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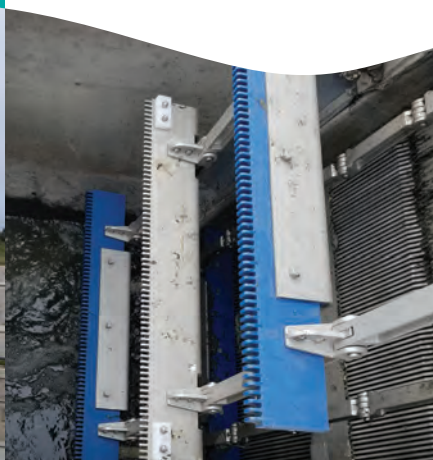
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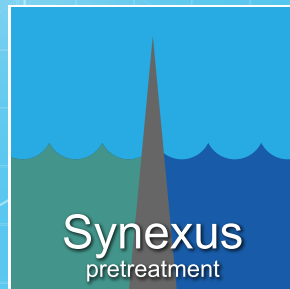
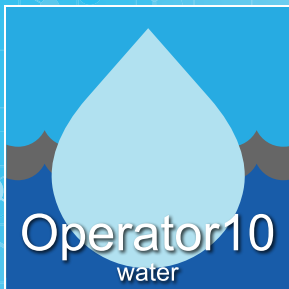


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let's be clear

## It's All Connected

THE WATER QUALITY-QUANTITY NEXUS IS ANOTHER ILLUSTRATION OF HOW WATER IS INTIMATELY LINKED WITH MULTIPLE ASPECTS OF LIFE ON EARTH

By Ted J. Rulseh, Editor



It seems water is a lot more important and integral to life than we routinely think.

Some years ago, scientists began talking about the water-energy nexus — the idea that it takes water to produce energy and energy to produce water. For example, electric power plants require vast amounts of water for cooling, and meanwhile water and wastewater treatment plants are major consumers of energy.

Next to gain attention was the water-food-energy nexus — the idea that farming is the largest consumer of the world's freshwater and that more than one-fourth of the energy used globally is spent on food production and supply.

The latest iteration of this concept is the water quality-quantity nexus. Much has been said and written about global water scarcity — how hundreds of millions of people live in areas where water supplies are severely limited.

### CLOSE CONNECTION

Current thinking holds that, often, water quality and water quantity are intimately connected. For example, a river flowing past a community could be an abundant source of water for all domestic purposes, but it's not if that water is severely polluted and the community lacks the money and facilities to clean it.

Or, in the case of groundwater, sometimes after too much pumping from an aquifer, the levels of natural compounds grow dangerously high as the amount of water diminishes. Other times, as in coastal areas, excessive pumping drops the water table to below sea level and then saltwater intrudes, making the water unfit for drinking and even for irrigation.

These issues are by no means limited to developing countries. In fact, the water quality-quantity nexus is very much on the radar of the National Association of Clean Water Agencies. The organization projects that water issues in the arid West and the Southeast will become more acute with climate change and the growing demand for water.

One example of the problem is the Rio Grande on the Texas-Mexico border. The concentrations of agricultural and industrial pollutants increase markedly during the low-flow summer season. Pathogen levels can increase nearly one-hundredfold during that time of year.

### NEW APPROACHES

The connection between quality and quantity suggests new approaches to expanding and improving water supplies. For example, according to the Columbia Water Center at Columbia University, approaches that use conservation to extend supplies could be more cost-effective than traditional methods that aim to improve the quality of diminishing supplies.

For example, conservation initiatives that reduce demand on aquifers could enable groundwater levels to rise, helping to prevent saltwater intrusion and lowering concentrations of harmful natural contaminants.



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NACWA, according to a policy statement on its website, is working on these issues through its national policy agenda and collaboration with local, state, regional and national organizations. For example, NACWA is addressing the emerging challenge of salinity.

“Across the country, there is a growing national trend in freshwater salinization from road salt application, water reuse, desalination, water softeners and high natural background levels,” the statement says. The association is working with U.S. EPA staff to discuss how that trend is affecting municipal water agencies.

In addition, NACWA has developed a concept paper along with the Western Coalition of Arid States. Roundtable discussions with various stakeholders in the Southwest revealed that many water-quality and -quantity challenges extend well beyond those states’ borders “and thus demand a greater national focus.”

## LOOKING DEEPER

The water quality-quantity nexus is another reminder of how interconnected water is with every phase of human life and our societies and how by looking deeper we can devise more effective and more diverse solutions to water problems.

This concept is summed up well in a paper co-authored by Thushara Gunda, a scientist at Sandia National Laboratories. The paper, *Water security in practice: The quantity-quality-society nexus*, states, “As precipitation patterns shift, and as water is ever more intensively exploited, managing water resources in an integrated manner will be increasingly imperative to ensure water security in the future. ... Successful management of water resources needs to account for water quantity and water quality aspects of the physical resource as well as associated societal dimensions of both.”

You can learn more about NACWA’s work around this issue at [www.nacwa.org/advocacy-analysis/campaigns/water-quality-nutrients-nonpoint-source-issues](http://www.nacwa.org/advocacy-analysis/campaigns/water-quality-nutrients-nonpoint-source-issues). tpo

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## TPO PODCAST

### Process Control Strategies

Check out the debut of *TPO*'s podcast! The first episode features editor Ted Rulseh talking with special guest Ron Trygar of the University of Florida Training, Research and Education for Environmental Occupations (UF TREEO) Center about process control strategies. Trygar shares with listeners some practices that help optimize operations for the best effluent quality, and how to listen to what the plant is telling you.

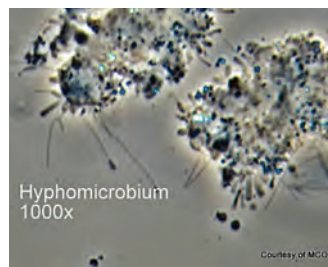
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## BUG OF THE MONTH

### Meet *Hyphomicrobium*

In this edition of *TPO*'s ongoing series Bug of the Month, readers get to take a peek under the microscope at *Hyphomicrobium* and learn about how it can indicate wastewater septicity. *Hyphomicrobium* are a genus within the Proteobacteria phylum, and over 30 individual species have been identified.

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## “OVERHEARD ONLINE

“We’re not just interested in seeing if the virus is in the wastewater — it undoubtedly will be. We want to know what happens to the virus in wastewater and biosolids.”

*Researchers to Examine COVID-19 Virus in Biosolids*  
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## COVID-19 FIGHT

### Wastewater Testing Is Critical

Almost certainly you’ve seen headlines about wastewater treatment plants around North America joining the fight against COVID-19 by testing wastewater in an effort to predict viral hotspots. In this online exclusive article, read about how our industry is well positioned to be a key player in the fight through this kind of routine testing during the pandemic.

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# A Home Run of an Upgrade

A TOTAL TEAM EFFORT HELPED AN ILLINOIS PLANT UPGRADE TO A NEW BIO-P PROCESS AND MAKE OTHER IMPROVEMENTS WHILE SUSTAINING OPERATIONS AND PERMIT COMPLIANCE

STORY: **Jim Force** | PHOTOGRAPHY: **Miles Boone**



The team at the Main Wastewater Treatment Facility includes, from left, Christina Smith, Dan Massa, Chris Rebone, Richard Wadda, Samantha Metallo, John Huver and Steven O'Neil.

**H**ow do you accommodate a two-year upgrade of a treatment plant, change over to new processes, keep staff abreast and involved, and maintain effluent compliance — all while dodging contractors, engineers and equipment suppliers?

In St. Charles, Illinois, Chris Rebone, wastewater division manager, says it takes a proactive and patient approach, open communication between departments, and the willingness to make mistakes and learn from them.

He should know. From 2017 to 2019, the city's Main Wastewater Treatment Facility underwent a game-changing renovation that added a new biological phosphorus removal process, rehabilitated the digestion and biogas systems, and added other new equipment and processes.

Rebone gives credit for the successful transition to his staff of Samantha Metallo, assistant division manager; Dan Massa, John Huver, Steven O'Neil and Steven Streich, certified wastewater operators; James Smith, wastewater technician; and Richard Wadda, laboratory technician.

"It took a lot of ingenuity on their part," he says. "I can't thank our people enough for their due diligence and attention to detail. They accepted the challenge and ran with it."

“I can't thank our people enough for their due diligence and attention to detail. They accepted the challenge and ran with it.”

**CHRIS REBONE**

### EXTENSIVE UPGRADE

The Main Wastewater Treatment Facility is one of two at St. Charles. The Westside plant treats 0.6 mgd on average and has a 0.7 mgd design capacity. The Main facility (9 mgd design, 7 mgd average) has Muffin Monster screens (JWC Environmental) in the influent pumping stations, followed by primaries, biological treatment, final clarification and UV disinfection (TrojanUV). Effluent discharges to the Fox River.

Biosolids are stabilized in a pair of egg-shaped digesters (Walker Process Equipment, A Div. of McNish Corp.), dewatered on Alfa Laval centrifuges, stored at the Westside plant and spread on corn and soybean fields in fall. Biogas powers the plant's Walker Process Equipment boiler and heat exchanger system.

New state-imposed phosphorus removal requirements led the city to undertake the \$17 million plant upgrade to biological phosphorus removal. Rebone says it made sense to rehabilitate the digesters and

## Main Wastewater Treatment Facility

St. Charles, Illinois

[www.stcharlesil.gov](http://www.stcharlesil.gov)

BUILT:  
**1956; upgraded 2017-19**

POPULATION SERVED:  
**35,000**

FLOWS:  
**9 mgd design,  
7 mgd average**

TREATMENT LEVEL:  
**Secondary**

TREATMENT PROCESS:  
**Anaerobic-anoxic-oxic (A2O)  
biological phosphorus removal**

RECEIVING STREAM:  
**Fox River**

BIOSOLIDS:  
**Land-applied**

BUDGET:  
**\$5.1 million (operations)**

biogas system while the rest of the plant was under construction: “We thought it best to do everything at once.” The project involved:

- Converting to a three-stage anaerobic-anoxic-oxic (A2O) system, with aerobic, anoxic and anaerobic zones for biological phosphorus removal
- Adding a new internal recycle pump station
- Adding a primary sludge fermenter
- Adding ferric chloride for chemical polishing
- Replacing a sludge storage tank and installing a new biogas storage tank
- Rehabilitating the digester piping and operation systems
- Upgrading the biogas system

## CLEARING THE HURDLES

Plant management had to install these improvements on the fly. The challenge was double-edged: maintain compliant operations during construction and be able to operate the new processes once the project was complete.

“We had to operate for a long time without our full biological system available to us,” Rebone says. Day-to-day operation was maintained, and the plant continued to nitrify while the new anaerobic and anoxic zones were being installed in the existing aeration basin.

“We were upgrading our air system, as well as adding new dissolved oxygen probes and blowers so we could operate our new aerobic zone with DO



Samantha Metallo, assistant division manager, was part of a renovation that added rehabilitated digestion and biogas systems and other new equipment and processes.

## Main Wastewater Treatment Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
<b>BOD</b>	157 mg/L	2 mg/L	20 monthly average
<b>TSS</b>	168 mg/L	3 mg/L	25 monthly average
<b>Ammonia</b>	18.45 mg/L	0.067 mg/L	Seasonal daily maximums from 1.4 to 3.4 mg/L
<b>Phosphorus</b>	4.9 mg/L	0.881 mg/L	<1 mg/L rolling monthly average

control,” Rebone says. “It was the middle of summer. That made it a challenge to continue to nitrify during construction and comply with our permit. The impact of restricted airflow also had an impact on our DO levels.”

That’s where the plant’s lab was critical. “We used Hach hand-held meters to monitor DO throughout the plant,” Rebone says. “The lab staff sampled DO at the tail end of the process. The lab took a harder look at sidestreams and their impact on our influent loading. They worked hand-in-hand with our operations staff. They went above and beyond the call.”

The staff also closely managed mixer speeds to maintain the minimum ORP values and optimized sludge age to maintain the required nitrification in the face of short solids retention times. Through these and other measures, the plant met its effluent permit of 98% removal of BOD, TSS and ammonia throughout construction.

## LEARNING CURVE

While the new processes returned the plant to full biological treatment capacity, they also presented the team with much to learn.

“They had to learn a completely new process,” Rebone says. “Only one or two other plants nearby use the A2O process for phosphorus removal. Our operators took part in training and helped with standard operating procedures on their own time.”

The new process includes the anaerobic zone where phosphorus is released (1.5-hour detention time), an anoxic zone (three-hour detention time) and an aerobic zone with luxury phosphorus uptake (eight-hour detention time).

*(continued)*



Christina Smith takes care of a variety of tasks in the laboratory, which played a critical role in guiding the plant’s process changes.

A large-scale view of the AquaPrime filtration system, showing multiple rows of green, fibrous cloth media mounted on a rotating metal frame. The system is designed for efficient water filtration.

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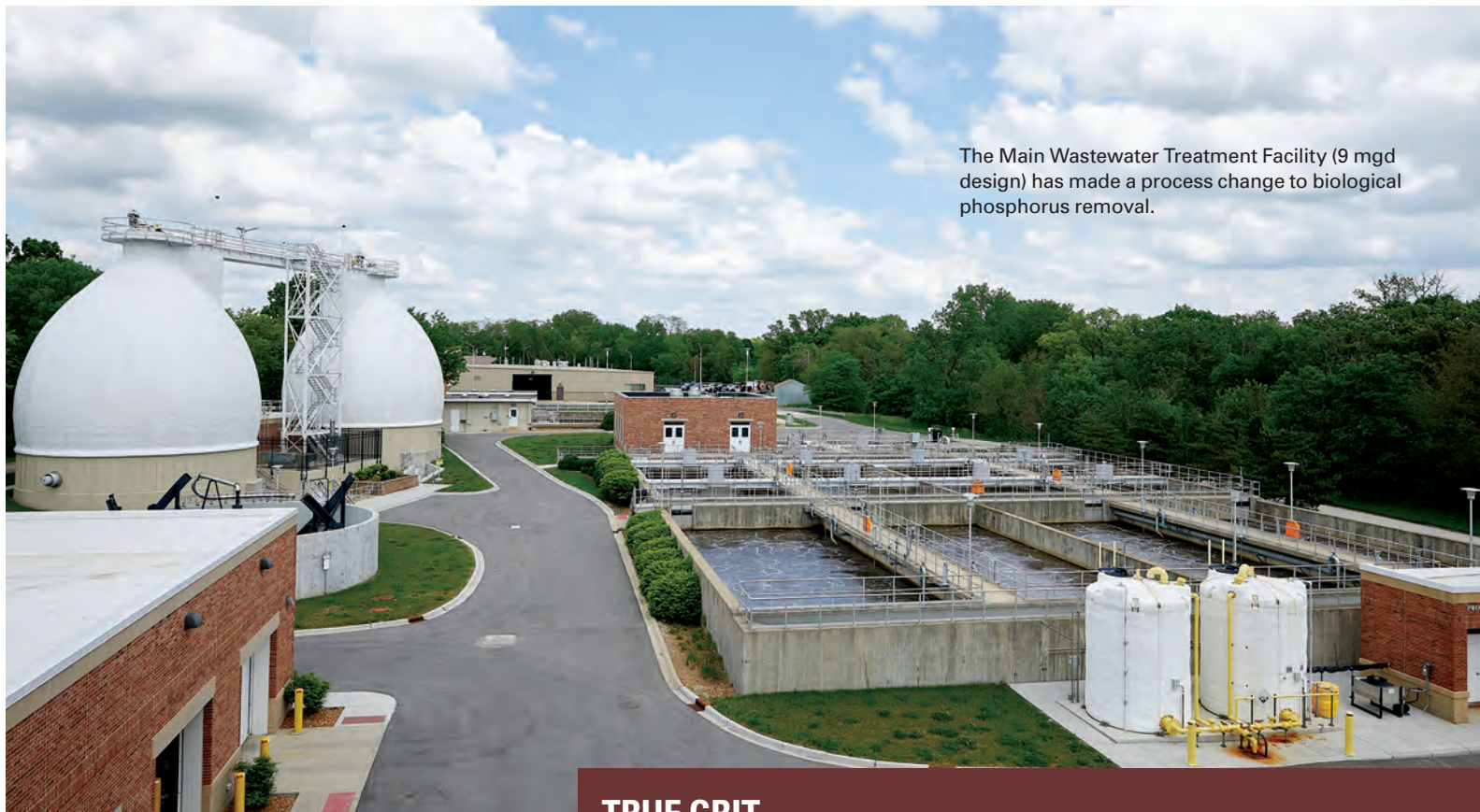
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The Main Wastewater Treatment Facility (9 mgd design) has made a process change to biological phosphorus removal.

“The Main Wastewater Treatment Facility is changed for the better, and the staff is better for it. If any plant deserves an award, it’s this one.”

**JERRY RUTH**

Mixers from Philadelphia Mixing Solutions keep the anaerobic zone solids in suspension.

The aeration system incorporates Atlas Copco blowers and new DO probes (Hach LDO with Hach SC200 controller) to enable operation of the aerobic zone with DO control. An internal recycle pump station recycles 200% of the influent flow to the anaerobic zone, optimizing peak flows and loads to balance denitrification with phosphorus removal.

At the end of the aerobic zone, ferric chloride is fed by peristaltic pumps (Blue-White Industries) to chemically polish the effluent. The final clarifiers follow, and the overflow passes on to the UV disinfection units.

The staff experimented with mixing speeds to obtain optimum ORP levels for the new anaerobic/anoxic conditions. In addition, DO had to be balanced in the aerobic zone to reduce the amount recycled with the return activated sludge.

### THE SOLIDS SIDE

More lessons were learned with the new primary sludge fermenter. The unit enhances biological phosphorus removal by producing volatile fatty acids and encouraging phosphorus to be incorporated in the cell biomass and removed through sludge wasting. With a detention time of three days, the biomass undergoes hydrolysis, along with acetogenesis and acidogenesis (biological processes that enhance the production of volatile fatty acids).

## TRUE GRIT

St. Charles, Illinois, faced a gritty problem when its new anaerobic-anoxic-oxic (A2O) treatment process started up. Before the digested biosolids storage tank was brought online, material was drawn directly from the bottom of the digesters using the centrifuge feed pumps.

Staff members noted that substantially more grit was forming in the digester bottoms and was creating vibration and imbalance when it got to the centrifuges. In cleaning the centrifuges, operators noticed something different about the grit.

“The material appeared to be a blue-purple sand, and there was plenty of it,” says Jerry Ruth, consultant with Trotter and Associates. “It didn’t appear to be struvite, which is always a possibility when sludge from a biological nutrient removal process is digested.”

Analysis by a local university using X-ray powder diffraction and scanning electron microscopy found that the material was vivianite and baracite (crystalline iron phosphates) and some quartz. It apparently was a byproduct of biological phosphorus removal and polishing with ferric chloride.

Once the plant started withdrawing from the top of the digesters, the issue went away. That was a good thing, Rebhone notes: “Centrifuges are expensive.”

It all worked. Rebhone notes that the bio-P project wrapped up on time, and the plant began meeting its monthly rolling average of 1 mg/L phosphorus just two months later, ahead of permit requirement.

On the digester side, the upgrade completely refurbished both egg-shaped digesters, bringing the capacity of each to 464,000 gallons. The internal piping systems and general digester operations were upgraded. The pumping and heating systems were replaced, the biogas storage capacity was expanded, and a new Walker Process Equipment boiler and heat exchangers were added.

### CLOSE COORDINATION

Engineers and supervisors can’t accomplish such a complex project alone. Jerry Ruth, project manager for the Trotter and Associates engineering firm, says working through the many issues in the upgrade took extraordinary effort from city management, operators and laboratory staff.





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Steven O'Neil checks measurements using the WaterMaster flowmeter (ABB Inc. - Instrumentation). The plant staff is credited with the successful completion of a major facility upgrade.

"Through it all, they kept their positive attitude, cooperative approach and, most important, compliance with their permit," Ruth says. "The Main Wastewater Treatment Facility is changed for the better, and the staff is better for it. If any plant deserves an award, it's this one."

Rebone credits the city administration for "being ahead of the curve and pushing the project before it was too late. It doesn't always happen that those above you are willing to listen and take such a proactive approach." And he notes that upgrading on the fly requires patience and the acceptance of wrong moves.

"Almost every decision you make will be right, but it's good to be wrong sometimes," he says. "It forces you to relearn things and can lead you down a different road. Be confident in your treatment approach and have patience. It takes some time."

But the operations and lab staff came in for the most credit: "They knocked it out of the park." **tpo**



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# Bringing Clarity to Level Measurement

ULTRASONIC AND RADAR TECHNOLOGIES BOTH HAVE THEIR PLACE IN THE WATER AND WASTEWATER SECTOR. THE KEY IS TO PICK THE DEVICE THAT BEST SUITS THE APPLICATION.

By Herman Coello

If your head spins after reading how amazing one level measurement method is versus another, it may help you to understand the key attributes of the technologies and how they apply to specific processes.

In monitoring the level of clean or not-so-clean water — be it in filter beds, wet wells, lift stations, water towers, chemical tanks or open channels — ultrasonic technology emerges on top, followed by radar.

It's true that some level measurement challenges can be solved by more than one technology, and yet no single technology can handle every process. Ultrasonic level technology has been proven for decades in the water and wastewater industry. Even though both ultrasonic and radar technologies have the required muscle, ultrasonic instruments also have the intelligence to meet comprehensive needs.

It's true that some level measurement challenges can be solved by more than one technology, and yet no single technology can handle every process.

and considering that long-term performance should be the goal, why make major changes due to factors like ease of commissioning or cost? And if the price of a newer model is attractive, consider what it might lack in functionality. A lower-priced device may be limited to simpler functions.

## SIMILARITIES AND DIFFERENCES

Ultrasonic and radar are noncontacting technologies: They measure through air using the time-of-flight principle. A contacting technology is

It is not enough to simply compare the attributes of ultrasonic and radar devices; it is necessary to consider their features in the context of the application. For example, if choosing a device to monitor the level in a lift station and control pump operation, it won't help that radar transmitters can function in a vacuum and withstand high pressures and temperatures; none of these conditions exist in lift stations.

To gain clarity, it's best to evaluate whether a newer technology offers tangible benefits. If the current level measurement solution is reliable,



An ultrasonic controller and transducer interfaced by way of a transducer cable.

equivalent to the oil dipstick in a car. Capacitance and guided-wave radar are contacting level technologies.

A significant benefit of noncontacting instruments is that they are low maintenance. There's seldom a need to clean the transmitter section (the antenna, emitter, lens or transducer face), as the water level usually remains below the sensor by 10 inches or more. In a wet well or lift station, the clearance between the highest level and the sensor is usually several feet.

In certain applications, however, a buildup can occur. Water treatment facilities must deal with overflowing from storms or floods, and in such cases, the measuring devices can be submerged. In addition, condensation can form on the sensing area with large temperature swings, as from warm days and cold nights. In choosing, it is important to understand how ultrasonic and radar technologies deal with these conditions.

Under submergence, the best-case scenario for a level device is to consistently report a maxed-out level measurement, indicating the abnormality. However, many instruments yield random values when submerged and thus aren't reliable.

*(continued)*



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An ultrasonic level transducer measures the water level in a wet well.

With recent advances, some radar level transmitters fare better under these conditions, but the issue of buildup remains. A slight nonconductive buildup is not a problem, but a heavier buildup can trap more conductive debris, leading to signal degradation and random operation. Since radar transmitters generate electromagnetic waves with no electromechanical action, there is no inherent mechanism to reduce the accumulation.

Like radar transmitters, ultrasonic transmitters are compact, encapsulating the electronics and sensing mechanism in one instrument. They differ in having a receiver and transducer that can be separated from each other. In the case of a controller, only the fully sealed transducer is placed inside the process; no sensitive electronics are exposed to the conditions in a lift station, wet well or tank.

In addition, unlike radar transmitters, ultrasonic transducers create electromechanical action during ultrasonic wave generation. This action on the transducer face renders them inherently self-cleaning. Where submergence conditions are prevalent, transducers can be fitted with a shield or hood; the air trapped in the hood keeps debris from reaching the sensor face.

Also important: Due to the mechanical action, the signal signature during submergence can be differentiated from that during normal operation. Thus, the controller keeps the level locked at more than 100% to indicate the submergence event.

## ASSESSING ACCURACY

Some argue that radar technology is more accurate than ultrasonic because it is not affected by wind and since the speed of sound varies with changing temperatures. However, for more than 20 years, ultrasonic transducers have included integral temperature sensors, allowing the devices to correct for the speed of sound.

Still, it is a good practice to use protective covers to shield them from direct sunlight and avoid heating up the electronics. There is an error in level measurement for every degree change in temperature, but thanks to advances like digital filtering and signal processing algorithms, some ultrasonic controllers can deliver accuracies down to plus or minus 1 mm.

It takes several minutes for an ultrasonic level sensor to acclimate to a drastic temperature change, as when a unit is brought from storage to a significantly hotter or colder place, but thereafter it will consistently provide correct measurements.

Radar transmitter accuracy is also affected by the temperature of the electronics, and it too can be correlated to an error per degree change. Add to the mix the expansion and contraction of vessels and substances being measured, and millimeter differences in accuracy become trivial.

The key question is how crucial accuracy is in the context of the application. In general, tight accuracy is not overly important in water tanks, chemical tanks, lift stations, scum wells, filter beds or clarifiers. Most radar and ultrasonic instruments offer accuracies of 0.25% or better — good enough in the water and wastewater industry.

## THE COST FACTOR

In the past, radar technology was more expensive than ultrasonic since radar transmitters can be used in more demanding applications that require longer measurement ranges. However, the newest compact radar transmitters have decreased in cost and size, and their operating frequencies have increased significantly.

The clear benefit is that radar instruments operating in the 80 GHz range can produce a narrow signal without large antennas. In constricted, crowded spaces, a narrow beam suffers less degradation from interference. Radar transmitters can be set up quickly; in simple applications, they can be up and running in a few minutes.

Many newer radar transmitters can be connected to a controller for additional functionality, but doing so minimizes their cost advantage. A further complication is that some newer controllers designed to interface with low-cost radar transmitters are more basic than their advanced counterparts for both level and open-channel flow. Functions included with most advanced controllers but often lacking in more basic models include:

- Differential level
- Gate or screen control
- Smart pump control
- Volume calculation
- Energy-saving algorithms (pump operation during off-peak electricity rates)
- Fat ring reduction (in wet wells)
- Dual-point operation capabilities (solids and liquids, level and flow, or any combination)
- Multiple measurement ranges (transducer dependent)

Before committing to a lower-priced solution, it is important to consider what will be gained or lost and, thus, avoid creating gaps in functionality.

## CHOOSING WITH CARE

There is room for both ultrasonic and radar level measurement technologies in the water and wastewater industry. Ultrasonic devices have been relied on for decades and have evolved to meet market demands. Both technologies offer the benefit of low maintenance.

But in level measurement, there are other factors to consider. An understanding of the process and its unique challenges (submergence, buildup, condensation, pump demands) will provide the clues to selecting the ideal instrument.

Enticing attributes such as high accuracy and low cost should not be the sole deciding factors. The key is to be objective about what the challenge entails. When unsure, it is wise to work with a supplier who offers a well-balanced product portfolio, backed by years of experience that can provide much-needed clarity.

## ABOUT THE AUTHOR

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# The Rewards of Staying Put

TED MECKES DIDN'T HAVE TO LOOK FAR TO FIND HIS CAREER. HE'S RIGHT AT HOME AS THE AWARD-WINNING WATER DIVISION MANAGER IN SPRINGFIELD, ILLINOIS.

STORY: **David Steinkraus**

PHOTOGRAPHY: **Bradley Leeb**



“ I tend to not make changes and to be very cautious.  
But it's a trait that has worked well for me.”

TED MECKES

When Ted Meckes graduated from college, he found a job with the water utility in his hometown of Springfield, Illinois.

He never left in search of a larger community, bigger plant or higher-powered job: He found ample challenges and opportunities where he was. Growing up, he had all the earmarks of an engineer: “I always tried to take my dad’s lawn mower apart and put it back together — and my bicycle,” says Meckes, water division manager for City Water, Light & Power in Springfield.

His choice of college and career began with a visit to Marquette University in Milwaukee, where his older brother Dan was a student, as were friends and his sister Jane. He liked the smaller classes of 12 to 15 students, which allowed lots of interaction with professors and time for experiments.

“There was plenty of theory, but lots of hands-on work, such as building a toothpick bridge to test the strength of materials,” Meckes says. He graduated in 1986 and applied for every job imaginable. Back home in Springfield, he learned of an opening at the water plant. He had done a little work in college with pumps and pump curves; he toured the plant and was offered the job of plant engineer. He took it.

From time to time, he looked at other positions in other places. “I tend to not make changes and to be very cautious,” he says. “But it’s a trait that has worked well for me. You’re not going to get rich working for a municipality, but they have a good retirement system.”

### SURFACE WATERSHED

Springfield draws its source water from Lake Springfield on the city’s southeast side. Drum screens with an air burst system (Aqseptence Group, Inc. - Johnson Screens) remove debris, and six low-service pumps (Pentair Fairbanks Nijhuis) move water to the head of the gravity-fed system.

Ferric sulfate and polymer are added to form floc, and lime is added for softening. Five upflow clarifiers remove solids; three of those were converted to ClariCones solids contact clarifiers (McDermott), while the other two are inverted cones. Carbon dioxide is added to adjust pH, and phosphate is added for stabilization, followed by fluoride. Polishing is done in 12 standard gravel-sand-anthracite filters.

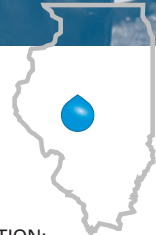
In the late 1980s, the utility formed a watershed committee that includes several farmer participants. The city recently received grants of more than \$1.3 million through the U.S. Department of Agriculture to finance alternative farming techniques. The largest share, more than \$1 million from the USDA’s Regional



Ted Meckes is a 2019 winner of the George Warren Fuller Award from the Illinois Section AWWA.



## Ted Meckes, City Water, Light & Power Springfield, Illinois



POSITION:  
**Water division manager**

EXPERIENCE:  
**34 years**

DUTIES:  
**Manage surface supply, treatment plant, distribution system, administration**

EDUCATION:  
**Bachelor’s degree, mechanical engineering, Marquette University**

CERTIFICATION:  
**Professional engineer, Class A water operator**

GOALS:  
**Continue providing the best-tasting water; educate the community on the importance of water infrastructure; be an advocate in the water industry**

Conservation Partnership Program, has a 50% local match but allows in-kind contributions; that has made it much easier to find partners.

“We’re asking these farmers to take land out of production,” Meckes says. “We know this is their livelihood.” Some farmers already use techniques such as no till or strip tilling. The city wants to use the money as an incentive for others who worry about the cost of new practices: They need help to see that better farming helps the environment and their bottom line.

Meckes oversees a staff of 93 divided under Dan Brill, supervisor of land and water resources; Todd LaFountain, general superintendent of water treatment; Mike Johnson, general superintendent of water distribution and engineering; and Larry Rockford, superintendent of property services.

## BUILDING REDUNDANCY

Early in his career, as plant engineer, Meckes was in charge of maintenance, and one change he made was to make sure there was a large stock of spare parts. He followed the same strategy with equipment.

“When I started, we had one of each, and by the time I left, we had two to three of each so we didn’t have to be shutdown because, for example, a chlorine evaporator was down. We had two of them, so we’d just bypass one and fix it the next day. One thing I really strive for is to get redundancy in our system. As I tell our electric people, ‘I can’t buy water off the grid.’”

He moved through the engineer ranks and then became assistant plant superintendent in 2000. When the superintendent retired in 2004, he applied for that job. Then the water division manager job opened.

“I’ve always been a person who wanted to be a leader,” Meckes says. And I felt I could do best for the entire department as the water division manager rather than just as superintendent. “I want to work hard, and I think that’s what a true leader is: someone of whom people say, ‘The guy puts time in. He’s not afraid to come in early, stay late.’”



Meckes, shown (above) inspecting a pump seal temperature and control panel (Pentair Fairbanks Nijhuis) has worked hard to build productive relationships with regulatory agencies.



He has friends who became orthodontists and dentists; they have time to play golf three days a week. “But I enjoy what I do,” Meckes says. “I have passion about it. I’m happy with the career choices I made once I became an engineer.”

Another task earlier in his career was public education, and there he learned another lesson that can be applied anywhere. He considers it a simple truth that to change an adult’s mind, talk to their child.

One friend got a lesson from his son, who was in a class Meckes talked to at school. The friend reported, “I was brushing my teeth. My son walks in and says, ‘Turn the water off: You’re wasting water. Mr. Meckes taught us that.’ To this day, I turn the water off while I brush my teeth.”

## CAREER HIGHLIGHT

In 2019, the Illinois Section AWWA recognized Meckes’ career with the George Warren Fuller Award. “To be put in the same place as some of the people who have received that award is an honor,” he says. “And I couldn’t have done it without my past supervisors, past bosses, past employees and current people.”

## CHANGING THE CULTURE

Ted Meckes had a revelation a decade ago when a new coal-fired power plant was built in his area. The company that built the plant had strict rules. For example, any team member caught without a hard hat was fired. There were “toolbox talks” to discuss safety topics.

Meckes looked at his own utility — City Water, Light & Power in Springfield, Illinois. “We had a safety culture that was nonexistent,” he says.

Water department managers realized this was not good for their staff, and all the managers were interested in improving. They met, talked and came up with a plan.

Now the Springfield team has annual trainings where everyone assembles to discuss safety. They may hear about trench safety, bloodborne pathogens or any number of topics. Meckes does the introduction for each annual training.

Once he used the example of two high school football teams: “High school football is big around here.” He listed on a board all the player statistics for the two teams — one a dominant powerhouse — but he didn’t list the school names. He asked which team would win.

The team members picked the dominant school because its players looked better on paper. Then Meckes put up the halftime score: 35-7 with the supposedly weaker team in the lead.

“Why?” Meckes asked. “Because that coach changed their mindset, changed the culture of that team to where they thought they could do anything. He put them in a position to succeed. I want to put you in a position to succeed, but you have to trust me. You have to go with me and believe me and follow me.”

Results of the safety emphasis are in the numbers: From about 200 reportable accidents per year a decade ago, the utility is now at 20. He says not everyone on his team follows safety practices perfectly, and he’s not sure they ever will reach 100% success. “But I continue to strive for that.”



One feature of people in the water industry is they don't compete with each other, and that makes them very willing to help, Meckes says. Over the years, he has built a network of people he can call if he has a problem with plant equipment. "I'd call Greg Swanson in Moline or Keith Alexander in Decatur and say, 'Hey, what's going on?' And they'd say, 'I've had that, and it's fixed like this.'"

One way to build a good network is through conferences: "My goal is to meet three new people at every conference and to be able to communicate with them. Then you can build lasting relationships."

## WORKING WITH REGULATORS

There are other ways to build productive relationships. In 2016, the Illinois Environmental Council, a coalition of environmental groups, urged legislation to regulate lead contamination in rivers, lakes and streams to protect drinking water.

"Instead of just saying, 'No, that's not true,' I brought in a piece of lead pipe and a couple of articles," Meckes says. "And I said, 'We agree lead needs to get out. We need to do a better job. But here's how lead gets into drinking water. Let's stop this first.' And right then, we developed a rapport with the council."

The result of his work is clear on the council's website, where the Illinois Section AWWA is listed as a stakeholder that helped craft the final bill.

Meckes has also helped the Illinois Section AWWA navigate state legislation and regulations, says Jeff Freeman, chair of the section. Freeman is also CEO of Engineering Enterprises, a consulting firm, and has known Meckes for about a decade.

"I would say Ted's biggest asset to the Illinois Section is his relationship with state legislators and regulators," Freeman says. "He does a great job of representing our industry in helping them think through proposed legislation and in talking about practical considerations." In particular, Freeman mentioned Meckes' work on a lead service line bill to make line replacements more practical and reasonable for the industry.

“My goal is to meet three new people at every conference and to be able to communicate with them. Then you can build lasting relationships.”

**TED MECKES**

As a member of the Water Utility Council, also part of the Illinois Section AWWA, Meckes takes a lead role in monitoring new regulations through the legislature and the rule-making process in the state Department of Public Health. That work is huge, Freeman says, and it helps that Meckes works and lives in the state capital.

"He's clearly dedicated to the water industry," Freeman says. "If you reach out to him, he's always very responsive; and if he can help you out, he will."

As for customer relations, Meckes finds proof that people appreciate being listened to. While he was superintendent of the water plant, a woman called

him to complain about the taste of chlorine in her water. He thanked her and adjusted the chemical feed.

A year later, she called again with the same complaint and apologized for complaining. "I said, 'Don't apologize; you're one of the hypersensitive population.'" After that, she occasionally called to talk. When Meckes was promoted to water division manager, she sent him a note of congratulations. **tpo**

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The Paso Robles (California) Wastewater Treatment Plant has a design capacity of 4.9 mgd and an average flow of 1.9 mgd.

# Big Sustainable Swings

A CALIFORNIA CITY GOES ALL-IN ON RECYCLING WITH TERTIARY-TREATED WATER FOR IRRIGATION AND A NUTRIENT HARVESTING SYSTEM THAT SOLVED A STRUVITE PROBLEM

By Steve Lund

**P**aso Robles, California, made a plan in 2013 to go to tertiary wastewater and then recycling, but the city didn't intend to modify the treatment plant until 2025. California's prolonged drought changed that plan.

In 2016, the city had nearly completed a plant upgrade, including equipment to generate electricity from biogas, when the state began offering grants for recycled water projects.

"We had master-planned space so we could easily plug in tertiary treatment later," says Matt Thompson, wastewater treatment manager. "Because of the grant funds, and because we had Black & Veatch and a construction manager on board, we decided to go ahead and build the tertiary treatment facilities."

The work, completed in 2019, included innovations in UV disinfection and nutrient harvesting. The project received the Engineering and Research Achievement Award for 2019 from the California Water Environment Association.

## SITE ADVANTAGES

The Paso Robles Wastewater Treatment Plant (4.9 mgd design, 1.9 mgd average flow) is on a site that slopes toward the Salinas River. The tertiary process, which includes filtration and UV disinfection, makes use of that slope.

"We can take advantage of the fall of water to run effluent through the tertiary treatment process entirely by gravity," Thompson says. "We intercept the effluent from the secondary clarifiers and run it through some flow equalization basins on its way to filtration."

The equalization basins are repurposed secondary clarifiers that were taken offline during the 2016 plant upgrade. They probably would have been demolished if the tertiary project had kept to the original schedule.

"I wanted to save some money so I had Black & Veatch explore repurposing the clarifiers," Thompson says. "They happened to be in roughly the right location within both the plant space and the hydraulic profile to serve as flow equalization." Reusing the concrete basins saved about \$750,000.



Paso Robles installed a cloth media filtration system (Aqua-Aerobic Systems) as part of an upgrade to tertiary treatment for water recycling.

The highly variable flow from the secondary clarifiers collects in the basins to be released at a steady pace to the filters. "We decided to go with cloth media filtration," Thompson says. "The advantage is that there is very little headloss. We don't want to have to pump the water through our filtration process. We're able to flow entirely by gravity through our cloth media."

The filtration system (Aqua-Aerobic Systems) enables operators to plug in a flow rate through the control system. Motor-actuated valves then adjust automatically to even out the flow. "That's a nice thing to have because fil-



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ters don't like the normal fluctuations of flow that you see coming into a wastewater treatment plant," Thompson says.

## DEALING WITH HARD WATER

The Paso Robles water supply, which comes from wells under the Salinas River, is mineral rich. That is a problem for UV disinfection because hard water tends to create a film over the lamps. The solution was a TrojanUVSigna system with ActiClean technology.

The quartz tubes that hold the UV lamps have Teflon collars on the outside that automatically move across the surface, wiping the tubes and discharging citric acid to clean the minerals off the quartz. Thompson calls the system a game changer for small plants that treat hard water: "Previously cities like ours would shy away from using UV light because they would be so concerned about fouling of the lamps."

“Not only are we producing tertiary-quality recycled water, but we've also greatly improved the quality of the water that we discharge to the river during the wet season.”

MATT THOMPSON

Lamp maintenance is also easier because the system hydraulics lift the banks of lamps out of the channel for easy access. Casey Shepherd, chief plant operator, observes, "We're very fortunate as an operations-maintenance staff to have it be so user friendly. We can pull up the entire light banks hydraulically. We do it once a week on both channels. We add new ActiClean gel once a month."

Before tertiary treatment, Paso Robles disinfected with chlorine. The advantage of UV is the absence of residual chemicals. "Not only are we producing tertiary-quality recycled water, but we've also greatly improved the quality of the water that we discharge to the river during the wet season when there is low demand for recycled water," Thompson says.

During that season, the recycled water is used for irrigation around the treatment plant and for cleaning, but most is discharged to the river. "We consider that an interim situation until we complete the purple-pipe distribution system and sell it to the wine grape growers around Paso Robles," Thompson says. "That part of the recycled water project is still in design."

(continued)



A TrojanUVSigna system disinfected the flow of wastewater.

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The distribution system is to begin operating in 2022. The largest customer is expected to be a new water district that formed just outside the city. A storage pond for recycled water is in place. “We’re essentially developing a new water supply for Paso Robles,” Thompson says.

### NUTRIENT HARVESTING

The utility is also developing a new fertilizer supply. As the tertiary processes were under construction, the treatment plant suffered an onset of struvite formation in the piping, making nutrient control a priority.

The city had a long-range plan for nutrient harvesting, but Thompson had it added to the tertiary treatment project as a change order. The old process sent biosolids filtrate back to the treatment process. That allowed nutrients to build up and eventually form struvite.

The new system sends the filtrate to a cone-shaped device where it is mixed with magnesium. When caustic soda is added to raise the pH, struvite forms in a controlled reaction and falls to the bottom. From there, it is pumped into porous sacks that allow water to drain.

The nutrient harvesting equipment (Multiform Harvest) was assembled and is run by the treatment plant team. “It’s incredibly productive,” Thompson says. “Our operators are pulling more than a ton of struvite out of the process every week. Our plan is to sell it to a fertilizer distributor.”

The main motivation was to deal with the struvite problem, but there’s a sustainability benefit as well. “We consider ourselves to be recycling nutrients,” Thompson says. “Every ton of phosphorus fertilizer that we pull out of our plant is one less ton of material going out into the environment. We’re getting ahead of the nutrient regulations.” **tpo**

The Multiform Harvest nutrient harvesting hopper at the Paso Robles Wastewater Treatment Plant yields a marketable phosphorus fertilizer.



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# 30 Years of Recycling

THE WATEREUSE ASSOCIATION LOOKS BACK ON MAJOR PROGRESS IN MANAGING WATER AND AHEAD TO A WIDE RANGE OF GROWTH OPPORTUNITIES

By Ted J. Rulseh

**W**ater recycling is seeing growth in familiar places and expansion into new areas. Helping to push it along is the WateReuse Association, which marks its 30th anniversary this year.

WateReuse is the only trade association in the U.S. dedicated solely to advancing laws, policy, funding and public acceptance of recycled water. The association represents a coalition of utilities that recycle water, businesses that support the development of recycled water projects and recycled water consumers.

The fundamental principle is “using the right water for the right purpose, everywhere and all the time,” according to the association’s website. “That means aiding and accelerating the natural process of cleaning the water to make it suitable for its intended purpose, from irrigation to industrial uses to drinking.”

WateReuse advocates for policies, laws and funding to increase the practice of recycling water. Its national office leads the advocacy efforts with the U.S. Congress and federal agencies, including the Bureau of Reclamation and EPA.

Among the association’s initiatives is working with the EPA’s Water Workforce Initiative on training for operators of water recycling systems. Patricia Sinicropi, executive director, talked about the state of the recycled water industry in an interview with *Treatment Plant Operator*.

**tpo: What is the history of the WateReuse Association?**

**Sinicropi:** It was founded in 1990 by California utilities and businesses that were beginning to focus more closely on water recycling approaches, given supply issues in that state. It became a national association in 2000. We have some 500 members; about half are water, wastewater and water recycling utilities, and the other half are businesses.

**tpo: In the big picture, what has driven the progress on water recycling and reuse?**

**Sinicropi:** During the last 30 years, water reuse has become a more feasible and practical alternative for communities struggling with supply. Membrane technologies have come down in cost. And the nearly 10-year drought in California and Texas placed a focus on recycling over the past decade and a half. That has accelerated the growth of the practice and membership in our association.

**tpo: Do you see water reuse becoming more mainstream even in areas where historically there have been no serious droughts or other supply issues?**

**Sinicropi:** Yes. Water recycling, especially with decentralized systems, can help communities facing all sorts of challenges, not only on the supply side, but also on the water-quality side and the wet-weather side. Beyond that, the stewardship culture in corporate America will drive more commu-

nities and businesses toward water recycling approaches.

**tpo: What impacts can recycling have on the water-quality side?**

**Sinicropi:** In regions where water quality is a limiting factor for build-out and development, such as in the Chesapeake Bay region where they are struggling with high nutrient levels in the watershed, recycling the effluent from municipal wastewater systems is an effective mitigation strategy to reduce nutrient loading and impairment of surface waters.

**tpo: How can recycling help with wet-weather issues?**

**Sinicropi:** If a community has a large and old centralized wastewater treatment system that tends to be leaky and has sanitary sewer overflow issues and combined sewer overflow issues, reducing the load through decentralized water recycling can help build efficiencies in that centralized asset.

**tpo: What do decentralized water recycling systems look like?**

**Sinicropi:** They come in many sizes. There are building-specific water recycling systems. A well-known example is The Solaire building complex in New York City. That on-site recycling system serves five residential facilities. The membranes are in a building’s basement. The treated water is used as a nonpotable supply. It’s quite effective and has reduced the effluent from the building going to the centralized plant by 60%.

**tpo: What is your association doing to support operators of water recycling facilities?**

**Sinicropi:** We participate in the EPA Water Workforce Initiative, which is developing new tools to help train plant operators in managing water recycling systems. We’re especially interested in a certification program for operators of decentralized recycling systems. We hope that will give operators a new skill and enhance their excitement in the work they do.

**tpo: The U.S. EPA has drafted a Water Reuse Action Plan. Where do you see it having an impact?**



Patricia Sinicropi

“Water recycling, especially with decentralized systems, can help communities facing all sorts of challenges, not only on the supply side, but also on the water-quality side and the wet-weather side.”

PATRICIA SINICROPI

**Sinicropi:** The plan is mainly focused on some basic, but important policy and research support systems and on facilitating greater adoption of water recycling. One item is doing an inventory and compiling all the various state rules related to water recycling and then developing a model state regulation. The plan also envisions a library of research and the development of a coordinated national research program. That initiative would identify what research is needed during the next five to 10 years and make a plan to move forward with it.

**tpo:** Where do you see the real growth areas in water reuse and recycling?

**Sinicropi:** We expect a lot of growth focused on creating resiliency. Along the Eastern Seaboard, I believe we will see more communities using recycling to help address the overpumping of aquifers and the sea level rise and saltwater intrusion in those aquifers. The best-known model for that is around Hampton Roads, Virginia, where they are using injection of recycled effluent into the aquifer to push out the intrusion of saltwater.

**tpo:** What other growth areas do you envision?

**Sinicropi:** I believe there will be greater interest in decentralized approaches, especially in cities that see rapid population growth and want to continue to attract development. This is especially true in older cities with large legacy centralized systems that don't lend themselves easily to building more capacity. Decentralized recycling is a way to grow without putting too much pressure on the central system. In the West, reuse will continue to grow significantly. California, Nevada, New Mexico and Arizona are going all-in on water recycling.

**tpo:** How would you assess the future of direct potable water reuse?

**Sinicropi:** It is going to be part of the mix. As people realize that treatment technology has reached the point of providing very pure water, removing every possible constituent that could cause public health concerns, more and more people will be comfortable with direct potable reuse. We believe it will see significant adoption over the next 20 years or so.

**tpo:** What is the role of the association's Recycled Water User Network?

**Sinicropi:** It's a way for commercial businesses and farmers to become members of our association at a fraction of the normal fee and gain access to our network of experts, information and professional development opportunities. In addition, when they become members, they receive a Water Star label to use on their marketing materials and in community and customer relations to demonstrate that they are good stewards of water resources.

**tpo:** What are the greatest barriers holding back growth in water reuse and recycling?

**Sinicropi:** Public perception is becoming less of a barrier, and I don't think there are barriers to reuse where water scarcity is an issue. One barrier is cheap water. If a community doesn't have a water supply issue and the water is relatively affordable, then they ask, "Why do recycling?" The challenge in those regions is getting people to think differently about

how to manage water resources and to adopt an ethic of greater efficiency in managing water.

**tpo:** What is the focus of September's 35th Annual Water Reuse Symposium?

**Sinicropi:** Because of the coronavirus, it will be a virtual conference. Last year we had more than 1,000 people join us in San Diego, and we hope we'll have 1,000-plus people join us this time on a virtual platform. The theme is Reaching New Heights in Water Reuse. The keynote speaker is Pete Kageyama, who talks about emotional engagement with places — cities, towns, villages, schools and neighborhoods. His book, *The Emotional Infrastructure of Places*, explores how we create connections to our places and to each other. That in turn helps us take on the biggest and most complex problems facing our societies. **tpo**

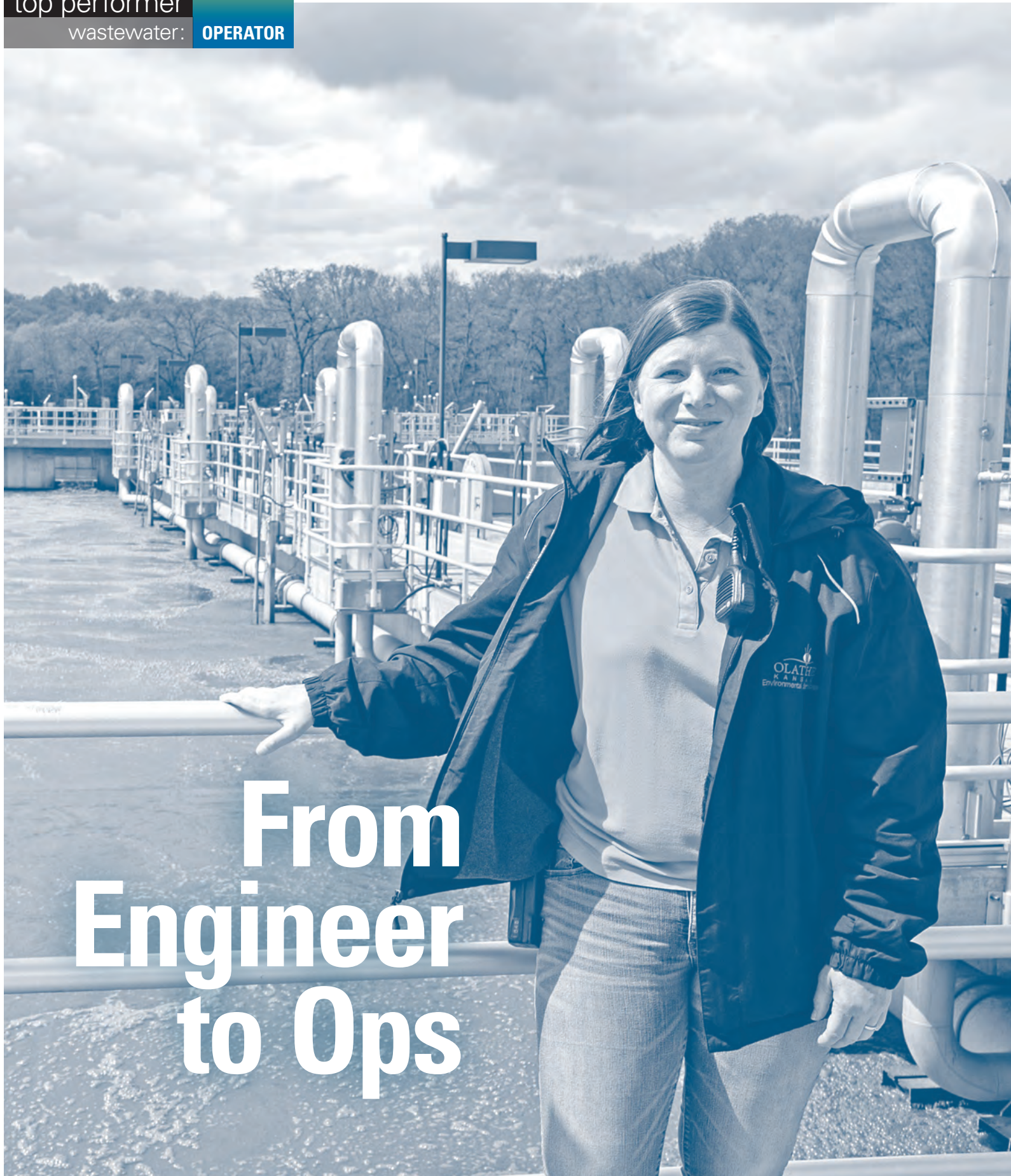
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# From Engineer to Ops

Heather Phillips, Olathe wastewater operations manager



## HEATHER PHILLIPS WAS A CONSULTANT WHO HELPED DESIGN THE WATER RESOURCE RECOVERY FACILITY IN THE KANSAS COMMUNITY WHERE SHE IS NOW OPERATIONS MANAGER

STORY: **By Ted J. Rulseh**  
PHOTOGRAPHY: **Denny Medley**

**H**eather Phillips has seen the clean-water business from two key perspectives.

She started her career with a major engineering consultancy. A dozen years later, she made a move to the operations side and is happy with the decision. “I like that operators ask questions,” she says. “Operating a wastewater treatment plant is an art more than a science.”

“There are a hundred ways you can operate a nutrient removal facility, and I like that the operators are always coming to me and saying, ‘What if we did this?’ and ‘What if we did that?’ We talk through the challenges of the day and work together as a team to solve problems. It’s never just one of us saying, ‘You have to do it this way.’”

Phillips, formerly a process engineer and plant designer with Black & Veatch, has been with the City of Olathe, Kansas, for eight years and since December 2015 has been wastewater operations manager, responsible for two treatment plants and a biosolids composting system. Her performance in that role earned her a 2019 William D. Hatfield Award from the Kansas Water Environment Association.

### DESIGNED FOR ENGINEERING?

Phillips was born in Ames, Iowa. When she was 5, her family moved to the Kansas City area, and she grew up in various suburbs (Olathe is one suburb, though she never lived there).

“In school, I was always good at science and math,” she recalls. “I wanted to do some kind of engineering. I chose civil because it was a general type of engineering. A couple of classes on environmental engineering got me excited about working in an environmental field and eventually wastewater treatment.”

She earned bachelor’s and master’s degrees in civil engineering from Kansas State University. Between degrees, she worked in the Clean Cities intern program with the City of Manhattan, New York, promoting natural gas as an alternate fuel for



Phillips oversees a 7.75 mgd (design) facility that uses a process developed by biological nutrient removal pioneers.

fleet vehicles. After finishing her master’s degree, she joined the Black & Veatch Process Group.

She specialized in plant design using BioWin (EnviroSim) and GPS-X (Hydromantis Environmental Software Solutions) simulators, used for running wastewater process models to test operations under “what-if” scenarios, such as a major storm event or other upset. In her last five years with the Black & Veatch Kansas City office, she worked on a capital improvement program for the Metro Wastewater Reclamation District in Denver.

### APPEAL OF OPERATIONS

“I flew back and forth quite a bit, working closely with operators,” Phillips says. “That’s where I decided I enjoyed working in the field more than doing designs.” She had also worked on the design for the new Olathe treatment plant and was training staff members there. “A process engineer position with the city became available. I was ready to get back into operations again because the Denver project had ended. I saw an opportunity to start up a plant I helped design.”

She made the move in October 2012. Olathe’s Cedar Creek Waste-

## Heather Phillips, P.E., BCEE

Olathe, Kansas

POSITION:  
**Wastewater operations manager**

EXPERIENCE:  
**20 years in the industry**

EDUCATION:  
**Bachelor’s and master’s degrees, civil engineering, Kansas State University**

LICENSING:  
**Class IV wastewater operator**

AWARDS:  
**William D. Hatfield Award, Kansas Water Environment Association**

GOAL:  
**Continue training and developing operators and meeting challenges**



Heather Phillips believes in hiring good people without wastewater experience and training them up.

“ I get out there and work with everybody, especially during storm events. ... They are a really good group of people. It’s sort of a family environment, and it’s a lot of fun.”

**HEATHER PHILLIPS**

water Treatment Facility (7.75 mgd design, 4 mgd average) came online that same year. It uses a process developed by biological nutrient removal pioneer James Barnard and colleague Ed Kobylinski. “I helped with the process modeling and designed the aeration system,” says Phillips, who along with her

engineering credentials holds Kansas Class IV (highest) wastewater operator certification.

The city also operates an older trickling filter plant (3.2 mgd design, 1.5 mgd average). Anaerobically digested sludge from that plant is converted in a windrow process into Class A compost that’s used for the city’s parks and soccer fields.

### REMOVING NUTRIENTS

The Cedar Creek facility is unique in having a mixed liquor fermenter that supports biological phosphorus removal to meet an effluent total phosphorus limit of 1.0 mg/L and can also enhance denitrification. After the headworks with bar screens (Vulcan Industries) and a HeadCell grit removal system (Hydro International), the wastewater enters a five-stage Bardenpho process.

The anaerobic and anoxic zones include mixers (Flygt - a Xylem Brand). In the aerobic zone, air is provided by Siemens Industry blowers by way of membrane fine-bubble diffusers (Sanitaire - a Xylem Brand). Mixers in that zone (also Flygt) help keep the mixed liquor in suspension so that the air can be turned down to avoid an excess of oxygen at the end of the basin.

At the end of the anaerobic zone, the mixed liquor is allowed to settle. “From the bottom of that zone, we pump about 10% of the plant flow into the fermenter,” Phillips says. “It’s a thickened mixed liquor similar to return activated sludge.”

The fermenter contents are mixed for a few minutes several times per day; overall retention time is about 14 hours. “We’re producing acetic and propionic acids, but we’re not letting the process go all the way to methane,” Phillips says. “The acetic and propionic acids become food sources for the phosphorus-accumulating organisms and the denitrifiers in the basins.



Phillips wasn’t bothered by the natural tension between the engineering and operations sides. (She is shown using a Nitrate TNTplus test kit from Hach.)

“We can select whether to put the fermenter output into the front of the anaerobic zone to enhance phosphorus removal or into the first anoxic zone to help with denitrification. We have operated both ways.” Typical effluent phosphorus is 0.5 to 1.0 mg/L; total nitrogen is typically below 8.0 mg/L versus a permit limit of 10 mg/L.

After final clarification and UV disinfection (TrojanUV3000), the effluent discharges to Cedar Creek, a Kansas River tributary. Waste activated sludge is dewatered on centrifuges (Andritz Separation) to 22%-25% solids and landfilled. “We are considering a biosolids evaluation in the next couple of years; we want to find a sustainable use for all of our solids,” Phillips says.

### MAKING A TRANSITION

From consultant to operations is not a common career path, and on arrival in Olathe, Phillips experienced some of the natural tension between engineers and operators. “Coming in as an engineer was harder than coming in as the only woman,” she recalls. “The plant design turned out really well, but the operators like to rib me about some little things that didn’t work quite right. For example, the basin floors aren’t sloped so they’re harder to clean out. They like to blame the engineers for that.”

As for being a woman, “They wondered if I would be able to drag the fire hoses around. I don’t have to do that very often, but I showed them I could do it. I get out there and work with everybody, especially during storm events. It’s a team effort. They are a

really good group of people. It’s sort of a family environment, and it’s a lot of fun.”

A key challenge for Phillips is dealing with turnover and getting new operators trained up. Operators frequently leave for better pay in the private sector; in some cases they move to the fire department or other jobs within the city.

### THE RIGHT STUFF

For Phillips, staffing and training are about hiring carefully. “We’ve brought in people who had experience and people who didn’t,” she says. “A lot of times it’s easier to bring in someone fresh out of high school who has zero training in wastewater, as long as they have a good attitude and work ethic and really believe in what they’re doing.”

“In the city, we have a leadership philosophy that everybody applies. It talks a lot about passion, collaboration and leadership development. We use that as the backbone in our day-to-day work. But hiring the right people is

### ON THE GREEN TEAM

When not working at the Cedar Creek Wastewater Treatment Facility in Olathe, Kansas, Heather Phillips enjoys spending time with her husband, Jason, and children Sandra (9) and Myron (7).

That includes volunteering as Sandra’s Girl Scout troop leader, and as a member of the Green Team at the kids’ school. “We work on Earth Day projects for the school,” she says. “A few years ago, we worked with the school district to become one of the first schools to compost all their cafeteria waste.”

The project doesn’t extend to compostable paper goods, but it does capture a substantial volume of food waste. “On the first few days of the program, they weighed how much food waste they were able to divert,” Phillips says. “About 70% to 80% of what used to get thrown away is now being composted.”

A contractor collects the material and handles the composting process but gives some of the product back to the school for projects. This year, the students will create self-watering planters by repurposing 2-liter bottles and filling them with cafeteria compost to grow their own take-home herb gardens.

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critical. Even if they only stay three or four years, if they have a good attitude and a hard work ethic, that helps our team come together and get the job done.

“All of our operators have some kind of passion for the outdoors and fishing or hunting. When they come to work and see that they’re doing something to help the environment and public health, that’s a common thread we see with folks who stay around for a while.”

For recruiting, Olathe team members attend career fairs and talk up the profession when giving facility tours to high school and college students. “When people come on site and see what the job really is, it interests a lot of them,” Phillips says.

“This is a great industry. There is so much potential and so much job security. It’s only going to get more challenging as regulatory limits get stricter.”

**HEATHER PHILLIPS**

superintendents; Les Newton and Patrick Karashin, control operators; Carl Cook and Jared Schultz, process operator II; and DeAndre Williams, Anthony Ryan, Jose Mora-Calvo and Jonathon Chesbro, process operator I.

Paul Bixel is environmental compliance manager in charge of industrial pretreatment and FOG, Steven McNolty II is maintenance manager for asset management, and DeWayne McAllister manages the city’s certified laboratory.

The city pays operators for the Sacramento courses, provides annual in-house training and encourages and pays for attendance at events such as KWEA conferences and operator schools offered by the state Department of Health and Environment.

### ALWAYS IMPROVING

The training and support pay off in teams that are engaged in day-to-day work and are on the lookout for ways to improve the process. “When we first brought the fermenter online, we had some short-circuiting issues,” Phillips says. “Our maintenance staff came up with a design change. They built it themselves, and it has been running ever since with their modifications.”

That team includes Bart Rehagen, maintenance operations manager; Mark Higgs, maintenance superintendent; and Floyd Koder, instrument and controls supervisor.

The city recently received a new permit that replaces concentration limits for effluent nitrogen and phosphorus with total maximum daily limits (in pounds). Meanwhile, two aging oxidation ditches that handle about 25% of Cedar Creek’s flow are likely to be phased out. An empty field next to the two nutrient removal trains has room for two more identical units.

“The design is pretty much done,” Phillips says. “When those trains are built, the oxidation ditches will be demolished and digesters will be put in. That is probably more than 10 years in the future.”

### MANY REWARDS

It all adds up to job satisfaction for Phillips, who observes, “This is a great industry. There is so much potential and so much job security. It’s only going to get more challenging as regulatory limits get stricter. That’s part of the fun of it — to see construction projects and learn new processes as they come online.”

### UP THE LADDER

People coming on board have a defined career track, from operator I to operator II to control operator — a position that requires Class IV certification and two to three years of experience. “In that role you’re not a supervisor of people, but you’re basically in control of the plant,” Phillips says. “We have a career progression for each step with a pay increase. In addition, with each step up in certification, they get a little more on their paycheck.”

Operations staff members are Richard Jones and Anthony Kurkowski, wastewater operations



Heather Phillips feels that training and support pay off in teams that are engaged and alert for ways to improve plant processes.

### video profile



To learn more about Heather Phillips and the Cedar Creek Wastewater Treatment Facility, watch a video profile at [www.tpomag.com](http://www.tpomag.com)

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This year's Prince William-Manassas (Virginia) Regional Science and Engineering Fair had 237 participants from middle and high schools. BELOW: Dave Scott, Prince William County (Virginia) Service Authority project manager, judged the science and engineering fair for the first time this year.



# Fair Competition

A VIRGINIA SERVICE AUTHORITY'S EVENTS HELP ENCOURAGE STUDENTS TO PURSUE WATER-RELATED CAREERS

By Sandra Buettner

There's nothing like a little competition to help people discover the careers available in the water sector.

With that in mind, the Prince William County (Virginia) Service Authority participates in an annual regional science and engineering fair for middle and high school students. The service authority judges recognized 10 water-related entries in this year's event.

The science and engineering fair is just one of the ways the authority encourages students to explore the water professions. "We want them to go into water-related careers or at least consider them upon graduation," says Kathy Bentz, deputy director of communications.

## CREATIVITY ON DISPLAY

Prince William County, located on the Potomac River and with a population of 463,000, is Virginia's second most populous county. Service authority customers are served by two wastewater treatment plants with a combined capacity of 26.17 mgd.

In one of the authority's competitions, middle school students create, design and build a functional model water tower, applying their science, technology, engineering, arts and mathematics (STEAM) skills. Entries are judged on design ingenuity, overall structure, and hydraulic and cost efficiency. The winners receive cash prizes.

The authority also sponsors a Water Art Invitational for high school students. Categories in this 20-year-old event include painting and drawing, computer graphics, photography and mixed media. Among 140 pieces sub-

mitted for this year's event, 27 entrants and their teachers received cash awards. The winners are featured in the authority's annual calendar.

## SCIENCE ON DISPLAY

This year's Prince William-Manassas Regional Science and Engineering Fair included 237 entries showcasing some of the region's brightest students and their innovative projects. Schools in the county hold events for middle and high schools, and the school winners go on to the regional fair.

While the regional fair is hosted by the county school system, the service authority takes part by recognizing and judging the projects that are water-related. Employees who work in the lab, engineering, IT and other departments judge the entries, receiving information about the projects in advance and then visiting the booths at the fair to speak with the students. They convene afterward to choose the water category winners.

"It is a great experience judging these students' entries," says Audrey Arnold, education and outreach coordinator for the authority and one of the judges. "We put them through a mini-interview, and their presentations are so succinct and professional." This year's winners are:

- **First Place – Senior Division:** Desmen Boykin, Forest Park High School, "The effects of different plant-based microplastics on lotus plants."
- **Second Place – Senior Division:** Divya Ramakrishnan, Osbourn Park High School, "The effect of ferrofluids on the extraction of microplastics from water."
- **General Manager's Awards – Senior Division:** Amanda Hurley,

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Osborn High School, “Soil and groundwater – How acidic is too acidic?” and Ebru Ayyorgun, Battlefield High School, “The effect of water bottle material on biofilm growth.”

- **First Place – Middle Division:** Rowan Floyd, The Nokesville School, “Human impacts on oceanic defenses.”
- **Second Place – Middle Division:** Shelia Nguyen, Ronald Reagan Middle School, “The effect of different drinking water types on the bacteria growth of water.”
- **Third Place – Middle Division:** Seth Kellogg, Seton School, “Filter

it before you drink it – Identifying an inexpensive, effective primary ingredient for an improvised water filter.”

- **General Manager’s Awards – Middle Division:** Lauren Motter, Benton Middle School, “Do different types of activated carbon affect how well it can filter a dirty solution?” and Hannah Hakimpour and Katie Kim, Ronald Reagan Middle School, “The effect of different brands of water on the number of microplastics.”

Typically, the winners are invited to an authority board meeting where they present their projects in poster sessions. The board members then present each student with a certificate and cash prize. However, this year the board meeting was canceled due to COVID-19 restrictions.

“Our directors really missed interacting with the winners and encouraging these scientific-minded students,” Bentz says.

## BEARING FRUIT

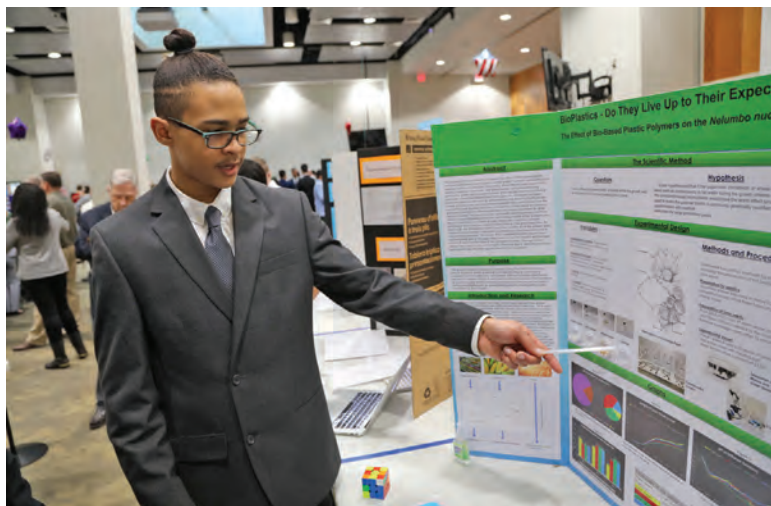
The science and engineering fair has already brought some tangible benefits to the authority. Daniel Gigi, a first-place winner in the senior division a couple of years ago, ended up with an internship in the authority’s lab. During his internship, he created a standard operating procedure based on an EPA framework for the decontamination of large amounts of water.

In addition, a past art contest winner, Jessica Garcia, became an intern in the authority’s graphics art department. After graduation, she was hired and is now designing a virtual learning webpage.

Boykin, this year’s senior division first place winner, made 3D-printed protective masks with a classmate for a hospital where his sister is a surgical nurse. **tpo**

## What’s Your Story?

**TPO welcomes news about your public education and community outreach efforts for future articles in the Hearts and Minds column. Send ideas to [editor@tpomag.com](mailto:editor@tpomag.com) or call 877-953-3301.**



The Prince William County (Virginia) Service Authority honored Forest Park High School freshman Desmen Boykin (pictured), Rowan Floyd of The Nokesville School and eight other students in the 2020 Prince William-Manassas Regional Science and Engineering Fair.

# A Pump Protection Plan

A CHOPPER PUMP HELPS A TEXAS COMMUNITY SOLVE A PERSISTENT PROBLEM WITH DEBRIS AND GREASE BUILDUP IN A LIFT STATION

By Chris French

“I used to dread coming here,” says Mitch Puckett, director of the water and sewer department in Madisonville, Texas.

He’s talking about Lift Station No. 8, and it’s no wonder he once felt as he did. Despite the installation of two pumps that were sold as able to cope with typical lift station debris, less than 12 months after they were installed, the chore of unblocking rags from those pumps became all too frequent.

Then, there was the grease: “A layer of grease more than 7 feet thick,” Puckett says. Even with all the grease traps required by code at food establishments, it seems almost every community in America has at least one lift station that its sewer department dreads. “It was unreal,” says Kevin Story, public works director for Madisonville, whose utility services include water, wastewater, street lighting and solid waste.

The city found a solution in a chopper pump fitted with a venturi nozzle. The device protects the existing pumps by macerating heavy solids into pieces, allowing them to remain in service instead of being replaced at substantial cost.

## FRUSTRATING PROBLEM

Story observes, “It was also ridiculous that so soon after the installation, the problems at our most recently built lift station meant Mitch and I had to spend so much time trying to put it right. Pulling these pumps out isn’t easy, and as any small water and sewer team will tell you, we already had more than enough to do with taking care of the city. Coming back time and time again to Lift Station No. 8 had to change.”



A Landia AeriGator chopper pump has helped resolve a lift station pump clogging problem in Madisonville, Texas.



From left, Kevin Story, Madisonville (Texas) public works director; Art Savage, Landia regional sales manager for Texas; and Mitch Puckett, Madisonville water and sewer department director.

Story and Puckett acknowledge that the opening of a major new retailer, with 40 restrooms, just across the street was sure to create challenges for the sewer system. With grease and rags finding their way into the sewers from Madisonville’s nearly 4,500 residents, the only remedy at times was to bring in a vacuum truck.

Story had campaigned hard for the city to invest in its own vehicle since each vacuum truck service can cost up to \$5,000. Chemicals can also help a beleaguered lift station, but while they provide some respite, the grease problem inevitably returns, and the annual cost is also around \$5,000.

At Lift Station No. 8 (the city has a total of 12), the failure of the two duty pumps lay in the design of the impellers, which became dull and could not efficiently cut debris. The rags and trash included everything — T-shirts, towels, underwear, mopheads and assorted hygiene products, plus the almost never-ending intake of grease.

## ACTIVIST DIRECTOR

As an experienced public works director with 27 years in the industry, Story is not often found sitting behind a desk; he’s out and about making sure things are right. The exception is when he’s at a short school. He and Puckett attain valuable qualifications through the Texas Commission on Environmental Quality and keep up to date on the right equipment.



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“Grease damages pumps, and we don’t want to be losing out on some of our capacity because of it. Now, we look down on clear water and no longer have to dread going to this lift station.” **KEVIN STORY**

Frustrated with the trials and tribulations of his Lift Station No. 8, Story discussed solutions with Waco-based Smith Pump. Based on previous successful installations, including the report of a complete turnaround of a challenging lift station in Llano County, Story decided to try an AeriGator chopper pump from Landia, which invented it 70 years ago.

Designed with a hardened-steel knife system that keeps large solids from entering the pump casing, the Landia chopper pump brought immediate results. The venturi nozzle enables the pump to deal with variances in the lift station scum. (For lift stations close to homes, the AeriGator unit has also been effective in reducing odors.)

### MAINTENANCE SAVER

“We were satisfied with the AeriGator from day one,” Story says. “It’s a complete 180-degree difference from what we had. Before, Mitch and I had to take the volute covers off the duty pumps and try to re-shim everything as best we could to get the impeller close to the wear plate. Try as we did, the volume of grease and debris would find a way of backing up and oozing up and over the lift station walls.

“My team worked hard to ensure this could only happen at a lift station or manhole, rather than at a home or business, but the grease was terrible. It’s hard to believe we had it 7 feet thick here; but now, at last, that’s a thing of the past.

“Pumps aren’t cheap. It was a worry that the float would sit on top of all the grease, leaving the duty pumps running to a possible expensive burnout. We don’t want to be using up funds on replacements when the city needs

money that can be spent elsewhere on services.

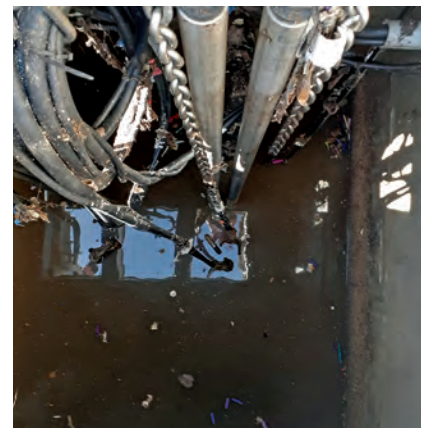
“Grease damages pumps, and we don’t want to be losing out on some of our capacity because of it. Now, we look down on clear water and no longer have to dread going to this lift station. And because things are so much better, it also helps our other lift stations.”

### FUTURE DESIGNS

Story concludes, “Long after we’re gone, I want people here to see that we cared about looking after the city and that we thought about the future. I am very pleased that we solved the issues of Lift Station No. 8 for the long term.”

Last year among states, Texas had the largest growth in population in the U.S. Madisonville is not alone in having pumps that lack the horsepower of proper macerating system to handle rags. Standard-duty pump specifications often are no longer enough.

Landia recommends including constant-torque (variable-frequency drives) in future lift station designs; otherwise rags sitting at the suction of the pump upon startup cannot be properly macerated. That can cause another messy and costly pump pullout. Story will attest that it’s better to avoid such problems if possible. **tpo**



Lift Station No. 8 in Madisonville, Texas, no longer has to deal with a 7-foot-thick layer of grease.



Instrumentation - Testing	Laboratory Equipment/Supplies	Laboratory Services/Testing	Meters	Monitoring Equipment	SCADA Systems	Software	OTHER
					✓		
✓				✓			
			✓	✓			Meter Reading Equipment
✓				✓			
			✓	✓			
			✓				Batch Dispensing Systems
				✓			Chlorine and Chemical Tank Scales
✓	✓			✓			COVID-19 Testing
✓			✓			✓	

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(continued)

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 Analyzers/Sensors  
 Controllers  
 Data Loggers/Management  
 Detection Equipment  
 Flow Control Meters/Monitoring  
 Gauges  
 Instrumentation - Analytical  
 Instrumentation - Level Control  
 Instrumentation - Process Control

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 866-562-4698 732-494-8660  
 info.sci@horiba.com www.horiba.com/scientific

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 351 Bell King Rd., Newport News, VA 23606  
 877-253-5537 757-596-6680 Fax: 757-596-6659  
 sales@kelleramerica.com www.kelleramerica.com  
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**KROHNE** KROHNE, Inc.  
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 800-554-2762 585-426-0990 Fax: 585-426-4025  
 mail@jescoamerica.com www.lutzjescoamerica.com  
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 1000 Cranberry Woods Dr., Cranberry Township, PA 16066  
 724-776-8600  
 fgfd@msasafety.com www.msasafety.com/wastewater  
 The Safety Company

**MYRON L COMPANY** Myron L Company  
 2450 Impala Dr., Carlsbad, CA 92010  
 760-438-2021 Fax: 760-931-9189  
 info@myronl.com www.myronl.com  
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**ONYX VALVE** Onyx Valve Co  
 835 Industrial Hwy U-4, Cinnaminson, NJ 08077  
 856-829-2888  
 david@onyxvalve.com www.onyxvalve.com  
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**ProMinent** ProMinent Fluid Controls, Inc.  
 136 Industry Dr., Pittsburgh, PA 15275  
 412-787-2484 Fax: 412-787-0704  
 prominent-us@prominent.com www.prominent.us

**SEEPEX.** SEEPEX Inc.  
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 831-373-0200 Fax: 831-373-4402  
 sales@sierrainstruments.com www.sierrainstruments.com

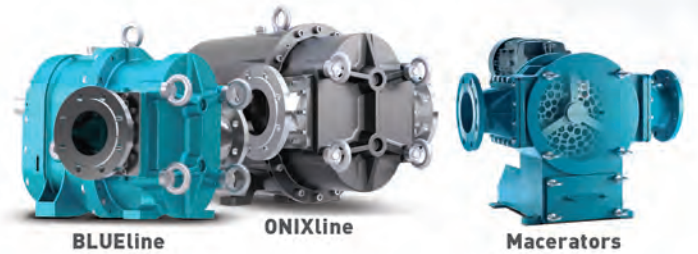
**VEGA** VEGA Americas, Inc.  
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 800-367-5383 513-272-0131 Fax: 513-272-0133  
 americas@vega.com www.vega.com  
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			✓			✓	✓	✓	✓
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Instrumentation - Testing	Laboratory Equipment/Supplies	Laboratory Services/Testing	Meters	Monitoring Equipment	SCADA Systems	Software	OTHER
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✓	✓						
			✓				
		✓	✓	✓			
✓				✓			
							Valves
				✓			Pump Controls
✓		✓	✓	✓			
✓				✓			

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# New Technology Slated for WEFTEC Connect

By Craig Mandli

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

## Aerzen Rental temporary oil-free blowers

**Aerzen Rental** provides **temporary oil-free blower packages** engineered for aggressive rental



environments with onboard variable-frequency drives, remote monitoring and outdoor builds with sound-attenuating enclosures. The rental units are available for immediate deployment in the event of a production failure or shortfall to longer-term operational leasing and rent to own.

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## Alfa Laval Aldec G3 VecFlow

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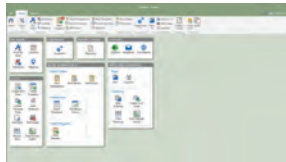


**866-253-2528; www.alfalaval.us**

## AllMax Software Antero CMMS version 7

**Antero CMMS version 7** from **AllMax Software** includes asset mapping, asset criticality scoring, improved workflow and work order management, and procedure scheduling for detailed plant inspections and rounds. Improvements have been made to the reporting, calendar and equip-

ment sections, ensuring users have access to their most critical asset and maintenance information in order to make informed, data-driven decisions. It accurately tracks maintenance data, allowing the user to streamline his or her maintenance program to save time, effort and money, all while providing the peace of mind that the equipment is being maintained efficiently and effectively.



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## Applied Felts CIPP liners

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



**276-656-1904; www.appliedfelts.com**

## Aqua-Aerobic Systems OxyStar

The **OxyStar** aerator from **Aqua-Aerobic Systems** has been a leading aspirating aeration technology for 50-plus years and has effectively aerated and mixed more than 4,000 municipal and industrial wastewater treatment systems across the globe to introduce oxygen into lagoons, equalization basins, aerobic digesters, sludge holding basins and/or activated sludge systems. Known for its efficient oxygen



transfer and intense directional mixing pattern, which results from its three-blade helical propeller, the aspirating aerator is a suitable solution to improve aeration systems in aerated lagoons, oxidation ditches and other activated sludge processes, equalization basins and aerobic digesters.

**815-654-2501; www.oxystaraerator.com**

## Atlas Copco ZS

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



**866-546-3588; www.atlascopco.com**

## Badger Meter Dynasonics TFX-5000

The **Dynasonics TFX-5000** ultrasonic clamp-on meter from **Badger Meter** uses transit time technology to accurately measure the volumetric flow of clean liquids and those with small amounts of suspended solids. It is suitable for water and wastewater applications, such as lift stations, booster pump stations and water mains. Designed to clamp onto the outside of pipes, it doesn't contact the internal liquid, allowing for installation without shutting down operations in new and retrofit applications. It is equipped with an internal



clock and built-in 8 GB data-logging capabilities to log water flow down to one second.

877-243-1010; www.badgermeter.com

### BDP Industries 3DP belt press

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

518-695-6851; www.bdpindustries.com



### Bright Technologies, Division of Sebright Products, belt filter press

The compact 0.6-meter skid-mounted belt filter press from Bright Technologies, Division of Sebright Products, has stainless steel frame and roller construction, as well as radius wedge zone and wing roller for sludge dewatering. Components include a sludge pump, polymer system and wash-water booster pump. Options include a sludge flowmeter, air compressor and discharge conveyors.

The compact walk-around skid design can be utilized in as little as a 10-by-20-foot floor area.

Rates of 25 to 50 gpm make it ideal for small applications or when a processor has outgrown dewatering containers.

800-253-0532; www.brightbeltpress.com



### Centrisys/CNP THK

The Centrisys/CNP THK sludge thickener is engineered for high-performance biosolids thickening. Compared to other centrifugal sludge thickening technologies, it uses 50% less power and dramatically reduces or even eliminates the need for polymer conditioning. Thanks to these savings, it represents a low total cost of ownership. With an all-cylindrical design for maximum capacity, it has a small footprint for its throughput. Air injection for precise control of sludge thickness makes operation easy



and reliable. It is an enclosed system, allowing for safe, hygienic operation and simple cleaning.

262-654-6006; www.centrisys-cnp.com

### Cretex Specialty Products LSS Internal Manhole Chimney Seal

Cretex Specialty Products LSS Internal Manhole Chimney Seal is a mechanical seal installed on the frame and grade ring sections of sanitary sewer manholes.



These seals eliminate and prevent manhole frame-chimney inflow. During wet weather, clearwater (inflow) enters manholes through deteriorated and broken frame-chimney joints, which may burden the collections system. Each seal is made up of a high-grade rubber sleeve and stainless steel expansion bands, which can be easily removed and reinstalled to allow for future manhole adjustments. The chimney seal has a 50-year design life and is available in four widths, allowing complete chimney coverage of up to 24 vertical inches with a single seal.

800-345-3764; www.cretexseals.com

### CUES GraniteNet WebInspect

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

800-327-7791; www.cuesinc.com



### Duke's Root Control Razorooter II

Razorooter II from Duke's Root Control is a herbicide-laden, thick foam with the consistency of heavy shaving cream that is a cost-effective way to kill tree roots in sewers. Duke's crew

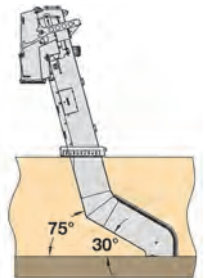


inserts a hose from manhole to manhole. The hose releases and sprays the foam in all directions, allowing it to adhere to roots and penetrate through wye connections to kill roots, even in lateral lines. The entire system is treated as the foam compresses against pipe surfaces and penetrates cracks, joints and connecting sewers. Roots are killed on contact inside and outside the pipe walls, decay naturally and slough away, with regrowth delayed for two to three years. Trees and other aboveground vegetation are not harmed.

800-447-6687; www.dukes.com

### Enviro-Care FSM

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



815-636-8306; www.enviro-care.com

### FerraTex Solutions wet-out liners

FerraTex Solutions provides CIPP wet-out liners and services for demanding trenchless pipe rehabilitation projects, reducing time and costs for CIPP installers.

With six locations across the U.S., they offer logistic advantages and customer service throughout the U.S., Canada and parts of Mexico. Each wet-out liner undergoes a rigorous ISO 9002 certified quality-assurance inspection. Once resin impregnation is completed, the resin-saturated liner is loaded into a climate-controlled trailer for delivery and is tracked through GPS.

844-433-7728; www.ferratex.com



### Flomatic Valves Model 745 AIS

The Flomatic Valves Model 745 AIS swing check valve has a valve body with full flow area equal to nominal pipe diameter and a 45-degree angle seat providing short disc travel with faster closure for non-slam performance. An EPDM molded one-piece disc has an integral molded O-ring on



the seating surface, which is reinforced with steel. It is available with accessories such as a backflush device, position indicator and limit switch. It has NPT threaded and plugged side ports for easy installation of gauges or accessories. It is designed and manufactured according to the ANSI/AWWA C508 Standard.

**800-833-2040; www.flomatic.com**

## Force Flow Drumm-Scale

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

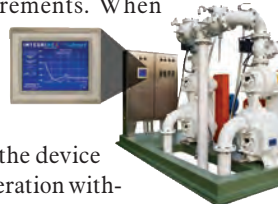
**800-893-6723; www.forceflowscales.com**



## Gorman-Rupp Integrinex Advanced

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

**419-755-1011; www.grpumps.com**



## Hach EZ Series online analyzers

**EZ Series** online analyzers from **Hach** provide a solution for continuously monitoring parameters that are critical to risk mitigation, compliance, safety and process uptime. They offer five different technologies: titration, colorimetry, chemiluminescence, ion-selective electrode and voltammetry. They include a wide analytical range; a variety of measuring ranges, multistream capabilities and



multiple parameter options; and reliable monitoring of remote locations or unmanned plants, which allows staff to focus on other tasks.

**800-227-4224; www.hach.com**

## Hayward Flow Control HLS Series level sensor

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

**888-429-4635; www.haywardflowcontrol.com**



## Keller America Econoline

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

**877-253-5537; www.kelleramerica.com**



## Komline-Sanderson Biosolids Drying System

**Biosolids Drying Systems** from **Komline-Sanderson** are capable of handling in excess of 1,000 tons of wet cake per day. Excess heat from combustion engines or turbines can be used to heat thermal fluid or produce steam. The dryer's shaft,



hollow paddles and trough are all heated. The robust design and low speed with minimal rotating parts result in reduced maintenance costs. Indirect drying using the airtight dryer results in minimal off-gas volume, which allows simplified odor control systems and safe operation resulting in reduced disposal costs for the beneficial reuse of biosolids as fertilizer and green fuel.

**800-225-5457; www.komline.com**

## Lakeside Raptor FalconRake bar screen

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

**630-837-5640; www.lakeside-equipment.com**



## Lovibond PTV Series

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

**941-756-6410; www.lovibond.com**



## MaxLiner USA MAX CalTube

**MAX CalTubes** from **MaxLiner USA** provide optimum flexibility and durability. The yellow version is engineered from ultraflexible, lightweight polyethylene fabric with PVC coating that is closed with a high-frequency welded overlap. It is intended for



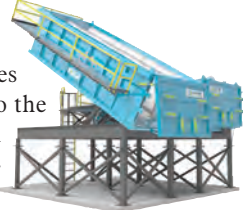


use in open-end liner and pull-in-place applications. They are ideal for lower pressure and heat curing up to 135 degrees F unsupported.

877-426-5948; [www.maxlinerusa.com](http://www.maxlinerusa.com)

### Park Process Big Tipper

The **Big Tipper** from **Park Process** allows the user to mount dewatering boxes on a permanent stand and eliminates hauling the containers to the landfill where they can become damaged in transit and when emptying.



Having the containers dump into a containment area also allows for extra drying of the filter cake. Using more than one dewatering container allows the units to handle a continuous flow of wastewater. While one container is filling, the other one is sitting idle and draining. Units are available in a multitude of capacities and tipping heights and come complete with handrails, walkways and stairs and/or ladders.

855-511-7275; [www.parkprocess.com](http://www.parkprocess.com)

### Penn Valley Pump double disc pumps

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



215-343-8750; [www.pennvalleypump.com](http://www.pennvalleypump.com)

### Sauereisen SewerGard Roll Applied 210XROL

**Sauereisen SewerGard Roll Applied 210XROL**

is an epoxy lining system designed to protect concrete surfaces of municipal wastewater treatment structures and collections systems from chemical attack and physical abuse. Roll applied ensures ease of application on vertical surfaces, does not require a primer, zero VOCs and prohibits water inflow and infiltration. It is resistant to



corrosive conditions common to the municipal wastewater treatment industry and suitable for application over damp or dry concrete surfaces. Depending of surface temperatures and substrate conditions, it can be applied up to 25 mils per coat.

### Sealing Systems Flex-Seal 2.0

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



800-478-2054; [www.ssisealingsystems.com](http://www.ssisealingsystems.com)

### Vaughan chopper pumps

Wastewater professionals work hard to keep the water flowing. To do their jobs



effectively, they need pumps and equipment made to handle the new sewage reality. When standard nonclog pumps come up short, bring in pumps that make sure wipes and heavy solids don't cause any harm down the line. By installing a reliable, heavy-duty **chopper pump** from **Vaughan**, solids are easily handled and broken apart to keep operations running smoothly.

888-249-2467; [www.chopperpumps.com](http://www.chopperpumps.com)

### VEGA Americas VEGAPULS C

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



800-367-5383; [www.vega.com](http://www.vega.com) tpo

**“My job depends on surrounding myself with good people in the organization. There are many who play different roles and who make everything come together. They allow me to succeed along with them.”**

Donald Malovets  
 Regional Maintenance Superintendent  
 Brazos River Authority  
 Waco, Texas

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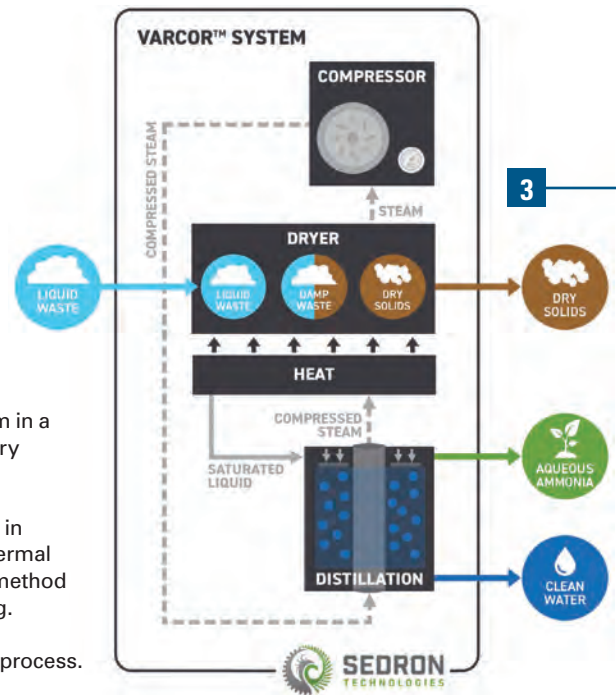


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2

- 1) The ammonia concentration system in a Varcor process installation on a dairy operation in Indiana.
- 2) The evaporator on a Varcor system in Indiana. The process uses an all-thermal mechanical vapor recompression method to produce heat for biosolids drying.
- 3) A schematic diagram of the Varcor process.



3

# Holistic Solids Handling

AN ALL-THERMAL PROCESS PROMISES EFFICIENT PRODUCTION OF CLASS A BIOSOLIDS WHILE HELPING REDUCE PLANT NITROGEN TREATMENT LOADINGS

By Ted J. Rulseh

**B**iosolids management challenges clean-water plants in a variety of areas — cost, energy efficiency, resource recovery, product quality, odor control and more.

A process developed by Sedron Technologies is designed as a complete, holistic solids handling system that delivers a dried Class A product with a variety of potential end uses. Sedron was introduced to the wastewater industry through involvement with the Reinvent the Toilet Challenge created by the Bill & Melinda Gates Foundation. That experience led the company to explore solutions for other waste streams.

The Varcor system is based on a proven thermodynamic process called mechanical vapor recompression. In addition to the dry solids, it yields distilled water and ammonia solution. The process is not susceptible to biological or chemical upsets and can process septage and biosolids (as well as agricultural manure).

A variety of options are available for implementing the system, from installation and operation by Sedron to outright purchase of the technology by the clean-water plant. Lucas Reid, program manager and business development representative, talked about the process in an interview with *Treatment Plant Operator*.

**tpo:** What was the genesis of this technology?

**Reid:** In 2011, the Bill & Melinda Gates Foundation contracted us to

develop a technology called the Janicki Omni Processor as a way to help solve sanitation problem in developing countries. That process could take an incoming waste stream at about 20% solids and dry it in an evaporative dryer to 90% solids. That dry material was combusted in a boiler to produce steam to turn a turbine and generate electricity; the evaporated water was condensed and could be treated to any desired standard.

**tpo:** How did news about this technology spread?

**Reid:** We built a pilot unit in 2013. In 2014, a video of Bill Gates drinking treated water from the unit went viral. We started getting phone calls from around the world; people saw the Omni Processor as a silver bullet for their problems. Dairy farmers called and asked if we could process manure. We said no because dairy manure had only about 4% solids. But the calls kept coming, and we found a way to process that low-solids material economically, without any biological or chemical systems — an all-thermal process.

**tpo:** What do you see as the advantages of a completely thermal process?

**Reid:** First, with a thermal process, you kill all the pathogens. Second, it doesn't matter what the input material is. As long as the waste stream is pumpable and flowable and contains water and solids, our system will process it.

**tpo:** What thermal process is used in the Varcor system?

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**Email:** [info@bdpindustries.com](mailto:info@bdpindustries.com)



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

**Reid:** The Varcor system uses a mechanical vapor recompression, in which we run steam through a compressor and increase its pressure and temperature using a very small amount of energy. We can then use that hotter steam as an energy source for evaporating the incoming water. It's about 30 times more efficient than evaporation by direct boiling. We use a natural gas steam generator to kick-start the system. That takes four to six hours, and then the system runs continuously.

**tpo:** How is the evaporator designed to use that heat to dry material efficiently?

**Reid:** After looking at many types of dryers and evaporators, we settled on thin-film drying. It's like cooking crepes on a griddle: We apply a very thin amount of material, heat it until the water is gone and then mechanically scrape the dried material off.

**tpo:** What happens to the liquid evaporated from the waste stream?

**Reid:** The water and everything that has a lower boiling point evaporates. In the wastewater industry, there's a lot of ammonia in those streams. We developed a patented process to remove this ammonia and concentrate it into its own stream. So we're left with clean water, a 20% aqueous ammonia solution and the dry solids.

**tpo:** How would you describe the value of your process to a wastewater treatment plant?

**Reid:** Originally we targeted biosolids management and the ability to take the material to a 90% dry Class A product. When we investigated further, we found an additional benefit in sidestream nutrient removal. The filtrate or centrate from biosolids dewatering is very high in ammonia; it goes back to the headworks and accounts for a high percentage of the plant's nitrogen loading. Our process removes that high-ammonia return stream and recovers the nutrients.

**tpo:** What is done with the aqueous ammonia solution?

**Reid:** We take that product away and work with farmers and fertilizer companies to use it as a fertilizer. The volume of aqueous ammonia depends on the size of the unit and the concentration of ammonia in the waste stream. Our current commercial system is designed to process 90 gpm of waste. For septage, the ammonia content can range from 20 to 200 ppm, which results in 30,000 to 40,000 gallons per year. For a wastewater treatment plant with anaerobic digestion, the ammonia content can be 900 to 1,700 ppm. Regardless, we will work to find a beneficial use for the product.

**tpo:** How much maintenance does this system require?

**Reid:** We designed the process for ease of operation and maintenance. All the pumps, piping and other components, except for the evaporator, are standard industry items. The wear surfaces on the rotating discs use a very hard material call Hardox (SSAB). The scraper blades are easy to replace without tools. The control system is fully automated. Our O&M cost is competitive with other technologies. The system is designed to run because we know the material doesn't stop coming.

**tpo:** What is being done to prove out this technology?

**Reid:** We have our first large-scale pilot processor running on a dairy farm in Texas, and our first commercial unit is on a dairy farm in Indiana. We're working with a number of wastewater treatment plants to run their products through our test unit in Sedro-Woolley, Washington. We have a septage processing facility south of Seattle that will be operational in the first quarter of next year. We're going to own and operate that facility, taking septage from local haulers and biosolids from wastewater treatment plants. We're doing this because we want to prove that the technology works. **tpo**

# Digital Technology

By Craig Mandli

## Analytical Instrumentation

### SHIMADZU SCIENTIFIC INSTRUMENTS LCMS-8060NX

The LCMS-8060NX triple quadrupole liquid chromatograph mass spectrometer from Shimadzu Scientific Instruments offers suitable sensitivity and acquisition speeds, increased robustness to minimize downtime, ease of use for greater workflow efficiency and analytical intelligence functions to maximize laboratory output. Newly developed ion-focus lenses, in the integrated electrospray probe, propel ions efficiently into the unit. Neutral particles are expelled to reduce noise and provide stability. A heat-assist design increases desolvation efficiency and promotes ionization of a wide range of compounds. The system's UFsweeper technology effectively sweeps ions from the collision cell without deceleration, maintaining high-sensitivity analysis even at high acquisition speeds. **800-477-1227; www.ssi.shimadzu.com**



LCMS-8060NX spectrometer from Shimadzu Scientific Instruments

## Control/Electrical Panels



Control panels and alarms from Delta Treatment Systems'

### DELTA TREATMENT SYSTEMS CONTROL PANELS AND ALARMS

Delta Treatment Systems' control panels and alarms are easy to install and operate, and they provide intelligent monitoring and alarm functions for residential, commercial and industrial wastewater treatment systems. Panels are available

in several models engineered for use with advanced wastewater treatment systems and custom packaged plants. All panels can be supplied with UL and/or Canadian UL 508A listings upon request, and customized control panels are available. The CP20/40/50 Series monitors air pumps and effluent pumps on the Whitewater treatment system. The Series CP22 panels monitor the air blower on ECOPOD systems with options for controlling and monitoring UV lights for disinfection after treatment. Series CP8000/9000 control the ECODRIP preengineered disposal systems' headworks filter system and effluent dosing pump using a programmable logic controller for time-dosing drip disposal fields. **800-219-9183; www.deltatreatment.com**

### FRANKLIN ELECTRIC SIMPLEX AND DUPLEX NONCLOG CONTROL PANELS

Available in both single- and three-phase power options, simplex and duplex nonclog control panels from Franklin Electric are designed exclusively for 3NC and 4NC Series nonclog pumps. Typically used for wastewater applications, these control panels are UL 508A listed and



Nonclog control panels from Franklin Electric

have a waterproof NEMA 4X enclosure, IEC motor contactor and lockable latch. The panels include an adjustable motor starter; and for single-phase, nonclog pumps include an adjustable pump overload relay. Single-phase control panels also come standard with starting components for proper operation and simplified field maintenance. All nonclog control panels can be designed with additional options, including an event counter, elapsed time meter, lightning protection, redundant off float, low-level cutoff and anti-condensation heater. **800-348-2420; www.franklinengineered.com**

### GORMAN-RUPP INTEGRINEX ADVANCED

Integrinex Advanced lift station controls from Gorman-Rupp are custom-engineered to meet unique system requirements. When equipped with FloSmart technology, the control system can detect a pump obstruction and run a cleaning cycle until the debris clears. Upon detection, the device initiates a cleaning operation without interfering with the operation of the pump station. When the cycle is complete, the pump is ready to return to normal operation. If the clog remains, the cleaning sequence repeats until the blockage is cleared. FloSmart helps maximize uptime while reducing maintenance costs. **419-755-1011; www.grpumps.com**



Integrinex Advanced lift station controls from Gorman-Rupp



Touch process controller from SEEPEX

### SEEPEX TOUCH

Touch is SEEPEX's adaptable solution for smart process control. It is a programmable process controller with integral touch screen and can be furnished as an accessory with SEEPEX pumps or BRAVO metering skids. It is preconfigured with a variety of control algorithms commonly associated with progressive cavity pumps, and it can also be custom-programmed for specialized applications. It can be

linked to a customer's SCADA system or plant control network via TCP/IP. Process control routines are built into the controller. Pump start/stop and speed control is available with a local-remote selector. It offers lead/lag pump operation with autoalteration, tank level control, closed-loop control (pH, flow, ORP, residual, turbidity and pressure), cake pump hopper level control, ratio dosing control, pump protection interlocks, high discharge and low suction pressure, a low flow, variable-frequency-drive fault, bridge breaker manual/auto control, and boundary layer interjection manual/auto control. **844-473-3739; www.seepex.com**

## Flow Control and Software

### SMITH & LOVELESS FORCE MAIN SYNC

Force main pressures vary; and without accounting for the variable conditions, reduced service life and a multitude of other issues arise. These phenomena result in impeller and volute erosion, reduced bearing and seal life, excessive pump noise, and vibration. Force Main Sync from Smith & Loveless monitors hydraulics in the common force main to keep pumping at the required flow rate. Using a PLC touch-screen human-machine interface, a VFD and a force main sensor,



Force Main Sync monitor from Smith & Loveless

it constantly senses force main pressure and automatically adjusts the VFD to maintain a constant flow rate, no matter how many stations are online. **800-898-9122; [www.smithandloveless.com](http://www.smithandloveless.com)**

## Flow Monitoring

### SIEMENS PROCESS INSTRUMENTATION SITRANS FS230

The SITRANS FS230 flow system from Siemens Process Instrumentation delivers accuracy and 100 Hz data update speed while ensuring noise immunity and simplicity in use. It is not necessary to cut the pipe or shut down operations to install the flowmeter, as the sensors are quickly and easily mounted on the outside of the pipe, minimizing maintenance expenses and preventing deposits from forming. It has the ability to react to sudden changes in velocity, speed of sound in applications such as compressor stations. This allows the use of small volume provers for in-situ flow validation by measuring the smallest variations in flow 100 times every second. It offers accuracy of 0.5% to 1.0% of flow rate for all media/pipe sizes and repeatability of 0.25% according to ISO 11631. Its SensorFlash 4 GB micro SD card storage lets certificates, calibration data, sensor parameters and events be logged every 10 minutes for easy servicing and recordkeeping. **800-365-8766; [www.usa.siemens.com](http://www.usa.siemens.com)**



**SITRANS FS230 flow system from Siemens Process Instrumentation**



**3014AB Filter Alarm (Smart Alarm) from Polylok**

## Instrumentation

### POLYLOK 3014AB FILTER ALARM (SMART ALARM)

The 3014AB Filter Alarm (Smart Alarm) from Polylok is a wired indoor/outdoor filter alarm that provides audio/visual warning notifying operators that a tank filter needs cleaning. The Smart Alarm Switch activates when the filter cartridge is near capacity (approximately 90% full) with solids. The

Smart Alarm Switch installed in the filter sends a signal to the panel, activating the audible and visual alarm. It offers a manual alarm test switch and horn silence, an alarm horn rated to 82 dB at 10 feet, and 15 feet of cable, with longer lengths available. **888-765-9565; [www.polylok.com](http://www.polylok.com)**

## Monitors

### FORCE FLOW WIZARD 4000

The Wizard 4000 from Force Flow is a powerful chemical inventory system for monitoring chlorine gas, sodium hypochlorite, hydrofluosilicic acid and all other chemicals used in water treatment. It can help ensure a safe process and a safe plant by providing essential information such as current chemical feed rate, how much chemical has been fed and how much chemical remains. With four separate channels, it can be used to simultaneously monitor levels in up to four separate tanks. Each tank can be monitored independently while monitoring combined totals for all the tanks. The daily-usage function allows for easy recordkeeping, and a days-until-empty function makes it simple to anticipate tank refilling and chemical reorder points. A feed-rate function allows early warning of dangerously



**Wizard 4000 chemical inventory system from Force Flow**

low or high feed-rate conditions, preventing hazardous underdosing or overdosing of chemicals to the water supply. **925-686-6700; [www.forceflowscales.com](http://www.forceflowscales.com)**

### HACH EZ SERIES ONLINE ANALYZERS

EZ Series online analyzers from Hach provide a solution for continuously monitoring parameters that are critical to risk mitigation, compliance, safety and process uptime. Choose from five different technologies: titration, colorimetry, chemiluminescence, ion-selective electrode and voltammetry. Benefits include a wide analytical range, including adenosine triphosphate (ATP), toxicity, volatile fatty acids/total inorganic carbon (VFA/TAC) and trace metals, along with organics, inorganics and nutrients. The analyzers have a variety of measuring ranges, multistream capabilities (up to eight channels) and multiple parameter options, including total or dissolved metals. Reliable monitoring of remote locations or unmanned plants allows staff to focus on other tasks. Automatic cleaning between samples eliminates cross contamination. **800-227-4224; [www.hach.com](http://www.hach.com)**



**EZ Series online analyzers from Hach**



**Airflow monitor from HEMCO**

### HEMCO AIRFLOW MONITOR

The airflow monitor from HEMCO can continuously monitor the face velocity airflow of a fume hood. Simply select and calibrate the instrument at the desired feet-per-minute velocity setpoint. If the hood face velocity falls below the setpoint, an audible alarm sounds and a visual red indicator light appears. The alarm is factory installed or can be field installed, and it runs on 115 volts/60 Hz AC. **800-779-4362; [www.hemcocorp.com](http://www.hemcocorp.com)**

### PRIMEX PUMP WATCH EXPRESS

Pump Watch Express from PRIMEX is a comprehensive family of 4G LTE/3G compact cellular RTUs and gateways used for monitoring pumping systems. It offers a simple tool for management of multiple sites, including alarm notification, data logging and graphic system visualization. It includes a lithium-ion backup battery for power loss detection and notification, SMS/email/web portal alarm notifications, graphic HMI with simple and clear station status display, interactive pumping station map, data logging and historical trending, first year of service included, and optional web portal customization. The NEMA 4X control panels come in three versions: lite, premium and gateway. **844-477-4639; [www.primexcontrols.com](http://www.primexcontrols.com)**



**Pump Watch Express from PRIMEX**

### RKI INSTRUMENTS GX-6000

The GX-6000 from RKI Instruments simultaneously monitors up to six gases, including combustibles, oxygen, carbon monoxide and hydrogen sulfide. Two smart sensor slots accept PID, infrared or other toxic gas sensors. It includes an internal sample pump, man-down and panic alarm, LED flashlight and large autorotating LCD. It operates as a single-gas PID unit or a multifunctional tool using all six channels. The PID sensor comes equipped with



**GX-6000 monitor from RKI Instruments**

a library of more than 600 VOC gases and can personalize a favorites list of 30 commonly used VOCs, as well as a list of eight of the most recently used VOCs. A benzene-specific PID sensor is also available. **800-754-5165; www.rkiinstruments.com**

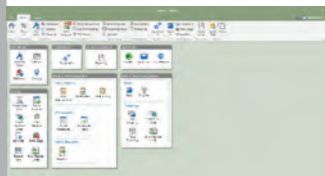
### SWAN ANALYTICAL USA AMI TURBIWELL

The AMI Turbiwell from SWAN Analytical USA uses a white LED method to measure turbidity in potable water, surface water and wastewater. It includes both a source and detector that are mounted in the cover of the measurement chamber with a drain mounted in the bottom. This means sediment settles to the bottom of the flow chamber while all optics are kept out of the path of potential coating substances. The bottom-mounted drain can be opened periodically to flush out sediment before it can become a problem, with an automated drain option available to further simplify operations. When cleaning or maintenance is needed, the measuring chamber is readily accessible from the front of the analyzer, with no tools required. With a push on the locking pin, the entire measuring chamber swings out for easy access. Quick fastener screws can be hand-turned to open the chamber for cleaning or verification. **847-229-1290; www.swan-analytical-usa.com**



AMI Turbiwell from SWAN Analytical USA

### Operations/Maintenance/ Process Control Software



Antero CMMS version 7 from AllMax Software

### ALLMAX SOFTWARE ANTERO CMMS VERSION 7

Antero CMMS version 7 from AllMax Software includes asset mapping, asset criticality scoring, improved workflow and work order management, and procedure scheduling for detailed plant inspections and rounds. Improvements have been made to the reporting, calendar and

equipment sections, ensuring users have access to their most critical asset and maintenance information in order to make informed, data-driven decisions. It accurately tracks maintenance data, allowing the user to streamline maintenance programs to save time, effort and money while providing the peace of mind that equipment is being maintained efficiently and effectively. **800-670-1867; www.allmaxsoftware.com**

### Process Control Systems

#### GREYLINE INSTRUMENTS PSL 5.0

The PSL 5.0 pump station level controller from Greyline Instruments has redundant level sensing. It includes a noncontacting ultrasonic sensor and can be connected to a loop-powered pressure sensor for redundant sensing in applications with foam or grease. It will continuously recalibrate the pressure sensor and automatically switch back and forth from ultrasonic to the pressure sensor as required. It is designed for lift stations, wet wells and storage tanks. Calibration and relay set-



PSL 5.0 pump station level controller from Greyline Instruments

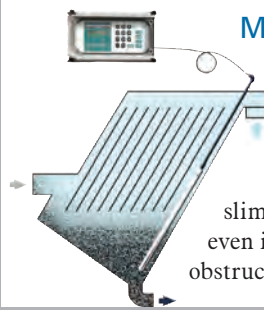
points are easy to enter through the user-friendly keypad and menu system. An automatic pump runtime logging and reporting system helps operators to plan pump maintenance and identify lazy pumps before they fail. It includes an isolated 4-20mA output and six programmable control relays for pump control, pump alternation and level alarms. An intrinsically safe sensor and a built-in data logger are optional. **888-473-9546; www.greyline.com**

#### LUTZ-JESCO AMERICA TOPAX MC

The TOPAX MC multichannel controller from Lutz-JESCO America has a modular design that makes it an adaptable and effective solution for all measurement and control technology requirements. It offers automated efficiency — freedom from repetitive control tasks while providing accuracy and reliability. Users can actuate the dosing pumps using an opto-coupler or relay and servomotors by using a relay or a 20mA output. The high-resolution, 5-inch color display offers a user-friendly operating interface, with a simple touch-control and intuitive navigation menu that can be set to multiple languages. Use four analogue outputs (0/4-20 mA) or the network capability to transfer measured values to a web browser or a telemaintenance point. A programmable interval timer can be used to set automatic alerts for wear-related sensor change. **800-554-2762; www.lutzjescoamerica.com**



TOPAX MC multichannel controller from Lutz-JESCO America



Automatic Sludge Blanket Level Detector from Markland Specialty Engineering

#### MARKLAND SPECIALTY ENGINEERING AUTOMATIC SLUDGE BLANKET LEVEL DETECTOR

The Automatic Sludge Blanket Level Detector from Markland Specialty Engineering uses high-intensity infrared light that, along with its slim profile, enables it to measure the sludge bed depth even in water/wastewater clarifiers and tanks that have obstructed or constricted areas, such as the inclined plates of lamellas. The beam intensity of the LED-phototransistor sensors automatically adjusts for thick or thin biosolids concentration or even light flocs. This detector allows operators to program desludge pumps to run only when necessary for maintaining the preferred liquid-solids interface level, saving wear and tear on pumps. It helps maximize water removal and optimize feed density. In dissolved air flotation units, it can adjust surface skimmer speeds to match variations in the thickness of the floating sludge layer. In sequencing batch reactors, it can control the decant valve to minimize cycle times. Calibration is not required. **855-873-7791; www.sludgecontrols.com**

ators to program desludge pumps to run only when necessary for maintaining the preferred liquid-solids interface level, saving wear and tear on pumps. It helps maximize water removal and optimize feed density. In dissolved air flotation units, it can adjust surface skimmer speeds to match variations in the thickness of the floating sludge layer. In sequencing batch reactors, it can control the decant valve to minimize cycle times. Calibration is not required. **855-873-7791; www.sludgecontrols.com**

#### MSA SAFETY H2S SCRUBBER MONITORING SYSTEM

The H2S Scrubber Monitoring System from MSA Safety is a preengineered system that is compatible with most wet or dry scrubbers. The monitor ensures that the air scrubber functions and meets EPA requirements. It controls chemical feeds for wet scrubbers and conserves expensive chemicals. The system operates within a closed loop so that no gas vents to the atmosphere. The unit is housed in a heated NEMA 4X enclosure to withstand harsh outdoor environments. Maintenance and calibration are simple procedures. If



H2S Scrubber Monitoring System from MSA Safety



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an obstruction occurs in the sample line, the unit provides flow failure indication. Calibration can be performed via Bluetooth, eliminating the need to open the system's front door. **800-672-4678;** [www.msasafety.com/detection](http://www.msasafety.com/detection)



PLCnext technology from Phoenix Contact

### PHOENIX CONTACT PLCNEXT

PLCnext technology from Phoenix Contact combines the openness of smart devices with the reliability of a traditional PLC, providing a control platform with both the advantages of traditional IEC 61131 programming and the flexibility of open-source languages like

Linux. It is a completely open platform. Users can directly access the core of the product via Linux. This gives them the freedom to leverage the open-source community or develop their own Linux-based applications on an industrially hardened control platform. At the same time, it enhances IEC 61131 PLC programming and makes it possible to program controllers using high-level languages for real-time performance and data. It has complete integration with Phoenix Contact PROFICLOUD for easy access to dashboard data and alarms using time series data. PLCnext Engineer, the software for the platform, provides an intuitive development environment with IEC 61131 and HTML5 visualization, allowing seamless integration with high-level languages including C, C++, C# and MATLAB. **800-888-7388; [www.phoenixcontact.com](http://www.phoenixcontact.com)**

*(continued)*

## When was your valve last serviced?



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### PULSAFEEDER MICROVISION EX

The MicroVision EX cooling tower controller with PULSAlink communications from Pulsafeeder comes with a Toroidal conductivity sensor, multiple level security codes, up to 10 digital inputs, dry contact alarm output, battery backup, USB data logging capability, and optional PULSAlink communications and 4-20mA analog outputs. PULSAlink allows the user to safely communicate with the controller from anywhere on a laptop, phone or tablet. Users can receive live readings, alarm notifications, and even change and customize the controller and settings over an encrypted cloud-based site. MicroVision EX and PULSAlink is also eServiceReport and Modbus compatible. It is available mounted on a fabricated panel system with pump mounts designed to provide complete and easy-to-install solutions for cooling tower applications. **800-333-6677; www.pulsatron.com**



MicroVision EX cooling tower controller from Pulsafeeder

### Sensors

#### BADGER METER DYNASONICS TFX-5000



Dynasonics TFX-5000 flowmeter from Badger Meter

The Dynasonics TFX-5000 ultrasonic clamp-on flowmeter from Badger Meter accurately measures the volumetric flow of clean liquids and those with small amounts of suspended solids or aeration, such as surface water or raw sewage. It is suitable for water and wastewater applications such as lift stations, booster pump stations and water mains. This meter provides accuracy up to 0.5% and flow rates ranging from 0.07

to 33,000 gpm on pipes as large as 48 inches. Designed to clamp onto the outside of pipes, the meter does not contact the internal liquid, allowing for installation without shutting down operations in new and retrofit applications. It is equipped with an internal clock and built-in 8 GB data logging capabilities to log flow down to one second. It also pairs with dual clamp-on resistance temperature detectors for Btu energy measurement. **877-243-1010; www.badgermeter.com**

#### BLUE-WHITE INDUSTRIES PROSERIES-M MS-6

The ProSeries-M MS-6 chemical feed flowmeter from Blue-White Industries accurately measures output from metering and dosing pumps to ensure proper dosing to critical water and wastewater treatment systems. It ensures precision accuracy when measuring flow, and the sensor's design provides a wide flow range from 0.158 to 158.5 gph. The sensor provides the operator with an almost immediate indication if there is a problem with metering pump operations. It has low pressure drop of less than 1 psi. Because the sensor is equipped with wetted parts constructed of PVDF and PEEK, it will handle harsh and corrosive chemicals associated with water and wastewater treatment. The end fittings are included with the unit and allow for more than 14 inlet and outlet configurations. **714-893-8529; www.blue-white.com**



ProSeries-M MS-6 flowmeter from Blue-White Industries

### KELLER AMERICA ECONOLINE

The Econoline pressure transmitter from Keller America combines a media-isolated piezoresistive silicon sensor with signal-conditioning electronics to provide a compact pressure transmitter with less than plus or minus 1% total error band accuracy over 32 to 122 degrees F. The industry standard 4-20mA analog output is compatible with most existing monitoring infrastructure and SCADA systems, and it provides meaningful output in ranges from 30 to 10,000 psi. Its design makes it suitable for use under harsh environmental conditions, including those with high levels of electromagnetic radiation, both conducted and radiated. As a result, it provides trouble-free service and sufficient accuracy for almost any application, including those involving aggressive media and/or high levels of electromagnetic interference and where small size, low weight and reasonable cost are required. It provides versatility for customer-specific applications and is produced using modern lean manufacturing methods, allowing short lead times, negating the need to maintain extra inventory on site. **877-253-5537; www.kelleramerica.com**



Econoline pressure transmitter from Keller America

### PMC ENGINEERING VERSALINE VL2000-SW SERIES



VersaLine VL2000-SW Series level transmitters from PMC Engineering

VersaLine VL2000-SW Series submersible level transmitters from PMC Engineering are designed for use in wastewater pump/lift station applications. The ceramic capacitive sensing element provides a rugged open-faced design that avoids clogging or sludge buildup from the materials often encountered in

wastewater. The stainless steel construction will satisfy most applications, but a Titanium option is

available where the chemical environments dictate. The sink weight SW2000 was developed specifically for the VL2000 Series, and is replaceable. This provides a "cage" sink weight/anchor for transmitters installed on the bottom of wastewater or sewage lift tanks. The standard polyurethane vented cable is molded to the transmitter, providing a high-integrity waterproof assembly. **203-792-8686; www.pmc1.com**

### VEGA AMERICAS VEGAPULS

VEGAPULS radar level sensors from VEGA Americas are 80 GHz sensors that use precision focusing to deliver reliable measurements regardless of internal obstructions or ambient conditions such as temperature changes or condensation. The stand-alone loop-powered sensors are available in a compact version with cable connection housing or a standard version with fixed cable connection (IP68). The instrument series is complemented with optional VEG-AMET controllers. All instruments and controllers can be adjusted via Bluetooth with a smartphone or tablet. This makes setup, display and diagnostics considerably easier, especially in harsh environments or hazardous areas. **800-367-5383; www.vega.com tpo**



VEGAPULS radar level sensors from VEGA Americas



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By Craig Mandli

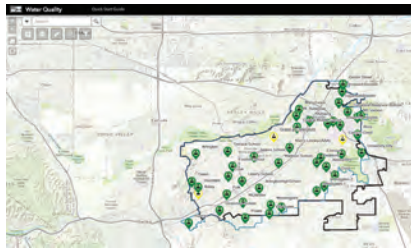
## Integrated software platform streamlines compliance and protects data integrity

### Problem

Riverside (California) Public Utilities was using different platforms to manage data, including programs for water-quality management, one to centralize data sourced from other business systems including SCADA, a GIS and an asset management/work order system. While the technology was current, the data was still siloed and isolated.

### Solution

The agency used the **WaterTrax API** from **Aquatic Informatics** to seamlessly integrate with third-party systems in a secure and automated manner, providing a holistic view of the distribution system, treatment plant process control and groundwater well samples. Having all the data funnel into a central system in real time means staff no longer needs to manually extract data before performing data manipulation.



#### RESULT:

The integration has yielded other benefits, with visual displays and automatic updates. Dashboards are displayed on a secure site. This has improved efficiency in water-quality management. Having the big picture in one place allows the utility to improve performance. **877-870-2782; www.aquaticinformatics.com**

## Centralized valve control reduces operating costs

### Problem

At a metropolitan wastewater treatment facility on the West Coast, wind and rain exposure had degraded the performance of the 15-year-old pneumatic solenoid valve system used for piloting critical process valves for water flow control. The manifolds were near the exterior process valves, exposing the electronic components to harsh conditions. This configuration also complicated maintenance and hindered troubleshooting.

### Solution

**Emerson** provided an **automation architecture** that integrates pilot valve manifolds and fieldbus electronics into a single easy-to-access, NEMA 4-rated enclosure networked with the facility's control system, providing more centralized control and easier maintenance. The turnkey solution was engineered and optimized for the municipality's requirements and arrived preassembled, tested and ready to install. It serves as a central valve control point that reduced upfront expense and operating costs.

#### RESULT:

Centralized valve control simplified the connections for the pilot valve network, saving energy and reducing downtime. The improved reliability reduces the facility's downtime, saving considerable water purchase costs. The centralized pilot valves run on just 0.8 watt, versus traditional valves that use up to 7 watts. **800-972-2726; www.emerson.com**

## Analyzers enable plant to monitor continuously and adapt to changing conditions

### Problem

The Plant City (Florida) Water Reclamation Facility uses only about half of its 10 mgd capacity. Fourteen percent of the flow comes from industries including metal treating, fiberboard construction, food processing and dairying. Given the diverse and variable loading, operators couldn't collect grab samples often enough to control aeration and maintain compliance.

### Solution

To take the guesswork out of managing the process, the facility installed two **UV-4100 process analyzers** from **ChemScan, an In-Situ Co.**, that were configured for analysis of ammonia, nitrate, nitrite and phosphorous. An external sample sequence controller (also ChemScan) manages the sample flow from each sample location. The system is designed for continuous operation so that a new sample line flushes while the previous sample is analyzed. Each parameter at each sample location has its own calibration and sends a dedicated signal showing the results to the SCADA system, where the data is used to control aeration rates, recirculation rates and chemical feed.



#### RESULT:

"Our analyzers are the heart of the plant, and our staff can operate them with minimal training," says Pat Murphy, chief plant operator. "We needed a process that was operator friendly, durable and long lasting. The online analyzers have been the key to making this a reality." **800-665-7133; www.chemscan.com**

## City improves water treatment monitoring

### Problem

The City of Haverhill (Massachusetts) Water Division serves 58,000 residents and businesses and produces 2 billion gallons of water per year. The plant is manned continuously. Water comes from three sources; the city needed to better monitor water treatment and maintain high quality.

### Solution

**GE Digital's iFIX** allowed the city to move to a **computerized process** environment, giving it a cohesive system to follow procedures and respond to events in a consistent and sequenced manner. Management went further by purchasing laptops for on-call operators, enabling them to control operations from any location.



#### RESULT:

The move has given the plant more flexibility and reduced cost. "With iFIX, you can dial in the plant, get it set up and don't have to watch it as closely," says John D'Aoust, plant manager. "The team has all the features of the control room in their hands." **800-433-2682; www.ge.com/digital**

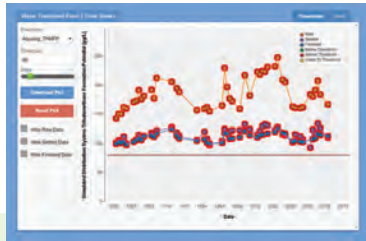
## Water company overcomes disinfection byproducts problem through collaboration

### Problem

The Middlesex Water's 60 mgd Carl J. Olsen Plant in Edison, New Jersey, saw high total organic carbon in the source water, causing high disinfection byproduct levels, mainly trihalomethanes, in parts of the distribution system where chlorine was used. The plant needed to quickly predict, identify and optimize organics removal to mitigate THM formation and ensure compliance with increasingly stringent regulations.

### Solution

The plant teamed with **HORIBA Scientific**, which recommended its **Aqualog spectrofluorimeter**. It simultaneously measures absorbance-transmittance spectra and fluorescence excitation-emission matrices (A-TEEM) within two to three minutes per sample, up to 100 times faster than conventional fluorimeters. HORIBA also supplied the Aqualog Datastream Dashboard using multivariate analysis to provide early warnings of TOC composition and concentration, which directly relates to DBP precursors, THM formation potential and key THM species' concentration.



#### RESULT:

The Datastream Dashboard-validated THM model yielded an adjusted  $R^2 = 0.980$  with a slope = 0.956, and it reported close correspondence to each THM species concentration. This allowed for a reagent-free method that rapidly predicts THM and species concentrations. The plant staff uses the information to adjust treatment and minimize THM formation. 732-494-8660; [www.aqualog.com](http://www.aqualog.com)

## Process turbidimeters helps water utility save an entire shift's worth of operator's time weekly

### Problem

Central Arkansas Water's Jack H. Wilson Plant has collected data and conducted a self-assessment and is working toward system optimization. During this process, the staff identified inefficiencies in the process turbidity workflow. One operator would spend six to eight hours per week (an entire shift) cleaning the turbidimeters. In addition to cleaning, the plant had a standard operating procedure to collect a manual grab sample every four hours.

### Solution

The utility selected **Lovibond PTV Series Process Turbidimeters**. "This is the only turbidity meter I have ever seen that worked correctly right out of the box," says Alan Dickey, instrument technician. The instruments were easy to install and use and require little maintenance. The instruments are now cleaned quarterly along with scheduled calibrations. This freed six to eight hours per week for other operating duties.



#### RESULT:

The plant continues to run monthly dry verifications on the turbidimeters. The PTV Series instruments deliver such consistent and reliable data that the every-four-hours grab sample procedure has been abandoned. Operators appreciate the hands-off dependability of the instruments and the time savings. 800-922-5242; [www.lovibond.com](http://www.lovibond.com)



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## County takes a proactive stance toward climate change

### Problem

Expecting more flooding due to changing climate, Maryland's Baltimore County has been revamping sewerage lift stations to be flood-resistant. One at a time, conventional below-grade electric pumps are being replaced with submersible dry/wet pumps. During a flood, these pumps provide uninterrupted service, even underwater. The county sought to monitor pump performance and prevent pressure switches from shorting out during floods, and it aims to make sure pressure instruments wouldn't become clogged with debris.

### Solution

The county combined an SOR 805PT submersible transmitter with an **Onyx Valve Isolator Ring**. The transmitter, designed for continuous submergence, sends an analog signal to a control station above maximum flood elevation. The Isolator Ring protects the transmitter and is guaranteed never to clog or plug.



#### RESULT:

During floods, the Isolator Ring and transmitter continue sending pressure signals to the control panel, even when submerged for days or weeks at a time. 856-829-2888; [www.onyxvalve.com](http://www.onyxvalve.com)

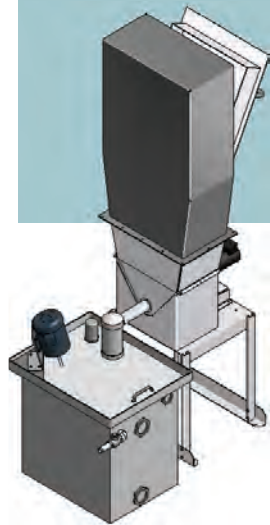
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case studies

DIGITAL TECHNOLOGY

## PC-based HART communicator saves cost and increases functionality

### Problem

Evoqua Water Technologies builds water and wastewater treatment systems controlled by industrial automation using HART-based instrumentation. Commissioning and servicing of these systems requires a staff of field service engineers, each needing tools to configure HART devices. Hand-held communicators for each engineer are costly, require frequent battery charging and require engineers to carry an additional device.

### Solution

The **ProComSol DevCom2000 Smart Device Communicator** PC application with a ProComSol USB HART modem was selected. DevCom2000 uses standard HART DD files to communicate with HART devices, allowing the engineers to use the laptops they are already carrying to configure HART devices.

### RESULT:

Steve Bachechi manages eight field service engineers serving the Colorado area. In addition to the cost savings, the DevCom2000 communicator can cover the engineers with only five licenses using the flexibility of the DevCom2000 licensing manager. This combination saved Evoqua \$16,000 to \$32,000 in equipment costs. An additional benefit is the ability to save configurations to PC files for cloning devices, share device configuration and archive configurations for future device replacement. **877-221-1551; www.procomsol.com**

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## Instrumentation allows plant to make quick corrections

### Problem

At Bucklin Point Wastewater Treatment Plant, an advanced BNR facility in Providence, Rhode Island, the loss of a recirculation pump in one of their trains caused SCADA to show significant changes in ammonia, nitrate and ORP.

### Solution

Bucklin Point monitors its nitrogen removal process with the **YSI IQ SensorNet online instrumentation system**. In regular operation, the YSI VARiON (ammonium and nitrate) and SensoLyt (ORP) sensors provide trending to adjust swing zones and recirculation pumps. These sensors also offer assurance that the process is operating correctly, and alert the operators of any process issues. The sensors were able to alert the operators of the process issue, and document the drastic process changes with one pump malfunction.

### RESULT:

Sharp changes occurred in both anoxic and aerobic zones. Anoxic ammonia doubled from 7 to 14 mg/L, while the aerobic ammonia reduced from 2.5 mg/L to 0.5 mg/L, and aerobic nitrate decreased from 7 mg/L to 4.5 mg/L. The ORP trends in each zone suggest significant changes to biological activity with the anoxic zone dropping by 50 mV and the aerobic ORP decreasing by 30 mV. The operators were quick to react to the malfunctioning recirculation pump and returned to regular operation in only three hours. **937-688-4255; www.ysi.com tpo**



## Anue Water Technologies

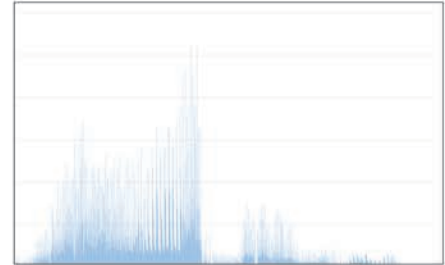
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### GF Piping Systems Signet 2580 FlowtraMag flowmeter

GF Piping Systems' full-bore Signet 2580 FlowtraMag magnetic flowmeter is designed specifically for high-accuracy flow measurement

## product spotlight wastewater

### Dosage control allows for treatment optimization

By Craig Mandli

Unforeseen problems often lead to disastrous, expensive consequences in a wastewater treatment environment. However, technological advancements are giving operators the ability to predict problems before they happen in several facets of the treatment cycle. The **S.sensing CS wastewater monitoring system** from **U.S. Water, a Kurita Co.**, offers innovative equipment to control and automatically adjust chemical dosage in wastewater treatment systems.

The automatic, chemical injection monitoring system is designed to control coagulant for optimum results. The monitoring system uses a laser-based technology and provides in-situ measurement of turbidity between the flocs. This enables the system to control product dosage at the inlet of the sedimentation basin, ensuring correct dosage of treatment, reduced labor costs and sludge disposal, consistent effluent quality and reduced surcharges.

"Utilizing technology to turn data into intelligent action is relatively young, and the benefits are just emerging," says Michael Murdy, director of Digital Solutions for U.S. Water, a Kurita Co. "As society expands the use of artificial intelligence and machine learning into industrial business operations, many opportunities will develop to save time or money, increase production, identify and mitigate risks, or make operations safer."

Industrial wastewater treatment systems typically control dosage according to a turbidity measurement



S.sensing CS from U.S. Water, a Kurita Co.

at the sedimentation basin outlet. This results in a time delay of dosage control. S.sensing CS technology eliminates this drawback by measuring the clear-water phase between the flocs. This makes it possible to adjust dosages according to the inlet water quality. Too-high and too-low dosages are therefore avoided. Pumps are immediately adjusted to match the load of the inlet water. The result is a smooth process with stable water quality at an optimum product dosage and a reduction in sludge formation and its attendant costs.

According to the company, the S.sensing CS system supports efforts to proactively predict challenges, create more efficient water treatment specifications, achieve higher productivity and reduce environmental impact. That can make it a valuable tool in the effort to identify challenging water issues, ensure same-time optimum dosage, and promote a smooth and stable plant operation.

"As the integration of technology iterates, society will become more comfortable with its ability to make intelligent decisions," Murdy says. "We each play a role in ensuring the technology is used responsibly — augmenting human intelligence, not replacing it." **866-663-7632; [www.uswaterservices.com](http://www.uswaterservices.com)**

in short pipe runs. High accuracy is achieved with a new sensor design that has shorter inlet and outlet pipe lengths and certified factory calibration. All-thermoplastic construction provides corrosion resistance for a long, maintenance-free service life. Available in pipe sizes of 1-, 2- and 4-inch PVC Schedule 80, the FlowtraMag is lightweight. The unit offers accuracy of plus or minus 1% of reading and offers repeatability of plus or minus 0.5%. Applications include water treatment skids, batch processing, chemical processing and transport, fluid dispensing, water distribution, reverse osmosis, liquid delivery systems, clarified effluent, metal recovery and landfill leachate, and many more.

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### Parkson Corp. TumbleOx nitrification reactor

Parkson Corp. released the TumbleOx nitrification reactor, which provides a simple, easy-to-operate and cost-effective solution to reduce effluent ammonia levels in lagoon-based treatment plants. The reactor consists of a partially submerged rotating drum filled with media. The unique media design maximizes surface area for high concentrations of bacteria to form and provides aeration as the media moves in and out

of submergence during drum rotation. Multiple drum configurations are available and can be designed for installation in owner-supplied tanks or as prepackaged, factory-built units.

**888-727-5766; [www.parkson.com](http://www.parkson.com)**



### HEMCO Modular Clean Labs

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## Krausz USA HYMAX digital Application Selection Guide

The HYMAX digital Application Selection Guide from Krausz USA is a web-based app that enables users to find the right HYMAX product for any water or wastewater pipe repair. Searches can be done according to the field situation of the repair, such as a crack or hole in the pipe; the application, as if a pipe needs to

be connected or restrained; and the HYMAX product name. The HYMAX digital Application Selection Guide is an effective tool for installers in the field, operations directors and superintendents, purchasing directors and warehouse managers, and engineers.

855-457-2870; [www.krauszusa.com](http://www.krauszusa.com)



## Endress+Hauser SRP700 asset health monitor

Endress+Hauser's SRP700 asset health monitor is a preengineered software-based solution for Rockwell Automation systems and tailored for various industries. The solution accesses field instrumentation diagnostics and presents it in a readable format to plant personnel, improving transparency, reducing maintenance costs and increasing plant availability. The SRP700 runs

on traditional hardware or in a virtual machine environment, and it is comprised of a central monitor and gateway, a standard client for device configuration management as well as a mobile client, and the Field Xpert SMT70 IP65/Class 1 Div 2 industrial tablet. It is used to access and acquire data from a variety of field devices, primarily analyzers and instruments.

888-363-7377; [www.us.endress.com](http://www.us.endress.com)



## Flomatic Valves Sylax 3 butterfly valve

The Sylax 3 lug-style and wafer-style butterfly valves from Flomatic Valves have strong ductile iron bodies, 316 stainless steel disc as standard, an EPDM seat and stainless steel stems. The valve is rated for 250 psi bidirectional and dead-end rating, and it has a 230 degree F maxi-

imum temperature rating. The valve is NSF/ANSI 61 and 372 certified for use with ANSI 125/150 pound flanges with a standard curved ergonomic handle and standard ISO 5211 top flange for easy actuation. The valves are available with gearbox or several other actuator options. Two models are available: Model S3W wafer type and Model S3L full-lug type in a size range from 2 through 12 inches, each with a standard lever handle, optional gear operation or electric actuation.

800-833-2040; [www.flomatic.com](http://www.flomatic.com)

(continued)

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## product spotlight water

### LED technology makes UV water treatment more efficient

By Craig Mandli

Ultraviolet disinfection is a well-established method for achieving adequate disinfection of drinking water. The process is intended to inactivate human pathogens such as viruses, bacteria and protozoa that are potentially present in raw water before receiving proper disinfection. As water passes through the UV unit, an ultraviolet range of light inactivates these human pathogens.

Conventional UV disinfection systems for water treatment use UV mercury lamps. However, **Acuva Technologies** has now applied the technology to the energy efficiency of LED lighting in its **UV-LED water disinfection system**. The system, according to Manoj Singh, president and CEO of Acuva, uses the proven technology of ultraviolet germicidal irradiation and LED lights to disinfect drinking water that is produced in an energy-efficient and environmentally friendly manner.

“We believe that access to safe drinking water is everyone’s fundamental right,” he says. “But even today, around 25% of the global population does not have access to safe drinking water. This is primarily because current technological options either do not produce adequate purity or they do not work with the current infrastructure available.”

UV disinfection uses strong short-wavelength radiation to inactivate microorganisms by destroying the nucleic acids and disrupting their DNA. The Acuva system purifies water in two steps. A composite filter removes sediment while activated carbon removes impurities. The UV-LED chamber then sterilizes harmful bacteria and viruses.

“Unlike chemical treatment techniques, UV is free of harmful byproducts,” says Ashkan Babaie, director of Advanced Engineering for Acuva. “It doesn’t change the taste, odor or color of the water.”

In addition, according to Acuva, UV-LED technology is more compact, uses less power, starts instantaneously and offers a longer life span than mercury lamps.

These capabilities allow it to be used in a more flexible nature in not only homes and businesses, but also watercraft, recreational vehicles and remote vacation homes and cabins with suspect drinking water quality.

Acuva’s IntenseBeam technology allows for precise control of optics, hydrodynamics and kinetics within the UV chamber to deliver an intense beam of ultraviolet light directly into flowing water, creating additional efficiencies. The optic and hydrodynamic design creates a controlled environment matching water velocity and UV irradiance to ensure full disinfection throughout the chamber. These complete low-power, flow-activated systems save on power consumption while extending LED life.

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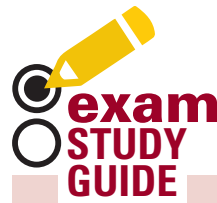
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## WASTEWATER

By Rick Lallish

Where can an operator look to find specific laboratory procedures and the proper compliance for those procedures?

- A. NPDES permit
- B. Wastewater textbooks, such as the Office of Water Programs, California State University, Sacramento textbook: *Operation of Wastewater Treatment Plants*
- C. Plant standard operating procedures
- D. Water Environment Federation guidelines and procedures

**ANSWER:** A. The actual source for addressing laboratory testing is the facility's NPDES permit. Parameters are spelled out as to what is monitored and what test must be used. The laboratory testing is governed by standard procedures published by professional organizations and the various state and federal agencies. It is important for operators and lab technicians to understand these guidelines and procedures in order to properly conduct testing needed to monitor plant processes and effluent parameters. More information may be found in the Office of Water Programs, California State University, Sacramento textbook: *Operation of Wastewater Treatment Plants*, volume one, eighth edition, Chapter 9.

## DRINKING WATER

By Drew Hoelscher

At what water temperature would an operator expect the highest dissolved oxygen concentration in mg/L?

- A. 50 degrees C
- B. 30 degrees C
- C. 10 degrees C
- D. 0 degrees C

**ANSWER:** D. Introducing dissolved oxygen into the water through aeration is common practice when treating groundwater with elevated levels of carbon dioxide, hydrogen sulfide, methane, volatile organic chemicals or iron. The amount of oxygen that can remain dissolved in the water depends on the water temperature. The colder the water, the higher the dissolved oxygen concentration in mg/L. For example, at 0 degrees C, water can hold 14.621 mg/L dissolved oxygen; at 50 degrees C, it can hold only 5.477 mg/L.

### 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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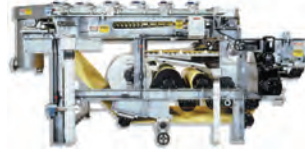
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### Xylem succeeds in exceeding its GHG target

Xylem announced it had succeeded in reducing greenhouse gas emissions intensity, exceeding its planned target. Xylem's 2019 sustainability report, *Water for a Healthy World*, revealed the company had achieved a 28.3% reduction in GHG intensity, against a target of 20% set in 2014. The report also demonstrated overachievement or material progress on all of its 2019 sustainability targets.

### SEPEX launches new Extended Warehouse inventory tool

The Extended Warehouse positions a large inventory of SEPEX parts across North and South America so parts no longer have to come directly from the manufacturing facility in Enon, Ohio. Users have the ability to search for needed parts and quickly locate available inventory, allowing SEPEX partners to find inventory near their customers, reducing the time required to fulfill customers' orders.

### Thompson Pump celebrates 50th anniversary in 2020

Thompson Pump is celebrating its 50th anniversary in business in 2020. The company was founded in Port Orange, Florida, in 1970 by George A. Thompson and his sons Bill and George M. At the time of its inception, George A. had been working as an operating engineer in NASA's Apollo program, his son Bill had just finished college and his younger son George M. had recently completed high school. From its beginnings as a dewatering contractor, Thompson Pump soon turned its focus to making and selling the pumps they had been using as a subcontractor. The company now serves the pumping and dewatering needs of more than 6,000 national and international clients.

### BlueTech Research and Imagine H2O strengthen partnership

BlueTech Research, a provider of water technology market intelligence, and Imagine H2O, global water accelerator, have signed a memorandum of understanding, further enhancing their successful seven-year collaboration. This step is part of a shared mission to positively impact the sector, support the entrepreneurial business ecosystem and create value through innovation, investment and technology.

### Mueller Water Products launches new international website

Mueller Water Products announced the launch of the Mueller International website, [www.mueller-international.com](http://www.mueller-international.com). The website showcases a broad product and service portfolio with a friendly user experience, designed to meet the needs of the global market. Specifics include newly developed data sheets and detailed regional information about a wide range of solutions, including engineered valves, fire hydrants, metering products and systems, leak detection and pipe condition assessment.

### Victaulic adds virtual access to continuing education program

Victaulic announced the launch of its free virtual training program, Victaulic University, which provides plumbing, heating and air conditioning professionals along with other construction, engineering and design professionals more convenient access to continuing education in these trying times and beyond. A sample of the PHA and Virtual Construction Design courses include Pressure Control Solutions for Potable Water; Thermal Movement Accommodation for Riser Applications; Accommodating Pipe Movement/Noise and Vibration Attenuation; Victaulic Tools for Revit: Increasing Modeling Efficiency; and Victaulic Tools for Revit: Making Fabrication Possible.

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### Mitchell Lewis & Staver announces financial support programs

In an effort to help customers impacted by COVID-19's effect on the economic downturn, Mitchell Lewis & Staver announces Mitchell Assist, a portfolio of financial support initiatives and programs. This marks the first time in the history of the industry that a distribution company has offered such a robust program that provides immediate assistance to essential businesses that work every day to address water challenges vital to the safety and health of our communities and the viability of our nation's infrastructure.

### ClearSpan offers cooperative purchasing

ClearSpan is a contract holder of Sourcewell and offers its municipal customers cooperative purchasing. With Sourcewell, municipalities work directly with ClearSpan through a simple purchase order process while satisfying all local and state procurement regulations. This allows local governments to get a structural solution quickly and when they need it most. **tpo**

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## people/awards

The **Palm Springs Wastewater Treatment Facility**, operated by Veolia North America, received the 2019 small wastewater plant award for safety from the California Water Environment Association.

The **City of St. Albans Wastewater Treatment Facility** upgrade and phosphorus removal project received the Merit Award in the water supply/treatment category from the American Council of Engineering Companies of Vermont.

**Robert Lindley**, assistant wastewater utility superintendent for the City of Monticello, received the Wastewater System Operations Specialist of the Year award from the Alliance of Indiana Rural Water.

**North Port Utilities** won three awards from the Florida Water Environment Association:

- The **North Port Wastewater Treatment Plant** and **operations team** received the coveted Earle B. Phelps Award for outstanding water quality and service.
- The **Utilities Department** earned the David W. York Reuse Award for the Tommy's Car Wash project on Sumter Boulevard.
- Meter reader **Angela Coppock** received the Samuel R. Willis award for heroism in assisting with a motorcycle accident.

The **Clayton County Water Authority** staff received 2020 awards from the Georgia Association of Water Professionals:

- The **Northeast Water Reclamation Facility** was named the Wastewater Plant of the Year for the advanced treatment 6 to 9.9 mgd category.
- **Jordan Cole**, pelletizing chief operator at the W.B. Casey Water Resource Recovery Facility, was named the District 3 Wastewater Top Op.
- **Mike Harp**, general services lead maintenance technician, was named Top Maintenance Technician 2020.

**Roy Light** retired after 25 years with the Eastsound (Washington) Sewer and Water District, most recently as general manager. He was replaced by **Christopher Giesting**.

The **Middlesex Water** legal department, headed by Jay L. Kooper, received a 2020 Professional Excellence Award from the *New Jersey Law Journal*.

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The East Bay Municipal Utility District in Oakland, California, appointed **Clifford Chan**, a 23-year employee, to replace **Alexander Coate** as general manager. Coate retired after 27 years.

The Hudson River Watershed Alliance in New York honored 2020 Watershed WaveMakers for protecting water resources: **Peter Smith** of the Quassaick Creek Watershed Alliance, the **Upper Hudson Watershed Coalition**, the **Albany Water Department** and **Hudson River Sloop Clearwater**.

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

## events

### Sept. 14-17

Virginia Section AWWA and Virginia Water Environment Association WaterJAM, virtual. Visit [www.vaawwa.org](http://www.vaawwa.org).

### Sept. 16-17

MI-ACE 22020: A Virtual Experience, virtual. Visit [mi-water.site-ym.com](http://mi-water.site-ym.com).

### Sept. 16-18

Wisconsin Section AWWA Annual Conference, virtual. Visit [www.wiawwa.org](http://www.wiawwa.org).

### Sept. 16-18

South Dakota AWWA Annual Conference, Aberdeen, South Dakota. Visit [www.sdawwa.org](http://www.sdawwa.org).

### Sept. 20-23

New England Water Works Association Annual Conference, virtual option and in-person option at Omni Mount Washington Resort, Bretton Woods, New Hampshire. Visit [www.newwa.org](http://www.newwa.org).

### Sept. 22-25

Ohio Section AWWA Annual Conference, virtual. Visit [oawwa.site-ym.com](http://oawwa.site-ym.com).

### Sept. 22-25

Minnesota Section AWWA Annual Conference, virtual. Visit [www.mnawwa.org](http://www.mnawwa.org).

### Oct. 3-7

Water Environment Federation Technical Exhibition and Conference (WEFTEC), virtual. Visit [www.wef.org](http://www.wef.org).



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