Water Audit Software." Visit www.awwa.org.

Oct. 21-23
Intermountain Section AWWA Annual Conference, virtual. Visit www.ims-awwa.org.

Oct. 26-Nov. 13
AWWA High-Tech Operator Course 3 – Fall 2020, virtual. Visit www.awwa.org.

Oct. 28
AWWA webinar, "A Closer Look at New and Not So New CECs: PFAS, Microplastics and Solvents." Visit www.awwa.org.

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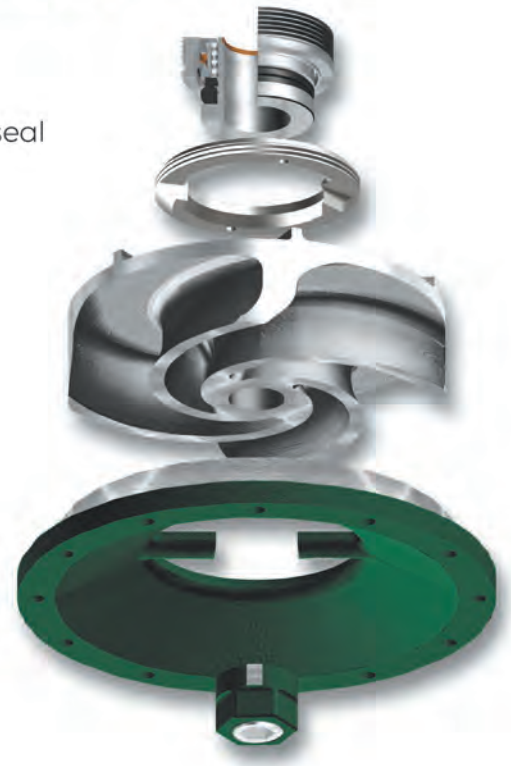

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