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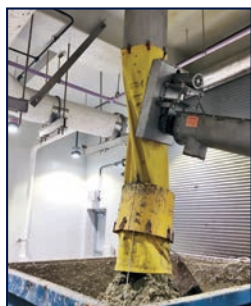
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let's be clear

## It's Time to Put Down the Signs

MASS MARCHES AND PROTESTS USED TO MAKE A DIFFERENCE IN SPURRING POLITICAL CHANGE. NOW THERE'S ONLY ONE THING THAT ACTUALLY MATTERS.

By Ted J. Rulseh, Editor



In this age of polarized legislatures and polarized citizens, some once basic tenets of political participation have changed.

This thought struck me last summer as I watched mass demonstrations involving gun control after the murders in Buffalo and Uvalde, and abortion rights after the Supreme Court invalidated Roe v. Wade. My purpose is not to argue a position on either topic — only to comment on the state of methods for petitioning our government.

I grew up in the era of civil rights demonstrations and protests against the war in Vietnam. It is beyond dispute that in both cases, massive public uprisings had meaningful impacts. In time Congress passed civil rights legislation. The Vietnam War ended.

Today, marches and rallies in most cases mean little or nothing. They are mere exercises in venting; they mistake activity for actual progress.

### WHO WILL LISTEN?

The reason for this is clear. In the 1960s, legislative races in statehouses and for Congress were more competitive than they are now. To incumbents, a street full of angry citizens represented potential votes to put them out of office — the only threat most politicians have ever understood.

Therefore, they had to pay attention.

Now, the majority of legislators, state or federal, are in safe seats, in many cases secure for life. Most U.S. Senators represent essentially one-party states. Can you imagine a Republican winning a Senate seat in California or a Democrat in Utah?

As for members of the House of Representatives, the districts they represent are gerrymandered, their voters selected for them by computer programs so that they can count on winning 60 to 70% of the vote versus any opponent from the other party. If they look out their window and see a protest against something members of their party strongly favor, they are free to ignore it. They'll be re-elected regardless.

### WHAT OF LETTERS?

If demonstrations are futile, then so is that old standby, the letter to the Congress member. Years ago, legislators had to pay heed to such letters. I recall a time when even a handful of well-written personal missives on a given topic (as distinct from mass-mailed postcards) would cause an officeholder to take notice. I used to write such letters regularly.

Now, my state assembly member and senator and my U.S. Representative are from the opposite party. Why would they pay any attention to my letter advocating something their solid majority opposes? So I rarely write those letters now.



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In that form of cynicism I am not alone. My son-in-law recently got caught in red tape when applying for a federal government benefit. I suggested he contact his member of Congress, since constituent service is part of a legislator's job. He declined, on the grounds his representative, a member of the other party, likely didn't believe in the program in question and would not help.

### SO, WHAT TO DO?

Meanwhile, the protests against the end of Roe did nothing to change how the Supreme Court ruled. The gun control protests arguably aided passage of a law, but one that at best enables members of both parties to say, "Well, at least we did something."

So where petitioning the government is concerned, in these polarized times, there's only one thing that makes any real difference. That is voting. Demonstrations and protests may let off steam and breed feelings of solidarity, but they will not significantly "move the needle" on whatever issue is of concern.

They are meaningful only to the extent that they revolve around registering people to vote, firing up people to vote, getting people's commitments to vote and to bring others of like mind to the polls. Any demonstration without those aims is a waste of time and energy, neither of which are in infinite supply.

Drum a few incumbents out of office, and others will take notice. And then the ground is prepared for meaningful change. The midterm elections next month will help prove the point — one way or the other. **tpo**

Today, marches and rallies in most cases mean little or nothing. They are mere exercises in venting; they mistake activity for actual progress.

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# Out Front on PFAS

TWO CALIFORNIA DISTRICTS DIDN'T WAIT FOR STATE REGULATIONS ON "FOREVER CHEMICALS." INSTEAD, THEY BUILT AN AWARD-WINNING ION-EXCHANGE PFAS TREATMENT FACILITY.

STORY: **By Pete Litterski** | PHOTOGRAPHY: **Ed Carreon**



John Brundahl, left, production superintendent, and Todd Colvin, chief water systems operator, stand near the PFAS media treatment vessels (AqueoUS Vets).

History will have a lot to say about 2021, the year when vaccines began to overtake the COVID virus and the world began to climb out of a pandemic.

At Southern California's Yorba Linda Water District, 2021 was just as momentous: It was the year when the Yorba Linda Water District and the Orange County Water District began operations at the largest single-site ion-exchange PFAS treatment facility in the United States.

Yorba Linda Water District is one of 19 water districts and municipalities in north and central Orange County that provide water from the Orange County Groundwater Basin. The PFAS facility is one of 36 treatment sites being built in Orange County by the end of 2023.

## SINGLE-SITE ADVANTAGES

The new level of treatment is required because of rising concerns about PFAS found in some areas of the groundwater basin, which provides close to 80% of the water used by 2.5 million people in north and central Orange County, just south of Los Angeles County.

Although most of the treatment facilities in the county will be installed at individual wells, the single-site approach, taking place in Placentia at the Yorba Linda Water District headquarters, was chosen for the Yorba Linda Water District facility for several reasons. Foremost, testing showed that all nine wells operated by the Yorba Linda Water District are affected by PFAS limits set by California regulators.



Plant operator 1 Luis Carrillo checks the effluent flowmeter readings for the PFAS treatment trains.



The centralization of the Yorba Linda Water District facility has several advantages:

- It is more efficient to monitor operations with minimal staffing.
- It is easier to take old well sites offline and bring new sites online.
- It is easier to keep water moving by simply rerouting if a unit has to be taken offline for maintenance or emergency service.
- In addition, because of the short distances between the wellfields and the treatment plant, running pipes from the wells to the central site was more manageable than for other districts.

## CAREFUL MONITORING

Orange County Water District funded the \$25 million project. In addition to the 22 ion-exchange vessels that comprise the treatment system, the project includes a 25 mgd booster pump station and a 1,000 kW backup generator.

In addition to construction costs, the Orange County Water District is paying up to \$75 per acre-foot of produced groundwater to offset operational costs for the treatment facility, according to John Brundahl, Yorba Linda Water District production superintendent. Those costs include two new staff members, including Todd Colvin, chief water systems operator.

Although the facility is permitted to produce 19 mgd of treated water, it is capable of producing 25 mgd, according to Colvin. The water system has more than 25,000 customer connections, primarily residential.

The Orange County Water District serves as the umbrella groundwater management agency overseeing the pumping of water from the basin's wells. Because of the importance of maintaining water levels in the aquifer, the district closely monitors and limits the amount of water each agency can withdraw through a simple pricing mechanism.

## Yorba Linda (California) Water District PFAS Treatment Plant

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“Each vessel is supposed to run 14 months at the volume we expect of it. Then we can turn to the other half of the pair.”

**TODD COLVIN**

## ALLOCATING SOURCES

Yorba Linda Water District and fellow members of the Orange County Water District are retail distributors of drinking water in their communities. Some districts serve a single city while others are special districts crossing city lines and sometimes serving unincorporated areas of Orange County. Besides its namesake city, the Yorba Linda Water District supplies parts of Placentia, Brea, Anaheim and unincorporated areas of Orange County. The district's headquarters and treatment plant are located in Placentia.



To protect the levels and quality of the water in the Orange County Groundwater Basin, member agencies agree to use the high-quality, low-cost groundwater for set percentages of their needs. Yorba Linda's basin pumping percentage is no more than 77% of its needs; pumping above that amount is subject to additional charges.

The balance of the water needed to meet consumer demand is purchased wholesale from the Municipal Water District of Orange County, out of water that the Metropolitan Water District of Southern California imports from surface water reservoirs in northern California and the Colorado River.

Colvin says that using groundwater is important for several reasons, including the closer controls the local agencies have on the basin water. But it is a pocketbook issue as well: "Any member that goes over its percentage pays the same price for that water that they pay for imported water."

## BEING PROACTIVE

The concern over the PFAS hazards in water sources across the country is not new. By the second half of the past decade, the U.S. EPA and independent researchers were investigating the growing amount of these chemicals found in drinking water and their possible links to cancer and other diseases.

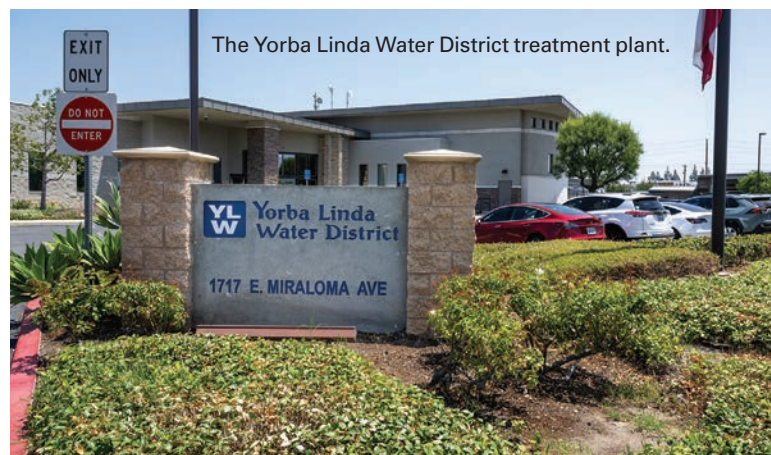
In August 2019 when the California State Water Resources Control Board updated its guidelines for water agencies to follow in detecting and reporting PFAS, the Orange County Water District and its members had already been tracking their levels and were ready to move ahead with a pilot project to avoid conflict with new regulatory standards.

District officials had also launched a proactive search for solutions. Rather than wait for new enforceable standards that could put the Yorba Linda Water District and its sister agencies in violation of new state standards, the district board agreed to shut down the affected wells in light state advisory levels and begin importing water until the chemicals could be removed.

The \$25 million cost of the Yorba Linda plant included 11 pairs of AqueoUS Vets PF12-520 LP ion-exchange resin systems in treatment vessels each larger than a pickup truck. It also paid for plumbing to connect them to the wells and to the distribution system.



Steve Clayton, senior plant operator, checks the telemetry system on the plant's computer software.



## REGULATING FLOW

Each pair of vessels is arranged in a parallel lead-lag configuration that makes one vessel the "worker," expected to remove essentially all PFAS. The second vessel serves as a polisher to remove any remaining contaminants. A computer system manages the paired ion-exchange units, which maximizes resin life by ensuring each pair is not left idle for 24 hours, while also idling a unit to allow operators to inspect the resin, perform maintenance or reload fresh resin.

The resin media works similar to the pellets homeowners have long used to reload household water softeners. Rather than dissolve, however, the resin pellets in the ion-exchange vessels are chemically engineered to attract and hold onto targeted substances such as PFAS.

Colvin says the key to operating the new system is to maintain water flows that allow the resin to do its work as water passes through the vessels. "We generally operate each train from about 600 to 1,600 gpm," he says. That flow rate assures that the water gets at least two minutes contact time with the resin while ensuring that the flow is distributed evenly.

Flows that are too slow can lead to channeling of the water stream across the resin such that some pellets get more or less contact. That can necessitate resin exchanges before a full charge of resin is expended. Under optimal operations, Colvin says, "Each vessel is supposed to run 14 months at the volume we expect of it. Then we can turn to the other half of the pair." **tpo**

## EARNED RECOGNITION

Civil engineers in Southern California showed their appreciation for the work of the Orange County Water District and Yorba Linda Water District by giving them top honors at the 2022 American Society of Civil Engineers Orange County awards ceremony.

In April, the nation's largest ion-exchange treatment plant, received the Outstanding Water Project and Project of the Year awards.

"We are honored to receive this recognition for the Yorba Linda PFAS Treatment Plant," says Steve Sheldon, Orange County Water District president. "I want to thank the district staffs for their hard work and coordination with all the project partners to get the plant up and running."

The Orange County Water District has a lead role in responding to climbing levels of PFAS in the Orange County Water Basin and has conducted pilot programs and coordinated decision-making in developing rapid response to new regulations governing those chemicals.

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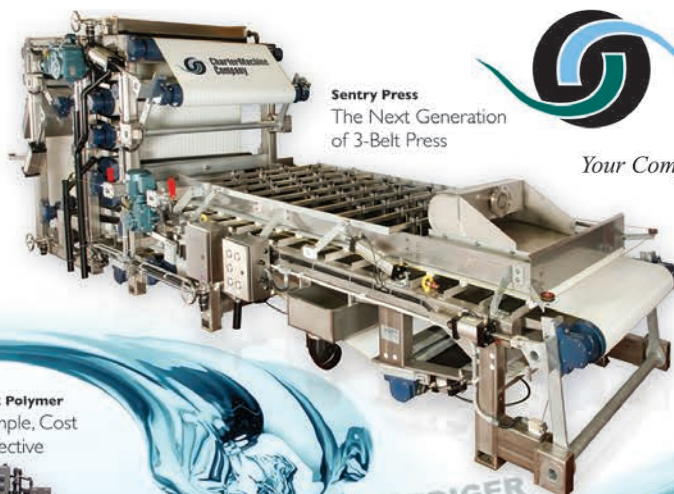
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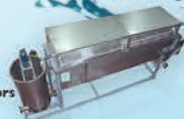
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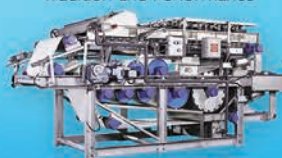
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# Service Techs at Center Stage

A CALIFORNIA CLEAN-WATER DISTRICT CREATES AN AWARD-WINNING VIRTUAL PLANT TOUR VIDEO TO STAY CONNECTED WITH RESIDENTS DURING COVID

By Sandra Buettner

Professional actors need not apply. California's Leucadia Wastewater District produced a video describing its entire treatment process, and did it using field service technicians as the stars and narrator.

The video won a Public Outreach and Education Award from the California Association of Sanitation Agencies. Because of COVID, the district had to suspend plant tours. But leaders wanted to stay connected to residents and communicate to customers about the services they provide.

Public outreach consultant Rising Tide Partners said a video would help during the pandemic, and augment in-person tours once they can resume.

## RISING STARS

The Leucadia district, in a northern San Diego County, operates a 1 mgd water recycling facility that serves 62,000 residents in a 16-square-mile service area that includes the southeast portion of the city of Carlsbad and the northern part of Encinitas. Its collection system includes 200 miles of pipeline.

As Rising Tide Partners started writing the video script, Paul Bushee, general manager, and Marvin Gonzalez, supervisor, met with the technicians to discuss the script. After that, the workers recorded their parts without teleprompters or prompts.

"The service techs were truly just naturals in front of the camera," says Trisha Hill, administrative services supervisor. "They did an excellent job explaining what they do." Hill notes that many were used to interacting with the public on their regular jobs and so were comfortable explaining their work on camera. They are also cross-trained in various areas.

"One requirement for the service tech III roles is that they must be comfortable with public speaking," Hill says. "A lot of the equipment they use is very expensive, and we ask that they present their recommendations to the board of directors when they need to purchase a new item." They tell the board what the equipment does, how it will benefit the community and why it is necessary.



Leucadia Wastewater District field service technicians were the stars of an educational video describing the entire treatment process.

## VIDEO PRODUCTION

Once the participants were chosen, the video took just three- and one-half days to film, plus 20 hours for editing. It was completed and live on the district's website and Facebook page in four months. The district promotes the video in its newsletter and e-newsletter.

The 14-minute video starts with Paul Bushee describing the district's territory and its services. The technicians then describe the work they do to help provide clean water. They discuss the workings of the pump station, and how a generator provides power in emergencies, and the vacuum trucks that help break up blockages in the sewer pipes.

In later segments, technicians describe the CCTV system for sewer inspection and the district's belief in identifying problems in early stages. They highlight the control room and show video of what they see when the camera is in the pipes.

Techs also talk about manhole, pipeline, and easement maintenance and describe the stages of treatment that create reclaimed water for landscape irrigation at sites including the La Costa Resort and Spa golf course.

## VALUABLE EDUCATIONAL

Before producing the video, the district was hosting just under 100 people a year for in-person tours. In just four months, the video was viewed more than 2,700 times. The video had the advantage of being able to cover areas not included in the in-person tours; viewers thus get a more complete view of the operation.

During the COVID lockdown when school kids were learning from home, teachers used the video to share information about the district and the importance of water. The students later returned to school, but as of last February, in-person tours had not resumed.

The district also offers educators virtual tours via Zoom, in which technicians talk about their roles; students then can interact in question/answer sessions. Perhaps the next rising stars are in the classrooms, viewing the presentations and thinking of a future with the district. **tpo**



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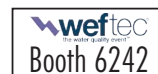
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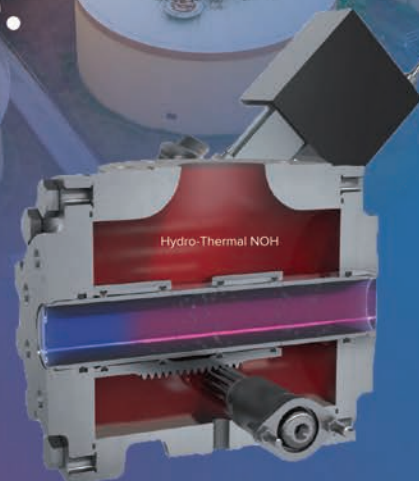
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Paul Crocker trained staff at the Nearman Water Treatment Plant to use photography to aid troubleshooting and help others understand mechanical equipment.

# A Picture-Perfect Career

PAUL CROCKER MAKES PHOTOGRAPHY AN INTEGRAL PART OF ASSET MANAGEMENT PROGRAMS THAT KEEP WATER UTILITY FACILITIES FUNCTIONING RELIABLY AND EFFICIENTLY

STORY: **Jim Force** | PHOTOGRAPHY: **Denny Medley**

It's said a picture is worth 1,000 words. To Paul Crocker, a picture can be worth 1,000 operations and maintenance details critical to troubleshooting and maintaining important process equipment.

Crocker, formerly with the Kansas City (Kansas) Board of Public Utilities and since January 2022 a senior reliability engineer with ReliabilityX, has used photography extensively to document critical information about thousands of assets in the drinking water treatment process and distribution pumping stations.

For that work, he won an Uptime Award at The International Maintenance Conference in 2016. "Taking pictures serves as a living notebook," he

says. "Photos are a significant improvement over written descriptions, which often are too general and not detailed enough."

Crocker is more than a photographer. He combines a passion for water with a deep interest and grasp of asset management and maintenance systems. He is also an expert in software used by utilities and industrial organizations to improve reliability and reduce costs.

George Williams, CEO of ReliabilityX, observes, "Paul is a hero to all of us who have a passion for reliability. No one in my professional career has inspired me more than Paul to pursue excellence. He has driven change without fear, while learning to ask for help when needed. He is reliability in action."

“Taking pictures serves as a living notebook. Photos are a significant improvement over written descriptions, which often are too general and not detailed enough.”

PAUL CROCKER

## FULFILLING CAREER

Crocker has lived his entire life in the Kansas City area. In 1987 he completed a two-year certification program in automotive machine shop and parts at Kansas City Area Vocational Technical School, now part of Kansas City Community College. He learned the auto parts business and how to rebuild internal combustion engines at the same time.

He started at the Kansas City BPU in the 1990s, working in the micrographics and central supply departments. In 2003 he completed a bachelor's degree in network and communications management at DeVry University, and then joined the staff at the utility's Nearman Water Treatment Plant. He earned water treatment plant operator certification at Fort Scott Community College in 2006 and now holds Class IV Water Treatment Operator certification.

The Nearman Water plant draws water from the Missouri River aquifer into two of the country's largest Ranney horizontal collector wells (Layne). Completed in May 2000, the plant can deliver 72 mgd to more than 55,000 customer connections. The facility has received a Gold Award for performance and reliability from the AWWA and has maintained its Partnership for Safe Water Directors Award since 2009.

At Nearman, Crocker quickly moved up to positions in operations, maintenance and management while continuing his education. At the University of Kansas, he received a certificate in maintenance management in 2012. He is also recognized as a Certified Reliability Leader by the Association of Maintenance Professionals and a Class III plant maintenance technologist by the Association of Boards of Certification, among other achievements.

His most recent assignment at the Nearman plant was supervisor of maintenance, leading a staff in inspection, repair, and overhaul of all control, mechanical, chemical feed, electrical and instrumentation equipment.

He was responsible for a \$1.5 million annual budget, supervising safe handling of chemicals, writing specifications for new equipment and services, and administering and maintaining the plant's enterprise asset management system.

## THE GADGET MAN

Steve Nirschl, director of water processing at BPU, went to grade school with Crocker and was part of the team that hired him. He calls Crocker the



The front entrance of the Nearman Water Treatment Plant in Kansas City.

## Paul Crocker, ReliabilityX Kansas City, Kansas

**TITLE:**  
**Senior Reliability Engineer**

**RESPONSIBILITIES:**  
**Work with clients on reliability, leadership, asset management**

**EDUCATION:**  
**Bachelor's degree, network configuration and communications management, DeVry University; online maintenance management certificate, University of Kansas**

**EXPERIENCE:**  
**29 years with Kansas City (Kansas) Bureau of Public Utilities**

**CERTIFICATION:**  
**Kansas Class IV Drinking Water Treatment Operator; multiple certifications in reliability and maintenance**

**AWARDS:**  
**2020 Meritorious Service Operator Award, Kansas Section, AWWA**

**GOALS:**  
**Advocate for water sector operators; promote asset management and reliability**

Gadget Man because of his interest in cameras and computers and his love of keeping track of work orders and assets.

“He liked taking pictures of projects and equipment as a way of implementing inventory processes and working them into the maintenance management system software,” says Nirschl.

Loyalty and dedication are Crocker's strengths, Nirschl says: “He challenged those around him. Getting others to change can be challenging but Paul was a strong example for other utilities. He put us way out front of everybody else. The things he put in place will be here for a long time.”



## HELPING HAND

While Paul Crocker is passionate about water, public utilities, and computerized maintenance systems, he cares just as much about other people, especially those who need help.

That's evidenced by his work with the Church of the Nazarene and Mid America Nazarene University. The organizations' Work and Witness program sends teams of volunteers into cross-cultural situations to construct buildings and assist with a range of other people-to-people projects.

For Crocker, the work involved training with the Centre for Affordable Water and Sanitation, with an emphasis on biosand water filters. CAWST provides training and consulting to thousands of organizations who have reached millions of people worldwide with safe water, sanitation and hygiene.

Helping install water filtration systems in Argentina and Guatemala might have been Crocker's first exposure to the importance of water resources to a community. The biosand physical filtration system uses no chemicals. It can be installed simply in a 55-gallon drum.

Crocker worked in far northern Argentina near the city of Formosa helping to install the units. On another trip, he helped provide the filters to people in Guatemala City.

He also helped improve the computing platforms of the Nazarene Seminary in Buenos Aires: "We brought in laptops and converted them from English to Spanish. We upgraded their computers and operating systems, fixing problems and removing viruses and malware."

Meanwhile, Crocker sought out opportunities to write and present about technology, computerized maintenance and water. In a 2017 LinkedIn post he asked readers to imagine a day without water.

"A day without water means no water comes out of your tap to brush your teeth," he wrote. "When you flush the toilet, nothing happens. Firefighters

have no water to put out fires; farmers couldn't water their crops; and doctors couldn't wash their hands.

"A single nationwide day without water service would put \$43.5 billion of economic activity at risk. In just eight days, a national water service stoppage would put nearly 2 million jobs in jeopardy. A day without water is nothing short of a humanitarian, political and economic crisis."

Efforts like those helped him earn a 2021 Operator Meritorious award from the Kansas Section AWWA.

## MANAGING ASSETS

It's not hard to understand Crocker's affinity for EAM systems. His early certification in engine repair and parts and his time in the storeroom at the water plant prepared him perfectly for the advent of the EAM in the mid- to late 1990s. The Nearman plant opened in 2000, and along with new treatment equipment it implemented an EAM system running on the Maximo platform.

Crocker soon became an expert in the system's ability to replace disparate systems, simplify team management, reduce costs, increase plant safety, improve inventory control and reduce maintenance costs.

"Water utilities must live within their means," Crocker says. "An EAM is critical to helping them do that, because it keeps an accurate asset and location hierarchy, which is especially important when writing work orders. It lets the utility know what assets they have and where they have them, and enables them to plan and schedule preventive maintenance work."

He adds that the system records when assets were purchased and contains vendor information, bill of materials and parts information. "Additionally, if the utility has done the work to set a criticality ranking on assets and put that data into the system, then the EAM can help direct maintenance work toward the most critical assets with the highest priority first. It can even help to justify increased headcount of both maintenance and operations staff."

One thing Crocker likes about Maximo is its wide use and flexibility. "There is always someone out there who has an answer for your technical question," he says. "It is nimble enough that it can be configured by an administrator to match almost any business process without needing customized Java code. It can share information with other enterprise systems. It works across all modern web browsers, mobile devices and even cellphones in connected or disconnected states."

## A NEW CHALLENGE

His recent move to ReliabilityX seems like a perfect fit. The company

focuses on improving the reliability of clients' plants by offering training, tools and services. "I'm helping clients improve their business practices, and helping with coaching and mentoring," Crocker says.

That includes training in areas like asset management best practices; maintenance management, planning and scheduling; predictive maintenance; and more. "I'll be doing site assessment against our reliability framework, which includes assessments of maintenance, operations, engineering and reliability," he says.

He's working with a wide range of industries — food processors, universities, water and wastewater plants and power plants — which depend heavily on smart maintenance and asset management systems. Utilities remain a priority: "We have one wastewater client we're working with now, and we hope to work with a drinking water utility in the very near future."



Paul Crocker, shown overlooking the Nearman plant's Hi-Tech sedimentation basin clarifiers (Kusters Water, division of Zima Corp.), now works with a wide range of water-using industries that depend on smart maintenance and asset management systems.

## POWER IN PICTURES

He hasn't forgotten about photography. In his tenure at the Nearman plant he trained staff to use photography to troubleshoot and to help others understand mechanical equipment. Early on he used a 35 mm camera, but he now uses his cellphone: "It's amazing the power of a modern cellphone. It's always in your pocket and can take lots and lots of pictures."

He used to have maintenance staff take photos of assets and nameplates, but their first attempts often turned out blurry or lacked the right perspective. He developed training to help them address the issues he was seeing, and their next photos were better. Lighting, composition and a steady hand on the camera are keys to taking good pictures, he says.

"I was looking for different views, the nameplate and model number, as well as the surroundings of the equipment — good composition of the scene. Having accurate nameplate information is really helpful in ordering replacement parts."

He continues to employ the practice. In his new job he uses photography to verify the existence of assets so they can be put into an asset hierarchy for a new asset management system. "I always recommend using photography to help improve practices, for reporting on asset condition, for defect elimination, and for single-point lesson exercises for operators," he says.

"I plan on writing a book on photography for maintenance and physical asset management, and I hope that's something I can get done this year or next year."



Crocker received an AWWA Operator's Meritorious Service Award in 2021.

## THE PERSONAL SIDE

Crocker has been married for 32 years and has three children and two grandchildren. He says nothing he has done in his professional life would have been possible without the help and support of his wife Michelle: "She's the reliability engineer for my family!"

He enjoys MLS Soccer and watching his hometown team, Sporting Kansas City. The team won the 2013 MLS Cup, and Crocker was able to get the trophy on site at the Nearman plant for a day.

He's just as big a fan of career opportunities in water. "Water and wastewater utilities are among the

most economically stable industries out there," he says. "They are absolutely critical to public health. Our water operators are the best. They are essential workers and very much deserve recognition and good pay for the work they do, providing the water we all need."


Reflecting on his career, he emphasizes learning and development: "Every day presents new opportunities and challenges. Accept them, learn from them, grow, and bring others along with you. Be well prepared, never stop learning, and share all you've learned."

Just as he has done. **tpo**

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# Height Advantage

PUEBLO WATER WILL SOON USE HYDROTURBINES TO GENERATE ELECTRICITY WITH THE FLOW FROM ITS HIGH-ELEVATION RESERVOIR IN THE ROCKY MOUNTAINS

By Steve Lund

**H**aving its main water supply at a high elevation has always been a mixed blessing for Pueblo Water. There is no need to pump the water to the plant because it flows downhill, but it comes in at a much higher pressure than the treatment process can handle.

The solution for many years has been pressure relief valves, but now the utility, at the base of the Rocky Mountains, is looking to turn that pressure into electricity, installing two hydroturbines to capture the power of the high-pressure flow.

“With the elevation difference, the water coming into our treatment plant is somewhere around 85 psi,” says Matt Trujillo, director of operations. “When we originally installed the raw water pipeline from the Pueblo Reservoir, about five miles of pipe, we had to install energy dissipation through a pressure dissipation building.

“We have three valves that have been in operation since 2003 that break that 85 psi down to 10 to 12 psi so it’s able to go through the treatment process. Now we can use that high pressure to our advantage to create power.”

## OLD SYSTEM REMAINS

The pressure relief valves, in a 30-by-30-foot building, get the job done, but they don’t do it quietly. “You drive by and you can just hear the wasted energy, the noise and vibration coming out of there,” Trujillo says. The hydroturbines will be installed in parallel to the existing pressure-dissipation plumbing, so the old valves can still be used if needed.

“A majority of the flow will be directed through the turbines,” says Trujillo. “If we need supplemental flow, or if we have to take down the turbines for maintenance, we can still run through the pressure dissipation building.” Pueblo’s Whitlock Water Treatment plant, with 84 mgd capacity, has average flows of 22-25 mgd in summer and 10-12 mgd in winter.

## SIGNIFICANT SAVINGS

The utility purchased 1.0 MW and 0.5 MW hydroturbines. Peak generation is expected to be 835 kW, and annual energy production is projected at 3,500 MWh. “That’s a relatively small fraction of what we use,” Trujillo says. “It’s probably in the 10-20% range.” Nevertheless, it’s a significant savings — an estimated \$400,000 a year when coupled with other metering changes.

The plant’s raw water comes in through a 66-inch pipe buried about six feet underground. The turbines will be connected to that pipe underground, and the connecting pipes will come up through the floor of a new building. The pipes will then turn horizontal and run through the turbines. Then the water will be piped back underground to connect with the supply pipe that feeds the treatment plant.



This 1.0 MW Gugler hydroturbine, along with a 0.5 MW unit, will be installed at Pueblo Water’s Whitlock Water Treatment Plant.

The smaller turbine will be used in winter, when water demand is lower. Although it won’t produce as much electricity, it will run more efficiently. In summer when the flow is higher, the water will flow through the larger turbine.

Pueblo Water serves a large distribution area (580 miles of buried pipelines) at a variety of elevations, so it has multiple pressure zones and storage tanks. “We try to get a healthy pressure for everybody in town, 40 to 100 psi,” Trujillo says. “The only way to do that is to move water to secondary storage tanks.”

That creates a substantial power demand for pumps and motors to move the water through the system; the new hydro power will help meet that demand.

## LONG TIME COMING

Trujillo always thought generating power from the water supply pressure was inevitable, but it hasn’t been a smooth road: “We’ve been looking at this for 15 years. The biggest hurdle was more on the regulatory side. When we got really serious, we called in a professional.”

Although the Lake Pueblo Reservoir from which the utility draws most of its supply is managed by the federal Bureau of Land Management, the permit for the hydro power project came from the Federal Energy Regulatory Commission.

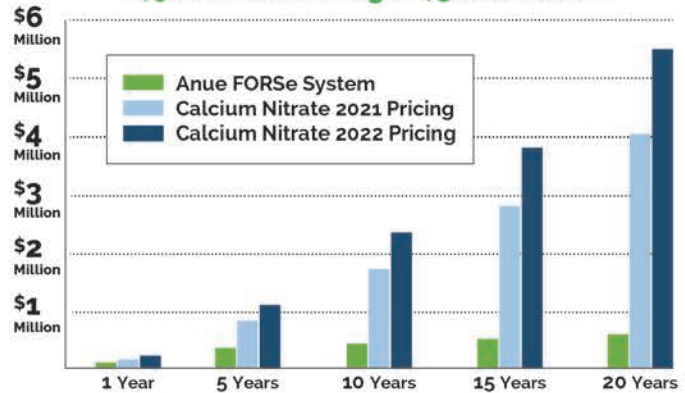
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Pueblo Water has already purchased the turbines, but the project has been delayed because the installation cost exceeded original estimates. “We did the procurement for the turbines ourselves, and next we sent out for bids for the construction,” Trujillo says. “Costs came back quite a bit higher than we expected. Now we are working to minimize the amount we have to contract out.”

“A majority of the flow will be directed through the turbines. If we need supplemental flow, we can still run through the pressure dissipation building.”

MATT TRUJILLO

He estimates construction will begin late in 2022 and take six to eight months, if there are no material shortages. “On paper it looks simple,” he says, “but it’s a little complicated to have all the equipment in place where we’re taking power generated on site, blending it with power coming from the municipal electric company, and making sure the power we generate doesn’t go back onto their grid, causing them potential issues.”

Once this project is fully operational, the generators will make noise, of course, but not as much as the energy dissipation valves. And when people hear noise as they drive by the treatment plant, it will be the noise of energy produced — not wasted. **tpo**



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# In With Oxygen, Out With Odors

INFUSION OF FORCE MAINS AND LIFT STATIONS WITH OXYGEN AND OZONE GENERATED ON SITE PREVENTS THE FORMATION OF HYDROGEN SULFIDE

By Ted J. Rulseh

Complaints about sulfide odors from manholes and lift stations can be a major headache for clean-water utilities. So can corrosion of wastewater infrastructure.

Traditionally, agencies have used chemicals such as calcium nitrate to mitigate hydrogen sulfide formation. As the price of chemicals has spiked in recent times, and as sustainable operation takes on higher priority, utilities are looking to alternate solutions.

One such solution is the injection of wastewater force mains and lift stations with oxygen and ozone generated on site. Anue Water Technologies offers FORSe Series treatment technologies for  $H_2S$  mitigation, eliminating odor issues and preventing corrosion of infrastructure.

FORSe 2 units inject highly pure oxygen into force mains to counteract the sulfate-reducing bacteria that create  $H_2S$ . FORSe 5 units inject oxygen into force mains and ozone into the air space in lift stations.

Gregory Bock, Anue vice president and general manager; Jon Amdursky, director of marketing and communications; and Kenny Graham, sales engineer with Anue channel partner Tencarva Southern Sales, talked about the technologies in an interview with *Treatment Plant Operator*.

**tpo:** What do you see as driving interest among utilities in technologies like yours?

**Amdursky:** One of the catalysts we've seen over the past year is the price of calcium nitrate, which most municipalities use to treat force mains and lift stations for  $H_2S$  mitigation. In the past 12 months (as of May), the price of nitrates has gone up 149%, and it's hitting municipalities all over

the United States. They are also being incentivized on the positive side by the federal Infrastructure Investment and Jobs Act, which includes \$55 billion for eco-friendly water and wastewater projects.

**tpo:** Is there any movement toward non-chemical solutions for sustainability reasons?

**Bock:** Yes, sustainability is a factor, and so is safety. After a change to on-site oxygen generation, there is no longer a need for a big truck to pull up and fill a chemical tank.

**tpo:** How does your technology differ from other offerings that use pure oxygen?

**Bock:** There are companies that supply liquid oxygen, which has a temperature of about minus 300 degrees F. We generate our oxygen and ozone on site from atmospheric air.

**tpo:** How does your technology concentrate oxygen?

**Bock:** The FORSe 2 process takes atmospheric air, compresses it and pushes it through an oxygen generator that produces 90-93% pure oxygen. We then run that pressurized and concentrated oxygen through multiple sensing technologies for flow, pressure and purity. Using that data, our software and custom control cabinet deliver the precise amount of oxygen required to keep the force main in an aerobic state, with a positive DO at the point where it finishes its path. If you have positive DO, you will not have  $H_2S$ .



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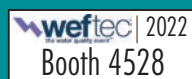
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**tpo: How does the ozone generation technology function?**

**Bock:** The FORSe 5 system produces and injects oxygen into the force main in the same manner as the FORSe 2. It then takes a side stream of the pure oxygen and runs it through an ozone generator. It infuses ozone into some of the wastewater and sprays it into the lift station air space. That leaves a low ozone residual in the headspace of lift stations, preventing H<sub>2</sub>S odors from forming and escaping to the air outside.

**tpo: What infrastructure is required to install these systems?**

**Bock:** The system requires proper HVAC, along with 480-volt, three-phase, power. All necessary voltage changes occur inside our control cabinet.

**tpo: In what forms can these technologies be delivered?**

**Bock:** We have the flexibility to deploy individual components that can fit into an existing building at the lift station. If it's a greenfield application, then the building can be designed around our equipment. Lastly, we have done multiple plug-and-play systems where we install the oxygen generation equipment in insulated, prefabricated containers with LED lighting, foam insulation, HVAC and electric or gas heat.

**tpo: How long does it take to deploy a system?**

**Bock:** From purchase order to delivery, typically 14 weeks. We have dealt with recent supply chain challenges by stocking the long-lead-time items in our warehouse.

**tpo: How does Anue engage with clients interested in the technologies?**

**Bock:** We share with them the return on investment and the value of using on-site oxygen generation instead of chemicals or other technologies. When a client requests a trial, we ask them to collect data before we arrive on DO, liquid sulfide and H<sub>2</sub>S gas levels. Then we bring one of our mobile demonstration units, which are full-scale trailers, 24 by 10 feet and 10 feet high.

**tpo: What information does the client receive as a result of the demonstration?**

**Bock:** Within 36 hours we can typically demonstrate reductions in H<sub>2</sub>S and liquid sulfides, and an increase in DO. The client receives that data and makes a decision. At times, after we finished the pilot, the client has persuaded us to leave the mobile unit there while they waited for their system to be built.

**tpo: What is the typical simple payback on a unit versus using chemical treatment?**

**Bock:** The typical payback is 18 to 24 months.

**tpo: Can you cite an actual example where these technologies have solved a problem for a community?**

**Graham:** The city of Pikeville, Kentucky, had an issue with odor complaints from a pump station and manholes near a large department store and commercial complex with shops and restaurants. That station pumped a little over a mile to the wastewater treatment plant, and when building a new plant they noticed more than typical odor at the headworks. We demonstrated FORSe 5 unit. Their highest H<sub>2</sub>S reading was 450 ppm, which is extremely high. We put the system online and after a couple of days we were getting readings of zero to 20 ppm. They ended up buying the system.

**tpo: How can communities absorb the capital cost of a system?**

**Bock:** For municipalities that can't afford the upfront capital cost, we solve the problem with Anue's unique rental or financing program through a lender. Either of these turnkey rental or financing programs immediately push the monthly cost down below what they are currently paying for chemicals. **tpo**





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# Coated With Care

A ROBUST LINING SYSTEM WITH METICULOUS APPLICATIONS AND COLOR TINTING ENSURE HIGH-QUALITY RESTORATION OF DEGRADED MBR BASINS TO LIKE-NEW CONDITION

By Greg Hansen

Water treatment facility owners have an array of protective coating options available for lining new concrete basins. However, they can opt to skip the lining altogether — at least at first.

Over time, unlined concrete is sure to deteriorate and will eventually need a lining; the decision to skip lining during construction basically kicks the paint can down the road. Robust concrete restoration materials and durable lining systems can easily restore basins to like-new condition, making the decision to wait perfectly sound, although owners must prepare to add a lining sometime in the future.

Such was the case for the Jordan Basin Water Reclamation Facility in Bluffdale, Utah. Before the facility opened in 2012, project managers from the South Valley Sewer District chose to not line the eight concrete basins that make up the facility's membrane bioreactor. Facing budget restrictions, they planned to earmark future funds for lining after the concrete degraded from use.

## MULTIPLE COATINGS

The deterioration came a bit faster than anticipated, as the corrosive membrane filter cleaning process caused the loss of 0.25 to 0.75 inches of concrete throughout the basins within about six years. There was no question the time to line the basins had arrived.

The district staff worked with Bowen Collins & Associates as design engineer for the lining project and with the Corrosion Control Technologies engineering firm to define the project parameters.

Utah-based CDC Restoration & Construction then completed the work, restoring the basins to like-new condition with a durable, nonpermeable lining system from Sherwin-Williams Protective & Marine. The labor-intensive 57-week project used a traditional five- to six-coat lining system while the facility remained in service.

The facility's MBR technology prepares wastewater effluent for reuse in irrigation. The MBR removes mineral salts, iron, insoluble organics and biological matter from influent. Concrete in the basins had severely degraded from attack by citric acid and sodium hypochlorite used to remove contaminants from the MBR filters.

The chemicals had progressively eaten away at the unlined basin walls. CDC Restoration & Construction performed a variety of rehabilitation steps, including preparing the concrete for repairs, restoring its surface to its original plane, applying a moisture remediation primer, adding a fiberglass mat-reinforced epoxy laminate and applying a protective epoxy lining.

## STEP BY STEP

The basins were restored one at a time while the facility remained in operation. Crew members set up a full containment system to keep dust and

Applicators used a 100% solids epoxy patching and surfacing compound (Sherwin-Williams Protective & Marine) to restore the deteriorated concrete walls of MBR basins.

ALL PHOTOS COURTESY OF THE SHERWIN-WILLIAMS COMPANY



The protocol of applying the moisture-mitigation coat, surfacing compound, tinted base epoxy layer and white topcoat enabled the work to proceed quickly. The team restored all eight basins well within the 60-week target completion time.

debris from contaminating adjacent basins. They also minimized dust and debris production by vapor-abrasive blasting the concrete.

Applicators first blasted the concrete to create a clean surface for coatings. Because operating basins remained full of water, project engineers knew moisture could migrate through the concrete on at least one wall in each basin under repair, creating potential adhesion issues.

To mitigate that problem, they spray-applied Resuprime MVT on the basin walls. This two-component, fast-curing epoxy resin is tolerant of residual moisture in concrete. It blocked moisture from migrating to the surface, enabling applicators to restore the concrete and apply the lining system.

## FIXING FLAWS

About 12 hours after applying the moisture-control coat, applicators repaired the deteriorated concrete. Using Steel-Seam FT910, a 100% solids epoxy patching and surfacing compound, they repaired cracks; filled voids, bugholes and honeycombs; and rebuilt the deteriorated surfaces to their original dimensions.

Because some basin walls had been previously primed and filled with epoxy cementitious materials, engineers specified the surfacing compound instead of a traditional cementitious resurfacer or mortar. The previously applied materials would not permit strong adhesion for a cementitious resurfacer or mortar.

The Steel-Seam surfacing compound application was also more efficient than alternative technologies. For example, applying urethane cement with a trowel would have required days of labor-intensive work and a longer project schedule.

With the concrete built back to an even plane, applicators turned to the reinforced lining system. They first applied a base layer of Dura-Plate UHS Clear Laminate and topped that with a 1.5-ounce fiberglass mat. Next, they sealed the mat with more of the clear laminate material before top-coating it with Dura-Plate UHS Epoxy White.

Both of these ultra-high-solids epoxy amine coatings are designed as laminating systems in immersion service. They provide reliable protection with high-build, edge-retentive properties.

## COLOR-AIDED INSPECTION

Ensuring quality lining installations is important when applying layered laminate/fiberglass mat systems. The base layer must be fully adhered to the substrate, and that requires the fiberglass layer to be fully wetted out. Otherwise, adhesion failures are likely.

For quality control, the engineering team devised a solution that would help inspectors both during the lining application and later when examining the lining for damage during periodic service inspections.



Applicators sealed in a 1.5-ounce fiberglass mat using a green-tinted laminate epoxy as part of the lining's reinforcement layer.

When clear laminate products are used, it is difficult to confirm visually that the fiberglass matting is fully saturated because there is no contrasting color. Therefore, the engineers specified a phthalic green hardener with the clear epoxy resin. The green tinting made it easier for applicators and inspectors to make sure the fiberglass matting was fully wetted simply by looking for any areas that were still white or a lighter shade of green.

Then, as applicators installed the white topcoat, they were able to ensure a uniform, pinhole-free final film by fully covering the contrasting green layer. Any areas of green showing through could quickly be touched up. This full coverage left no air pockets, dry areas or voids between the concrete and fiberglass, minimizing potential for adhesion issues.

The color contrast also helped inspectors examine the basins after service, since any visible green spots would indicate damage to the topcoat.



The final layer for the MBR basin linings is an ultra-high-solids epoxy amine coating engineered for immersion service.

By using a contrasting white color for the topcoat, personnel can easily do visual checks of lining condition. Any green showing through indicates damage.



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## BACK IN BUSINESS

After inspection by staff from Bowen Collins engineers, each basin was approved for use before applicators moved on to the next one. The protocol of applying the moisture-mitigation coat, surfacing compound, tinted base epoxy layer and white topcoat enabled the work to proceed quickly. The team restored all eight basins well within the 60-week target completion time.

The 15 mgd facility has remained in operation throughout the project, serving the surrounding area with filtered water for irrigation. The team's work earned first place in the 2020 Sherwin-Williams Impact Awards program.

### ABOUT THE AUTHOR

Greg Hansen ([greg.l.hansen@sherwin.com](mailto:greg.l.hansen@sherwin.com)) is project development manager for Sherwin-Williams Protective & Marine, focused on engineering for the power, water and wastewater, and food and beverage markets. **tpo**



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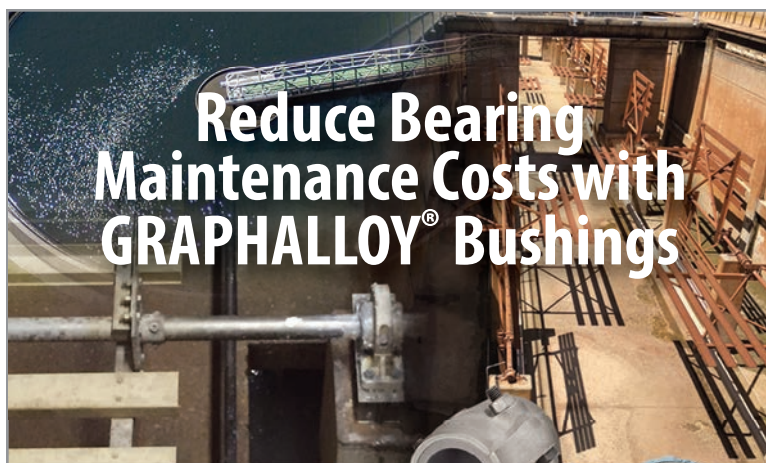
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Rodney Lance, right, plant manager, shown with Pat Blatter, operations and maintenance technician, has built a reputation for building strong relationships with his team and paying close attention to detail.



# Military Discipline

SKILLS LEARNED DURING AN AIR FORCE CAREER HELP RODNEY LANCE RUN AN EFFICIENT CLEAN-WATER PLANT AND WORK EFFECTIVELY WITH THIS TEAM

STORY: **Jim Force** | PHOTOGRAPHY: **Rachel Leathe**

Rodney Lance wasn't sure what he was getting into when the Air Force assigned him to water and wastewater back in 1986.

He had enlisted and signed up for the open career field. The assignment included the water facilities, water distribution, fire suppression and plumbing. Now, 35 years later, Lance can be satisfied with his successes as manager of the Great Falls (Montana) Wastewater Treatment Plant for Veolia North America.

Those include a 2018 William D. Hatfield Award and a 2021 Operator of the Year distinction from the Montana Water Environment Association, which he has served for several years as secretary-treasurer.

"I've really liked it," he says. "It's always different. Process management. Sending clean water out to the river. Helping the environment."

## FINDING A CALLING

Lance came to Great Falls in 2006 when the Air Force sent him to Malmstrom Air Force Base. When he retired in 2011, he took a job with a railroad company, but his heart wasn't in it. It's much different now.

He joined the staff at the Great Falls plant as an operator in training, and then became operations manager in 2014, assistant plant manager in 2019, and plant manager in 2021. The plant, which Veolia has managed for several decades, serves about 65,000 people.

Three bioreactors using fine-bubble diffusers (Sanitaire, a Xylem brand) and blowers (APG-Neuros) accomplish biological nutrient removal to meet clean water standards. Effluent BOD averaged 4.36 mg/L in 2021, and suspended solids 4.77 mg/L. Effluent phosphorus averaged 0.29 mg/L and ammonia nitrogen just over 9 mg/L.

Effluent is UV disinfected (Ozonix) before discharge to the Missouri River. Design flow is 13.3 mgd; average 8.5 to 9.0 mgd. The solids process includes anaerobic digestion, polymer addition and dewatering on a pair of centrifuges (Andritz). Between 36,000 and 72,000 pounds of cake at 20% solids is landfilled six days a week.

Plant processes are monitored and controlled by an Oracle utilities work and asset management program. The staff includes 14 people who operate the plant seven days a week all day, every day. They include Joseph Fayden, operations manager; Keith Nelson, maintenance manager; and Nathan Christiaens, laboratory technician.

The Great Falls system includes 28 wastewater lift stations and four stormwater pumping stations.

In addition to daily operations, Lance's chief responsibilities include planning, organization, scheduling, employee evaluation, training, facility maintenance, reporting and analyses, compliance assurance, safety and emergency response. "Keeps me out of trouble," he says.

## IMPORTANT INTERFACE

As a contract operator, Lance maintains what he calls a "professional client interface" with city management, and a critical connection with Veolia. He does well on both counts.

"Rodney does a great job supporting Great Falls," says Melissa Sandvold, vice president of operations for Veolia in the northwestern United States and northern California. "He listens and makes sure our programs are meeting the needs and expectations of our client."

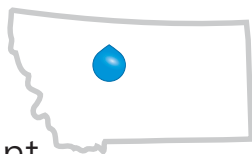
Paul Skubinna, Great Falls Public Works director, agrees.

"Rodney is amazing. He's been a plant manager for a little over a year and has really stepped up and done a great job. We communicate really well — sit down and talk capital improvements, resources, or maintenance. It's good to stay connected."

Skubinna points out that the city's long-standing relationship with Veolia is based on confidence and mutual comfort: "The plant employs local people, who are vested in the community. That's what makes it work."

Lance meets with the city team weekly or every other week as conditions call for. "We keep the city informed, and they talk to us about any issues," he says. Lance adds that being part of the Veolia organization is a plus.

## Rodney Lance, Great Falls (Montana) Wastewater Treatment Plant



POSITION:  
**Plant manager**

EXPERIENCE:  
**16 years in wastewater operations and management**

EDUCATION:  
**Associate degree, applied science, Community College of the Air Force**

CERTIFICATIONS:  
**Class 1C Wastewater Operator, Low-Pressure Boiler Engineer**

AWARDS:  
**Montana Water Environment Association: Operator of the Year 2021, William D. Hatfield Award, 2018**

GOALS:  
**Operate efficiently and safely; learn new technologies; be a mentor for youth**



Rodney Lance,  
plant manager

“You must be accurate, 100% correct, 100% of the time. The military instills that in you.”

RODNEY LANCE



## A HELPING HAND FOR PROFESSIONALS

The Montana Water Environment Association was established in 1944 as the Montana Sewage Works Association; it is a member association of the Water Environment Federation.

The organization focuses on enhancing members' skills, facilitating lifelong learning, championing productive relationships, enriching leadership potential and increasing recognition for and awareness of the clean water field.

Rodney Lance, wastewater treatment plant manager at Great Falls, has served as the organization's secretary-treasurer for a number of years. He affirms all of its aims: "The association provides training and networking, and helps members obtain their CEUs. My involvement has helped me personally and in my connections with other plant managers and operators. People reach out to me with questions and concerns, and vice versa. We're able to help each other."

His work is appreciated by all, especially Robin Matthews-Barnes, the association's executive director. "Rodney has helped to guide MWEA in its endeavor to support the wastewater industry in Montana," she says.

"That includes engineers, operators and the vendors who provide goods and services to improve the quality and efficiency of wastewater systems across the state, whether they serve large or small populations.

"Rodney is a really good human being who has empathy for others and wants to help in any way he can. I feel blessed to work with him; he is a great asset."



Rodney Lance works effectively with people of different backgrounds to obtain the best results.

Veolia has operations and maintenance contracts with more than 600 communities serving more than 10 million people throughout the United States. The contracts are designed to streamline plant operations, improve efficiency and increase reliability.

The company provides technical and management support and also helps with purchasing key commodities, especially important with supply chain problems brought on by the COVID pandemic. "Vendors are eager to work with us," Lance says. "In some cases, we have nationwide agreements."

## MILITARY LEADERSHIP

Cost is a key challenge for Lance and his team. "Costs are going up," he says. "In the case of polymer, maybe 40-50%. Plus, delivery is up to five months out."

The harsh northern Montana winters also present issues. Temperatures can stay below zero for days

“Lots of people are deserving. To be nominated and recognized by your peers is quite an honor.”

**RODNEY LANCE**

on end, causing difficulties like foaming and bulking in the aerobic digesters. "Freezing and breakup can cause problems with the bacteria and the media," Lance says.

Then there are the more specific task-oriented challenges. "That includes the digester cleaning project," says Lance. "It was the first in 15 years. It is a 1.5 million-gallon



The team at the Great Falls Wastewater Treatment Plant includes, back row from left, Rodney Lance, plant manager; Joseph Fayden, operations manager; Nathan Christiaens, laboratory technician; Keith Nelson, maintenance manager; Boo Landon, operations and maintenance technician I; and Corey Matthews, maintenance and instrumentation technician. Front row, Pat Blatter and Justin Gumenberg, operations and maintenance technicians II; Robbie Regennitter, maintenance machinist technician; and John Reardon, operations and maintenance technician II.

“Rodney is amazing. He has really stepped up and done a great job. We communicate really well.”

PAUL SKUBINNA

vessel. We did it ourselves, and it took three to four months. There was a lot of grit and silt. We had to use fire hoses to dislodge material, and we had to filter out the liquid and re-treat it. It took everyone here.”

Lance’s military background helps him deal with serious issues. “Through its Airman Leadership School, the Air Force teaches you management and leadership skills,” he says. “You learn how to work with people. You focus on ethics and attention to detail. You must be accurate, 100% correct, 100% of the time. The military instills that in you.”

“That’s his strength,” Sandvold says. “He meets deadlines, crosses all the T’s, dots all the I’s. He understands programs and makes them clear to his staff.”

### VALUING FAMILY AND STAFF

The hard work has paid off. “I get great satisfaction just being in this career field,” Lance says. He enjoys working with people from different backgrounds within Veolia and the city, and with the different treatment processes: “You never know what’s coming. There’s always something different going on. I like sending clean water out to the river and the people downstream, and helping the environment.

He values his staff and says safety and his plant’s safety record are paramount. “As of last December, we’ve gone 22 years with just one lost time accident,” he says. “In the last 17 years, we’ve had only four recorded accidents. It’s a great day when you can go home at the end of the day the way you came to work.”

Being promoted has been a highlight, as have the awards and recognitions he has received. “Lots of people are deserving,” he says. “To be nominated and recognized by your peers is quite an honor.”

Lance likes to hunt and read historical fiction, but he’s now spending lots of time with his youngest son Christopher, 17, who plays the trumpet with an interest in jazz. “I love to hear him play.” **tpo**



Lance (right) shown taking a UV treatment reading (Ozonite) with Pat Blatter, has earned a 2018 William D. Hatfield Award and a 2021 Operator of the Year award from the Montana Water Environment Association.

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# Training New Talent

MAINE COMMUNITY COLLEGES COLLABORATE TO OFFER A WATER TREATMENT TECHNOLOGY CERTIFICATE AND ASSOCIATE DEGREE AND PROGRAM TO STUDENTS THROUGHOUT THE STATE

By Ted J. Rulseh

**T**he need for new operators to replace those retiring has not abated. Drinking water and wastewater utilities nationwide are constantly on the lookout for qualified professionals, whether fresh out of school or changing careers.

The community colleges in Maine are helping to meet the need in their state by offering a water treatment technology certificate and associate degree program. Northern Maine Community College in Presque Isle launched the program in 2018 at the request of the state Department of Environmental Protection.

In 2020-21, Southern Maine Community College began partnering with NMCC to deliver training on its South Portland campus. State-of-the-art technology enables students to attend lectures from anywhere, but laboratory exercises directed by a faculty member are held on site.

The program aims to provide students with a fundamental knowledge of the scientific principles used to treat drinking water and wastewater. They learn industry theory and gain hands-on experience to better understand the information across the spectrum, from the basics to in-depth study.

Graduates can qualify as technicians in water and wastewater treatment plants and also have opportunities for roles in laboratory analysis, chemical processing, and sales in companies that support the water industry. Patrick Wiley, assistant professor of wastewater technology program at SMCC, talked about the offerings in an interview with *Treatment Plant Operator*.

**tpo: What was the impetus for this training program?**

**Wiley:** It's a similar story nationwide. There were too few people entering the field here, while many people were leaving for retirement. We wanted to fill that gap with training programs. We serve people with no previous background who take part as full-time students. We also provide remote education for people already on the job.

**tpo: How did the program get started?**

**Wiley:** Northern Maine Community College started it in 2018. We weren't getting a lot of enrollment, and so we expanded the program to the Southern Maine campus. There was private seed money to help us get started. The two colleges run the program collaboratively. Both campuses are equipped with multiple cameras and tools for remote learning. The original intent was to reach a broader spectrum of people who might be working and couldn't necessarily come to campus for instruction. But it turned out to be convenient during COVID, as we were able to offer some course content even when things were mostly shut down.

**tpo: In what ways are the courses offered?**

**Wiley:** We have a unique mix of people, and our delivery methods are

also unique. We try to be as flexible as we can. We offer in-person instruction, and remote instruction over Zoom. We also provide asynchronous remote instruction where we record the lecture content and put it on a learning platform called BrightSpace, where students can access the course resources, do their homework and take their exams. We have a couple of remote learners in a lab class. For them we do the lectures remote. Then they can come in one day a month and we'll do four labs in a row, so they can complete them all in one day.

**tpo: How were water and wastewater utilities dealing with the operator shortage?**

**Wiley:** Before joining the college I was the operations manager in Portsmouth, New Hampshire. The reservoir of operators was getting smaller as people were leaving. We had built a large new biological aerated filter. We ended up hiring people with reasonably compatible skills, or people who we thought could pick it up quickly, and training them on the fly. That's what a lot of facilities in this area were doing. In our program, we have some students who got into the industry that way. They take our classes and get up to speed while they're working. We've also have students who came directly out of high school.

**tpo: What is your educational background?**

**Wiley:** There was a wastewater program at Southern Maine that I took in 1997 to become a wastewater operator. I started working in the field and then went back to school. I got my bachelor's degree in environmental sci-



Patrick Wiley

“This profession is unique because it involves a huge collection of different trades and disciplines. You can't run out of things to do and to learn.”

PATRICK WILEY

ence from the University of Maine and my master's in natural resources from Humboldt State University in northern California. I completed my doctorate at the University of California Merced, where I worked on an algae biofuel project funded by NASA.

**tpo: What experience did you have in the profession before becoming an instructor?**

**Wiley:** While on the West Coast I ran a membrane treatment plant. Before that I worked for a few years in Saco, Maine. After earning my degrees I worked for the city of Portsmouth. In the past four years I've been a technical

consultant writing manuals for the Sacramento State University wastewater program. Those are the books we use in our program, along with the *Fundamentals of Wastewater Treatment* books from the Water Environment Federation.

**tpo:** How do you recruit students for the water treatment technology program?

**Wiley:** That's an area where we need to up the game a little bit. The Maine DEP includes information about the program in their newsletter. We held an event at the campus last summer where people from adult education programs and people working in the field explained the benefits of entering the industry. One high school student who came to that event took a tour, and he enrolled in the program. Last summer we did more work reaching out to targeted groups through social media. This is the first time the two community colleges have collaborated in this way, so we're still working out the logistics.

**tpo:** What is the difference between the certificates and the associate degree?

**Wiley:** There are one-year certificates in wastewater treatment and water treatment. You have to choose which one you want to attain. If you choose the associate degree, you take one year of wastewater and one year of water, and a couple of electives.

**tpo:** At what point in your program are people qualified to take a state licensing exam?

**Wiley:** After the first year, or even a little sooner, depending on the classes they're taking. We offer a very general introductory course in water treatment technology that's an overview of the whole field. If someone is just taking that, I probably wouldn't encourage them to take the exam. But those taking the introductory treatment classes would likely be successful.

**tpo:** Which method of course delivery seems to be the most popular?

**Wiley:** It's evenly split. Two students joined right out of high school, and they come in for class because they're full-time students. One student last year was full-time but got a job at a nearby treatment plant. He has continued toward his associate degree and takes classes via Zoom. Another student works for a water distribution utility and wants to get an associate degree. He's asynchronous but comes in for the labs.

**tpo:** Are there plant tours as part of your courses?

**Wiley:** We do a lot of tours. In the first year we were only able to do a couple because of COVID. Last year we went to seven or eight facilities.

**tpo:** How well are you doing in terms of placing students in jobs?

**Wiley:** We're doing very well. I get emails constantly from nearby facilities looking for people. The opportunities are there for people who want to take them.

**tpo:** Where do you see your program heading in the next few years?

**Wiley:** A first priority is to get our numbers up. We'd like to see 15 to 20 people in the program. How we get there hasn't been decided. We need to find a way to attract people with applicable skills, like pipefitters, electricians and other tradespeople. We've had some communication with outreach groups to veterans, because that's a potentially huge pool of wastewater operators. We hired people out of the military when I was at Portsmouth, and they were all fantastic. They were able to slot right in.

**tpo:** Do you see expanding the breadth of instruction?

**Wiley:** Yes. The biology department here has reached out to me. They have a lot of overlap with things we're doing. There are a lot of fish hatcheries in Maine, and one of the issues there is recycling the water and removing ammonia. Students in biology classes go to treatment plants on field trips. There's opportunity for us to collaborate with marine sciences, biology, aquaculture — providing the core knowledge and giving people options to branch out.

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**tpo:** What tools do you have for students to gain hands-on experience?

**Wiley:** We mix textbook and presentations with hands-on activity as much as possible. We have a motor control center trainer where students can build circuits; wire starters, switches and lights; and run a VFD. We can simulate faults so they have to do troubleshooting to find out why something isn't working. We have water and wastewater treatment trainers that the students built. We also have a centrifugal pump that students can pull apart and take the seals and impellers out. They can practice for rebuilding motors and pumps.

**tpo:** What about actual laboratory equipment?

**Wiley:** We have drying ovens, a microscope, an analytical balance, water baths, an autoclave, a spectrophotometer — all the basic items you would find in a treatment plant lab. We do lab exercises and then make the work apply to actual operations.

**tpo:** What would you say about the water field to encourage young people to consider it?

**Wiley:** This profession is unique because it involves a huge collection of different trades and disciplines. There's a biology aspect. There's a lot of chemistry. There's mechanical, electrical and controls. You can't run out of things to do and to learn. If you like puzzles and collecting data and making things work as a system, it's the ideal field. I don't think there are many industries where you get to do so many different things. Here in Maine, most of the facilities are relatively small, and you're almost required to be versatile. **tpo**

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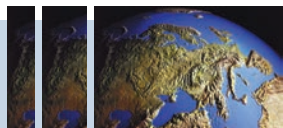


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By Craig Mandli

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Gorman-Rupp's Eradicator Plus solids reduction technology for 3-, 4- and 6-inch Super T Series self-priming centrifugal trash pumps is designed for the most extreme-duty

applications in the municipal, industrial and agricultural markets. The Eradicator Plus is ideal when cutting and tearing of organic solids entering the pump is required. Features include an easily removable lightweight inspection cover, back cover plate incorporating an obstruction-free flow path and a hard iron continuous vane impeller with a thick back shroud to prevent debris buildup. For new Super T Series pump installations, complete units are available in cast iron. Upgrade kits are available and will include all components needed to make an easy on site conversion.

419-755-1011; [www.grpumps.com](http://www.grpumps.com)



### Bally Ribbon industrial fabrics

Bally Ribbon Mills offers fabrics constructed of specialty polymer fibers that help achieve filtration application manufacturing chal-



lenges, including reducing environmental impacts and energy production. Specialty fabric polymer selection is determined by the type of gas or air being filtered. Fabrics used are composed of either polyester or polyphenylene sulfide for applications in which greater heat and acid resistance is required. BRM's specialty fabrics, available in a wide variety of fiber combinations and weave structures, are used in filtration applications requiring controlled air permeability and water porosity, as well as high seam strength and structural reinforcements for industrial air filtration applications. Seamless woven tubular fabrics can be created with a completely uniform fabric structure.

610-845-2211; [www.ballyribbon.com](http://www.ballyribbon.com)



### IDEC ferrule and crimping tool product line

IDEC Corp. released a new line of S3TL series ferrules, wire strippers, crimpers and screwdrivers. Ferrules provide improved mechanical and electrical connections as opposed to using bare wire. The IDEC S3TL ferrule product line includes various sizes accommodating wire gauges from AWG 26 to AWG 8, each with one or two wires, depending on part number. The ferrules are UL 486F certified when used together with S3TL series crimping tools. The strippers and crimpers are ergonomically designed for comfortable function with minimal required force. Crimping tools include a ratchet function that does not release until the connection is fully completed, ensuring work quality by eliminating errors and avoiding crimp faults. Screwdrivers are IEC60900:2004 and VDE certified with insulation of up to 1000-volt AC and 1500-volt DC, providing safe user protection against electrical shock.

800-262-4332; [www.idec.com](http://www.idec.com)



### Fluoramics LOX-8 full-density PTFE tape

Fluoramics has added additional sizes and lengths to its selection of LOX-8 full-density PTFE tapes. The 1/4-inch wide oxygen-safe tape is now available in lengths of 260 and 520 inches. The LOX-8 tape comes in 1/4-, 1/2- and 3/4-inch widths in two different lengths of each size. The tape has a temperature range of negative 400 degrees F to 550 degrees F and is waterproof.

800-922-0075;

[www.fluoramics.com](http://www.fluoramics.com)



### In-Situ TurbiTechw2 suspended solids sensor

The TurbiTechw2 suspended solids sensor from In-Situ includes a large optical surface and self-cleaning mechanism designed to deliver reliable data. The TurbiTechw2 can also be used to measure returned activated sludge, surplus activated sludge and suspended solids or turbidity. The sensors use a solid state infrared light source for stable measurements. The automatic cleaning process takes only 90 seconds, which means the sensor is available for readings 99.5% of the time.

800-446-7488; [www.in-situ.com](http://www.in-situ.com)

tpo



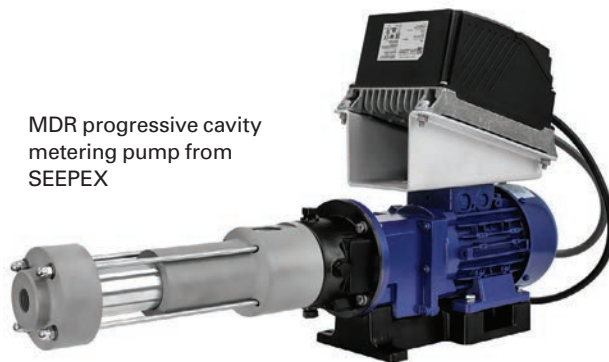
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## product spotlight wastewater

MDR progressive cavity metering pump from SEEPEX



### Progressive cavity metering pump suitable for corrosive media

By Craig Mandli

The wastewater treatment process requires the controlled dosing of chemicals into the process stream either to assist the treatment or to remove undesirable elements. In order for the metering pumps to work efficiently, operators need to be constantly aware of what is happening in the treatment process so that dosing levels and speeds can be adjusted accordingly. It is additionally important that the metering pump be durable enough to perform reliably in harsh chemical environments. SEEPEX, a longtime specialist in progressive cavity pump technology, recently introduced the **MDR progressive cavity metering pump** specifically for those situations.

The SEEPEX MDR range progressive cavity pump is a metering pump that can withstand the harshest of chemicals. Due to an external GA seal arrangement and engineered composite seal housing, lantern and rotating unit, the only metallic part in contact with the conveyed product is the rotor. The lantern and seal casing is integrated into a single engineered composite material that is chemically resistant and easily retrofit-able in existing pumps. This design allows mounting of the pump in any orientation due to a lip seal and propylene glycol to lubricate and protect the components.

By using a seal mounted externally, the metallic components are never in contact with the conveyed product. This allows for the use of a stainless steel GA seal in even the harshest applications. This design allows for broad chemical compatibility, increased performance, and decreased maintenance, according to Mark Yingling, SEEPEX director of product and market development.

"Due to the external seal and engineered composite components, expensive inventories of wear parts, constructed of exotic materials for chemical compatibility, are no longer required," says Yingling. "This is an advantage to our customers we are happy to offer."

The MDR range features a QUADX joint design that performs as a constant velocity joint, reducing pulsation to levels only detectable by laboratory equipment. It is constructed from engineered composite material, durable to wear, chemically inert, resistant to heat and easy to assemble and maintain. This, combined with progressive cavity pump technology, provides laminar flow and a high degree of accuracy in chemical dosing applications. These key characteristics help reduce chemical usage, provide accurate dosing for line injection, and maintain required chemical levels without over or under dosing.

937-864-7150; [www.seepepex.com](http://www.seepepex.com)





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we see opportunity. It's all in how you look at it.

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### Kaesar marks a year of green energy

In an ongoing commitment to minimize environmental impacts, Kaeser is manufacturing with 100% green energy and matching its consumption with renewable energy resources. Both Kaeser Compressors in the U.S. and Germany's Kaeser Kompressoren SE are marking a full year of operations using only green energy. The milestone has been achieved with three key programs. First, over a year ago Kaeser Kompressoren SE installed a photovoltaic system which generates approximately 650 MWh for its main manufacturing plant in Coburg, Germany. Second, Kaeser purchased renewable energy credits for its remaining manufacturing facilities. And third, in the U.S., Kaeser Compressors is part of Dominion Energy's Green Power Program and pays a premium per kWh for its headquarters in Fredericksburg, Virginia, to match energy consumption with renewable resources.

### Anue introduces new Midwest channel partner

Anue Water Technologies announced LAI is the new and exclusive channel partner for the sales and installation of all Anue Water products in Illinois and Wisconsin. According to a company release, with the addition of LAI, Anue is able to demonstrate and install its equipment solutions to over 90% of the municipalities in the U.S. and Canada.

### Sentry Equipment acquires Rebuild-it Services Group

Sentry Equipment acquired Rebuild-it Services Group, a rebuilder and installer of clarifier drives and thickeners for municipal wastewater treatment applications. Rebuild-it Services Group, based in West Jordan, Utah, will join the Sentry family and will function and go to market as an independent Sentry operating division, retaining its own brand and identity.

### CGLR and TWC create partnership

The Council of the Great Lakes Region and The Water Council announced a partnership to deepen ties and accelerate water innovation and stewardship in the binational Great Lakes region, the largest freshwater system in the world. As part of the collaboration, CGLR will help TWC grow its WAVE: Water Stewardship Verified program, an initiative that helps companies follow a strategic process to understand their water uses and impacts, assess associated risks across the enterprise and prioritize the highest risks.

### De Nora recognized in Water Europe Innovation Awards

Industrie De Nora S.p.A. was recognized in the 2022 Water Europe Innovation Awards. The company was named best in the Water Technology and Infrastructure category for its sludge ozonation application in advanced sewage treatment. The technology, suitable for municipal or industrial use, improves process efficiencies without the use of harmful chemicals, protecting the environment from micropollutants in accord with the European Union's Zero Pollution Action Plan.

### Stantec selected as PMC for Vancouver's treatment plant projects

Stantec was selected as the Program Management Consultant for the Iona Island Wastewater Treatment Plant Projects in Vancouver, British Columbia. The \$9.9 billion multiyear program includes construction of a new tertiary treatment facility and a range of ecological restoration and offsite works projects that are planned to improve the connection between infrastructure, the community and the environment. The IIWWTP Projects are the largest capital program undertaken by Metro Vancouver, a federation of 23 municipalities, one electoral area and one treaty First Nation that collaboratively plans for and delivers regional-scale services.

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### NYC delivers two miles of new sewers and water mains in Queens

The New York City Department of Environmental Protection and NYC Department of Design and Construction announced the completion of a \$24 million project to improve street conditions, alleviate flooding and upgrade infrastructure in the South Jamaica and St. Albans neighborhoods of Queens. The project, which was completed one year ahead of schedule, was funded by DEP and was managed by DDC. The project is part of a \$2.5 billion investment made by the city to improve neighborhoods throughout Southeast Queens. The program consists of 44 projects overall, including 18 that are substantially completed and three that are in active construction.

### Themec announces new sales director

Themec welcomed Brian Cheshire as its new sales director of water and wastewater. Cheshire, a 20-year veteran in the coatings industry, will focus on the overall market strategy and sales activity for this market. Cheshire's hire comes after the former sales director, Vaughn O'Dea, was promoted to director of Epoxytec, a subsidiary of Themec.



Brian Cheshire

### DIY Digital Marketing Playbook launched

Suzan Chin-Taylor, wastewater and trenchless technology industry author, keynote speaker and host of the DooDiva's Smells Like Money podcast, announces the launch of the *DIY Digital Marketing Playbook for Wastewater Pros*. This e-course and coaching program is for contractors and manufacturers in the wastewater industry who want to understand how digital marketing works and learn to use it to increase sales and attract ideal clients and talent in order to thrive — not just survive — in the new virtual selling environment. For more information, visit The TUIT Group Educational Products Portal. **tpo**



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Foley, AL



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

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# Clarifiers, Digesters, Water Towers, Structures and Components

By Craig Mandli

## Buildings/Structures

### LEGACY BUILDING SOLUTIONS TENSION FABRIC BUILDINGS

Combining rigid-frame engineering with the proven benefits of tension fabric membranes, Legacy Building Solutions offers fabric structures that are fully customizable. They utilize a durable rigid frame in place of the hollow-tube, open web truss "hoop" framing traditionally used for fabric structures. The strength of the structural steel frame provides several engineering advantages, most notably the ability to easily customize buildings to the exact width, length and height required. In addition to long clear spans, the buildings have straight sidewalls that maximize the usable square footage inside the structure. The design allows for much more structural flexibility than traditional fabric structures, including the ability to add lean-tos, mezzanines, side-wall doors and more. The structures are also engineered to provide desired overhangs or handle additional loads for items such as sprinklers and conveyors. **877-259-1528; [www.legacybuildingsolutions.com](http://www.legacybuildingsolutions.com)**



Fabric structures from Legacy Building Solutions

## Clarifiers

### LAKESIDE SPIRAFLO

The Spiraflo clarifier from Lakeside is a peripheral feed clarifier designed for the removal of suspended solids in a primary, secondary or tertiary clarification system. Wastewater enters the outer 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.



Spiraflo clarifier from Lakeside

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](http://www.lakeside-equipment.com)**

### SMITH & LOVELESS MODEL R OXIGEST

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 tank-age 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](http://www.smithandloveless.com)**



Model R OXIGEST treatment system from Smith & Loveless

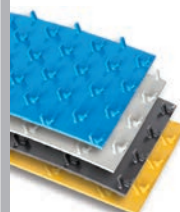
## Clarifier/Digester/Tank Cleaning

### ENVIRONMENTAL CHEMICAL NATURAL D

Natural D from Environmental Chemical is a bio-based liquid bacterial concentrate that combines eco-benign chemistry and application-specific bacteria to offer a long-term approach to odor control. It contains protein, starch, cellulose, fat, oil and grease-digesting bacteria, eliminating the source of the odor instead of masking it. It converts the organics to carbon dioxide and water and combines chemistry with microbes. It also prevents accumulation of scum, grease and other organics. It is designed for use in sewage disposal traps, plants, sludge beds, manholes, catch basins, storm sewers, drainage ditches, grease traps, creek traps, creek and canals, city garage dumps, refuse cars and trucks, public market areas, landfill deodorization, leachate ditches and lift stations. **800-262-0458; [www.environmentalchemical.com](http://www.environmentalchemical.com)**



Natural D bacterial concentrate from Environmental Chemical



Sure-Grip liners from AGRU America

## Coatings and Linings

### AGRU AMERICA SURE-GRIP

Sure-Grip liners from AGRU America are made of HDPE, HDPE-el, PP, PVDF or ECTFE, and serve as a long-term alternative to spray-applied concrete protection products. The liners prevent concrete corrosion and degradation, can substantially extend the lifetime of a structure, and by preventing exfiltration and infiltration, they can provide direct protection for the environment. The liners have anchoring systems that enable construction in areas of significant backpressure. Unlike spray-applied liners, which have to be reapplied regularly due to cracking or delamination, these liners are long-lasting, and are designed to avoid the residuals cost often associated with concrete spray-on liners, which require tank emptying and cleaning every few years for reapplication. **843-546-0600; [www.agruamerica.com](http://www.agruamerica.com)**

### PPG PROTECTIVE & MARINE COATINGS RAVEN 405

The RAVEN 405 wastewater treatment coating system from PPG Protective & Marine Coatings has high physical strength and broad chemical resistance to stand up to severe, caustic environments. This ultra-high build epoxy lining system has Severe Wastewater Analysis Test-



RAVEN 405 wastewater treatment coating system from PPG Protective & Marine Coatings

ing certification and passed the Pickle Jar Test, as its thick film can withstand high hydrogen sulfide gases and other caustics, chemicals and acids found in a wastewater facility. Applications include concrete wastewater lining, clarifiers and digesters, tunnels and pipelines, tanks, secondary containment and manholes. Benefits include corrosion resistance, 100% solids, ultra-low VOC (0.52 g/L), adhesive strength, and quick return-to-service. It can protect new concrete or help rehabilitate an existing structure. 888-977-4762; [www.ppgpmc.com](http://www.ppgpmc.com)

## Digesters/Components

### HYDRO-THERMAL NON-OBSTRUCTING HEATER

Hydro-Thermal's Non-Obstructing Heater is suitable for heating and maintaining the digester's precise temperature (+/- 1 degree F) for improving methane production and sludge stabilization. It also eliminates hot or cold spots in the digester, even during the winter months. It utilizes a small footprint, with direct installation into the existing piping. It is produced using wear and corrosion-resistant metallurgies to withstand grit and highly abrasive materials. Its straight-through design can ensure that rags or wipes do not get caught and plug the heater. With its unrestricted flow there are minimal pressure drops, allowing for a wide range of heating capacity. The heaters have no hot surfaces where burn-on can begin to occur. 800-952-0121; [www.hydro-thermal.com](http://www.hydro-thermal.com)



Non-Obstructing Heater  
from Hydro-Thermal



## Media

### KRUGER USA ANOX K5 MEDIA

ANITA Mox is a sidestream deammonification technology that is offered in both MBBR and integrated fixed-film activated sludge configurations,

Anox K5 Media from Kruger USA

depending on site conditions. As such, the system consists of engineered polyethylene carriers — Anox K5 Media from Kruger USA — to provide ample protected surface area for biofilm to thrive. The media (approximately the diameter of a quarter) hosts two types of bacteria in the same reactor. The outer layer consists primarily of ammonia oxidizing bacteria, which convert about half of the ammonia to nitrite. The inner layer consists mainly of anaerobic autotrophic ammonia oxidizer bacteria, which utilize the resulting nitrite and much of the remaining residual ammonia and convert them to nitrogen gas that is released harmlessly to the atmosphere. 919-677-8310; [www.veoliawatertechnology.com](http://www.veoliawatertechnology.com)

## Mixers

### JDV EQUIPMENT NOZZLE MIX SYSTEM

The Nozzle Mix System from JDV Equipment is a dual-zone mixing technology that provides uniform mixing patterns that produce even distribution and a stable environment. It can help optimize solids suspension and contact to promote efficiency in a wide range of applications. The system is designed with



Nozzle Mix System  
from JDV Equipment

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## product focus *(continued)*

pumps installed outside the tanks to facilitate ease of maintenance. The pumps are typically chopper pumps or pumps incorporating in-line grinders that prevent fibrous materials from accumulating and causing plugging problems. The application dictates which type(s) of the many varied pump options can be used. The high-velocity nozzles are mounted inside the tank and are oriented to discharge in a flow pattern that completely mixes the tank contents. **973-366-6556; [www.jdvequipment.com](http://www.jdvequipment.com)**

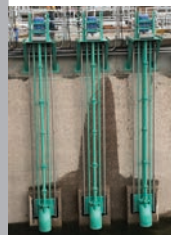
### **PARK PROCESS VORTAFLO**

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](http://www.parkprocess.com)**



**VortaFlo static mixer  
from Park Process**

### **VAUGHAN TURBO-S MIXER**



**Turbo-S Mixer from Vaughan**

The Turbo-S Mixer from Vaughan is a small, powerful propeller mixer that is mounted vertically inside an 18-inch elbow and is capable of mixing a pit with just 2 feet of liquid above the floor. It incorporates an upper cutter above the propeller to stop wrapping and fibrous material binding to protect the mechanical seal. It can be used in dairy manure mixing and in municipal treatment plant anoxic zone mixing and oxidation ditches. It can be quickly imple-

mented in primary influent channels, Bardenpho basin mixing, scum blanket mixing and primary sludge storage mixing. Additionally an optional turntable can allow it to be easily reaimed in the pit. **888-249-2467; [www.chopperpumps.com](http://www.chopperpumps.com)**

## **Tanks**

### **IMPERIAL INDUSTRIES 12,500-GALLON STORAGE TANK**

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](http://www.imperialind.com) tpo**



**Storage tank unit from  
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By Craig Mandli

## Press moves discharge permit approval, reduces costs

### Problem

Dave Hapchuk owns and operates a septage receiving facility where he pretreats septage from his operation and seven others southwest of Pittsburgh. With tightening restrictions, effluent quality was threatening his permit renewal: "I was lying awake trying to figure out how to make sure we'd get our discharge permit renewed. I wanted to lower my surcharges by sending a better quality of water to the city plant."

### Solution

The solution came with a **Fournier Rotary Press**. After screening, grit removal and settling in tanks, sludge is pumped to the dewatering system. The cake comes out as 30-44% solids bricks, which drop from the press in a roll-off container for trucking to landfill.



#### RESULT:

The press captures over 95% of suspended solids. "That was one of the things that moved our new permit for discharge along a lot faster," Hapchuk reports. **800-463-6328; [www.fournierdewatering.com](http://www.fournierdewatering.com)**

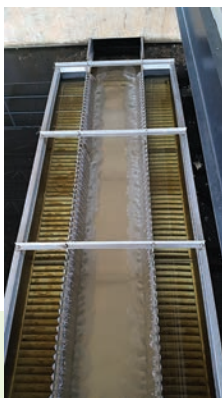
## Combined gravity settler and continuous backwash sand filter provide enhanced nutrient removal

### Problem

With increasing population and tighter nutrient regulations, a municipal wastewater treatment facility in Georgia needed help to meet a discharge permit level of 0.14 mg/L phosphorus. The facility treats an average of 5 mgd of primarily domestic wastewater along with influent from a poultry processing plant. Effluent is discharged to the Little River.

### Solution

After on-site pilot testing, the community chose an integrated design with a **Lamella Gravity Settler** and **DynaSand Continuous Backwash Media Filter (Parkson Corp.)**. Chemically conditioned wastewater from a sequencing batch reactor is directed to four basins with four sets of Lamella plate packs. The settler in the plate pack configuration serves as a secondary clarifier and has a small footprint. With EcoFlow technology, a 25% increase in settling area can be realized due to 100% utilization of the plate surface area. Clarified water is essentially free of TSS, and phosphorus removal exceeds 91%. The water then flows by gravity to the DynaSand deep-bed filter modules for polishing. The filter requires low power and eliminates ancillary backwash equipment.



#### RESULT:

The integrated design delivers water at less than 0.1 mg/L ammonia and less than 0.07 mg/L phosphorus with turbidity less than 0.5 NTU. The plant consistently outperforms its NPDES limits on BOD, total nitrogen, phosphorus, and turbidity. **888-727-5766; [www.parkson.com](http://www.parkson.com)**

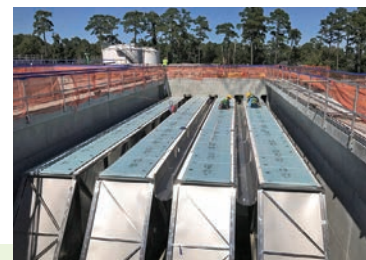
## City increases daily water capacity from 80 to 400 million gpd

### Problem

Serving one of the fastest-growing metro areas in the United States, the Houston Northeast Water Purification Plant needed to drastically expand its water capacity to support residential and commercial growth and reduce dependency on groundwater.

### Solution

The Houston Waterworks team chose **Jim Myers & Sons** for the expansion. The design of the **Mega-SETTLER plate settler system** enables increased water capacity in 50-75% less space than conventional settling tanks.



#### RESULT:

The technology increased capacity from 80 to 400 mgd while dramatically reducing the footprint of the sedimentation basin. This is the largest plate settler project in the world. When complete, it will have used over 4 million pounds of stainless steel to build over 50,000 individual settling plates. **704-554-8397; [www.jmsequipment.com](http://www.jmsequipment.com)**

## Mixer installed in reservoir to maintain equal temperatures

### Problem

The Reading Area (Pennsylvania) Water Authority in sought to mix a 15 million-gallon water reservoir (300 feet in diameter) to maintain equal temperature and chlorine residual throughout. The system needed to be in its own all-weather enclosure.

### Solution

**Pulsed Hydraulics** designed a **system** with 16 bubble-forming plates located in the tank as determined by the CFD model. The system included two PHI-500 enclosures that each house PHI 360 components and a 15 hp compressor. Two compressors connected and controlled by the company's software limit the start surge power to keep the plant's outdated electrical infrastructure from overloading.



#### RESULT:

Temperature readings from predetermined test points showed a differential of 0.1 degree F between all test locations. Before mixer installation and start-up, the reservoir water was stratified and readings showed a 6 degree F temperature variance. **800-641-1726; [www.phiwater.com](http://www.phiwater.com)**

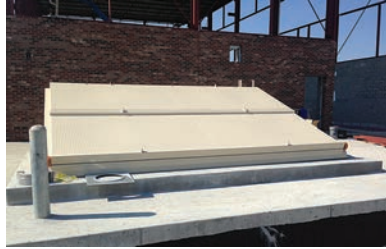
## City seeks cake storage solution for water reclamation facility

### Problem

When designing a new biosolids drying facility, the Des Plaines (Illinois) Water Reclamation Facility staff wanted the ability to process dewatered cake from their own facility and from external sources. With limited space and specific volume requirements, they needed a custom cake storage solution.

### Solution

**Schwing Bioset** worked with the community to meet the challenges of receiving, moving and storing dewatered biosolids for the dryer. The company manufactured a **custom-designed receiving bin** with a push floor design to receive the outside cake. The bin includes a safety screen to keep large tramp material from entering and a bifold cover to contain odors. A hydraulically driven push floor feeds cake to the pumps with. The main storage silo in the plant collects dewatered cake from the receiving bin and from dewatering to feed to the dryer. The main storage silo uses sliding frame technology similar to the push floor but with a single frame constructed of carbon steel to feed cake to the discharge.



#### RESULT:

The dryer operates continuously and smoothly with buffering storage provided by the receiving and storage bins without additional operators or maintenance staff. 715-247-3433; [www.schwingbioset.com](http://www.schwingbioset.com)

## Design-build approach includes cost-effective media

### Problem

East Cherry Creek Valley in Colorado sought a cost-effective media and filter system to provide groundwater treatment.

### Solution

**Tonka Water, a Kurita America Brand**, installed a groundwater treatment plant with a fully automated **OptaCell Plus horizontal pressure filter system** for the removal of iron and manganese. The facility includes two high-rate 1,400 gpm media filters with Iron-Man media pre-conditioning, providing operational flexibility, allowing operators to isolate individual cells within the vessel when needed. This also enables a cell to be taken offline for backwash while keeping the plant operating at full capacity. A **Simul-Wash backwash system** saves up to 50% of backwash water waste. The filters have isolated cell compartments above and below the underdrain, with a total of four individual filter cells. This enables individual cells to be backwashed or taken completely offline while the others remain in service.



#### RESULT:

The plant has performed beyond expectations since its startup. 866-663-7633; [www.kuritaamerica.com](http://www.kuritaamerica.com)

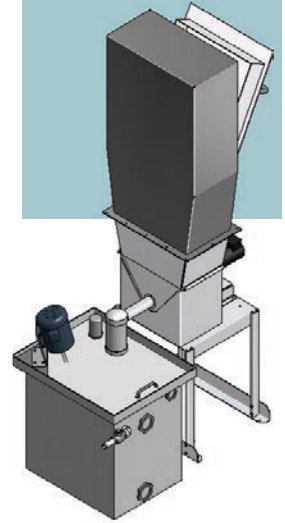
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## Belt dryer reduces 1,300 miles of biosolids hauling risks

### Problem

The city and bureau of Juneau, Alaska, produces 7,000 wet tons of dewatered biosolids per year. The material hauled 1,300 miles via truck, barge and train to the Columbia Ridge landfill in Arlington, Oregon. This transport poses multiple risks and costs, and the city faced uncertainty over environmental regulations.

### Solution

With geographic challenges, limited transportation options, an unpredictable climate, and lack of specialized support services, the city needed a stable, long-term biosolids solution to meet U.S. EPA guidelines. The city chose the **BioCon medium-temperature belt dryer (Veolia Water)**. The resulting Class A EQ material provides pathogen reduction and diversifies the range of end uses including reuse as landfill cover, fertilizing community sites and parks, erosion control, and topsoil replacement. These options also offer potential for much lower end-to-end cost versus shipping wet solids to landfill.



#### RESULT:

The dryer is designed for 36 wet tons per day and produces 5.5 tons of dried product, an 85% reduction in volume and weight. Other benefits include less truck traffic, lower emissions and reduced noise. 919-677-8310, [www.veoliawatertech.com](http://www.veoliawatertech.com) tpo



## people/awards

The **City of Harrisonburg Water Treatment Plant** received a Silver Water Treatment Plant Performance Award from the Virginia Department of Health.

**Illinois American Water** received four 20-Year Directors Awards from the Partnership for Safe Water program, and the Wendell R. LaDue Utility Safety Award from the AWWA.

The **City of Thomasville Water Treatment Plant** received a Platinum Award from the Georgia Association of Water Professionals for a full year of meeting or exceeding compliance standards with all Safe Drinking Water Act requirements.

**Dr. Jack Kiefer**, senior associate with Hazen and Sawyer, received a 2022 Dr. Pankaj Parekh Research Innovation Award from the Water Research Foundation. The foundation also gave three Outstanding Subscriber Awards for Applied Research to the **Metropolitan Wastewater Reclamation District of Greater Chicago, Gwinnett County (Georgia) Water Resources and EPCOR Water Canada**.

**Karl Linden**, the Mortenson Professor in Sustainable Development in the Department of Civil, Environmental and Architectural Engineering at the University of Colorado Boulder, was named a 2022 Fulbright Scholar. The fellowship will allow him to research solutions to water pollution in rural and First Nations communities in Canada.

**John Estrada** and **Pauline Estrada**, siblings from Clovis North High School in California, won the 2022 U.S. Stockholm Junior Water Prize from the Water Environment Federation for their project on conservation of irrigation water using a drought assessment tool powered by artificial intelligence.

The **Cadiz (Ohio) Water Treatment Plant** was renamed the **Thomas H. Carter Water Treatment Plant** in honor of Carter, a 30+ year employee who recently died of cancer.

Maine Water honored **Kirby Littlefield** for his career as an operator of the former water treatment facility that served Biddeford, Saco, Old Orchard Beach and Scarborough's Pine Point. Littlefield retired on May 12, 56 years after the day he started with the former Biddeford Saco Water, straight out of high school.

**Nicole Van Aken**, lab manager at the Fairfield-Suisun Sewer District in California, received the Arleen Navarret Award from the Bay Area Clean Water Agencies.

The National Association of Clean Water Agencies recognized two Pima County (Arizona) wastewater treatment facilities for exceptional performance. **Green Valley Water Reclamation Facility** and **Mount Lemmon Water Reclamation Facility** earned the Platinum Peak Performance Award.

**Jannette Whitcomb** is the new environmental health manager of Garfield County (Colorado) Public Health, replacing Joshua Williams.

**Alan Zerbato**, public works superintendent in Lee, Massachusetts retired after serving the town for 36 years. He served as superintendent for the past

## events

### Oct. 2-4

Southwest AWWA Section Annual Conference and Exposition, Embassy Suites Northwest Arkansas, Rogers. Visit [www.swawwa.org](http://www.swawwa.org).

### Oct. 2-5

Atlantic Canada AWWA Section Annual Conference, Hilton Saint John, New Brunswick. Visit [www.acwwa.ca](http://www.acwwa.ca).

### Oct. 3-21

AWWA High-Tech Operator Course 2, online. Visit [www.awwa.org](http://www.awwa.org).

### Oct. 4-6

WaterSmart Innovations Conference and Exposition, South Point Hotel, Casino and Spa, Las Vegas. Visit [www.watersmartinnovations.com](http://www.watersmartinnovations.com).

### Oct. 5-7

Intermountain AWWA Section Annual Conference, Uintah Conference Center, Vernal, Utah. Visit [www.ims-awwa.org](http://www.ims-awwa.org).

### Oct. 5

AWWA Federal Financing Helps Utility Address Affordability Challenges webinar. Visit [www.awwa.org](http://www.awwa.org).

### Oct. 8-12

Water Environment Federation WEFTEC 2022, Ernest N. Morial Convention Center, New Orleans. Visit [www.weftec.org](http://www.weftec.org).

### Oct. 11-13

North Dakota AWWA Section Annual Conference, Ramkota Hotel, Bismark. Visit [www.awwand.org](http://www.awwand.org).

### Oct. 12

AWWA Implementing Biological Treatment Processes in One Water Applications webinar. Visit [www.awwa.org](http://www.awwa.org).

### Oct. 17-Nov. 18

Water Treatment Operator Level 3, online. Visit [www.awwa.org](http://www.awwa.org).

### Oct. 19-20

AWWA OpShow: Practical Ideas for Water and Wastewater Operations, online. Visit [www.awwa.org](http://www.awwa.org).

### Oct. 23-26

California-Nevada AWWA Section Annual Conference, SAFE Credit Union Convention Center, Sacramento. Visit [www.ca-nv-awwa.org](http://www.ca-nv-awwa.org).

### Oct. 24-Nov. 11

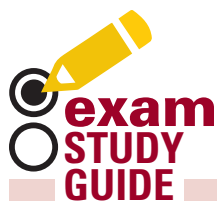
High-Tech Operator Course 3, online. Visit [www.awwa.org](http://www.awwa.org).

### Oct. 25-27

Garfield County Public Health Iowa AWWA Section Annual Conference, Coralville. Visit [www.awwa-ia.org](http://www.awwa-ia.org).

three years and was previously chief operator of the town's wastewater facility. During that time, Zerbato and his team were recognized for having one of the top facilities in the state. The town renamed the road to the wastewater treatment plant Alan Zerbato Way.

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## WASTEWATER

By Rick Lallish

What test is done on influent and effluent samples to determine the volume of solids removed in clarifiers or ponds? What apparatus is used to run this analysis?

- A. Total suspended solids, crucibles
- B. Acid-to-alkalinity, beakers
- C. Settleable solids, Imhoff cones
- D. Settleability, settleometers

**ANSWER:** C. The settleable solids test is done using the Imhoff cones. The test measures the volume of settleable solids in one liter of sample that settles to the bottom in a one-hour period. The test may be done on influent or effluent and in clarifiers or settling tanks. The test should not be confused with the settleability test done on MLSS in activated sludge plants. More information may be found in the OWP, CSU-Sacramento textbook *Operation of Wastewater Treatment Plants*, Volume II, seventh edition, Chapter 16.

## DRINKING WATER

By Drew Hoelscher

What is the percent strength in the solution mixing tank if an operator adds 96 gallons of chemical to 700 gallons of water?

- A. 13.7%
- B. 12.1%
- C. 8.3%
- D. 7.3%

**ANSWER:** B. It is common for a water operator to be tasked with making chemical dilutions at a treatment facility. In most cases this task is relatively simple, but an opportunity for error presents itself anytime chemical dilutions are performed.

$$(\text{Chemical gallons} / \text{Total gallons}) \times 100 = \% \text{ strength}$$

$$(96 \text{ Chemical gallons} / 796 \text{ Total gallons}) \times 100 = 12.06\% \text{ strength}$$

### ABOUT THE AUTHORS

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



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