

TREATMENT PLANT OPERATOR

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DEDICATED TO WASTEWATER & WATER TREATMENT

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MAY 2015

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Wastewater Treatment Operator
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on the cover

Josh Willison, the Missouri Water and Wastewater Conference's Young Professional of the Year, has advanced quickly in his career and now serves as a wastewater operator for Alliance Water Resources at the Franklin County Water & Sewer District. (Photo by Kris Wilson)

top performers:

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Handmade Excellence

Teams at Amarillo's two clean-water plants achieve Platinum-quality performance by applying manual methods instead of relying on automation.

By Jim Force

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Combining Talents

A Pennsylvania water treatment plant improves operations to meet stringent turbidity goals and receives Partnership for Safe Water Presidents Award.

By Trude Witham

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Vision Made Real

A Tennessee utility district builds an award-winning membrane water treatment plant, saving money and ensuring a quality supply to meet rapid growth.

By Trude Witham

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Career Builder

Josh Willison made all the right moves as a young Missouri wastewater operator, learning the treatment business, serving the community and winning a prestigious award.

By Jack Powell

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Clean Water Services helps sponsor a contest in which Oregon craft brewers create beer from river water collected downstream of wastewater treatment plants.

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By Scottie Dayton

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By Doug Day

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Maintenance technician Rod Ewing put his artistic talent to work to beautify a digester at a clean-water plant in Port Orchard, Washington.

By Jeff Smith

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As a new plant superintendent, Jeff Mahagan wasn't content with 'the way we've always done things.' He patiently and successfully changed an established culture.

By Ann Stawski

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Settleability Test: A Valuable Tool

By paying close attention to this simple test, operators can gain valuable insight into the biological treatment process and maintain high-quality effluent.

By Ron Trygar

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coming next month: June 2015

**FOCUS: Odor Control and Disinfection/
ACE 2015 Show Issue**

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» Top Performers:

Water Plant: Verdigris Water Treatment Plant, Broken Arrow, Oklahoma

Water Operator: Kevin Williams, Kansas City, Missouri

Wastewater Biosolids: Landfill restoration in Vancouver, British Columbia, Canada

Wastewater Operator: Steve Woodworth, City of Oconto, Wisconsin

» How We Do It: Ultrasonic algae control in Short Hills, New Jersey

» Hearts and Minds: Reuse water promotion in Pompano Beach, Florida

» Building the Team: Training for growth in Woodstock, Virginia

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» In My Words: Noting success in water leak prevention

» PlantScapes: Wetland complex in Fort Worth, Texas

» Technology Deep Dive: Hybrid thickening system from Centrisys

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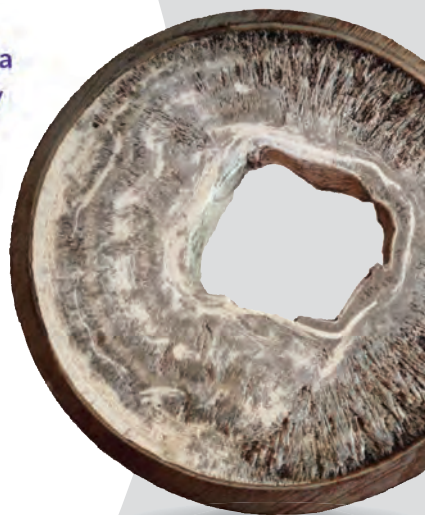
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let's be clear

The Case for Old School

TECHNOLOGY IN TREATMENT IS GREAT. BUT IS THERE A POINT WHERE TOO MUCH DEPENDENCE ON DIGITAL MAGIC BEGINS TO DULL OPERATORS' SENSES AND MAKE THEM LESS PROFICIENT?

By Ted J. Rulseh, Editor

You could call Jim Stover a throwback. As wastewater treatment superintendent in Amarillo, Texas, he expects his teams to function with minimal reliance on technology.



We might easily question his approach: Technology is proven to enhance process control and help deliver high-quality effluent. But Stover believes that the more operators perform work manually, the better they understand the process.

And just maybe he's on to something: Both of Amarillo's clean-water plants (see the feature story in this issue) have won NACWA Platinum Awards for perfect permit compliance for several years in a row.

It's worth asking the question: At what point does technology become a crutch? At what point does excessive reliance on it hinder operators' effectiveness?

USING THE SENSES

I'm reminded of a conversation with a 60-year-old industrial engine mechanic who told me his best diagnostic tools included his eyes, ears and nose. On walking into an engine room, he would notice right away if something didn't look, sound or smell quite right. Might his perceptions have been more valuable at times than the digital readouts on the control panel?

I also look to my own experience with photography. I came up in the newspaper business using a single-lens reflex camera with manual focus and manual adjustments for film speed, shutter speed and lens aperture. Now I have a digital camera that is fully automatic — just point and hit the button.

Yet I know I was a better photographer (though not a professional) with the old camera. Why? Because the need to make adjustments shot by shot forced me to be fully aware of and adjust for the light conditions. And I could use tricks, like choosing the right combination of aperture and shutter speed to bring more or less of the subject matter into sharp focus, to decide what to emphasize in the image.

Of course, I can use the automatic camera in the manual mode and exert just as much control as with my 40-year-old Nikkormat. But automation is the default, so I have to con-

sult the user guide to relearn the manual settings. Most of the time I'm too lazy to do so — and anyway, I usually get good-enough shots in the automatic mode.

And there's the key word: "usually." Sometimes, as with a dark background or strong backlighting, the conditions fool the electronics, and the results are dreadful.

ART AND SCIENCE

Are there parallels in the world of wastewater treatment? I'm certainly not a professional where that field is concerned, though I imagine most operators would agree when I say the profession is a blend of art and science.

Any number of factors can upset the process. Doesn't it take more to keep it under control than in-line sensors and feedback loops? Is there added value in the experienced operator with deep and nuanced knowledge of the process?

Influent varies, in some plants more than others. There are differences in dry and wet weather. There are differences from one part of the day or week to another. Industries can release slug loads. Sometimes materials get into the system that are toxic to the treatment microorganisms.

Any number of factors can upset the process. Doesn't it take more to keep it under control than in-line sensors and feedback loops? Is there added value in the experienced operator with deep and nuanced knowledge of the process? Someone with keen eyes and a sensitive nose? Someone who knows the way around a microscope and the instruments and chemical reagents in the lab?

I would be interested in your experiences with technology. What are its benefits and limitations? In solving a treatment problem, where does technology end and the hard-earned skill of an operator begin?

You are welcome to share your comments and your stories. Send a note to editor@tpomag.com. I promise to respond, and we will share selected stories in a future issue of *TPO*. **tpo**

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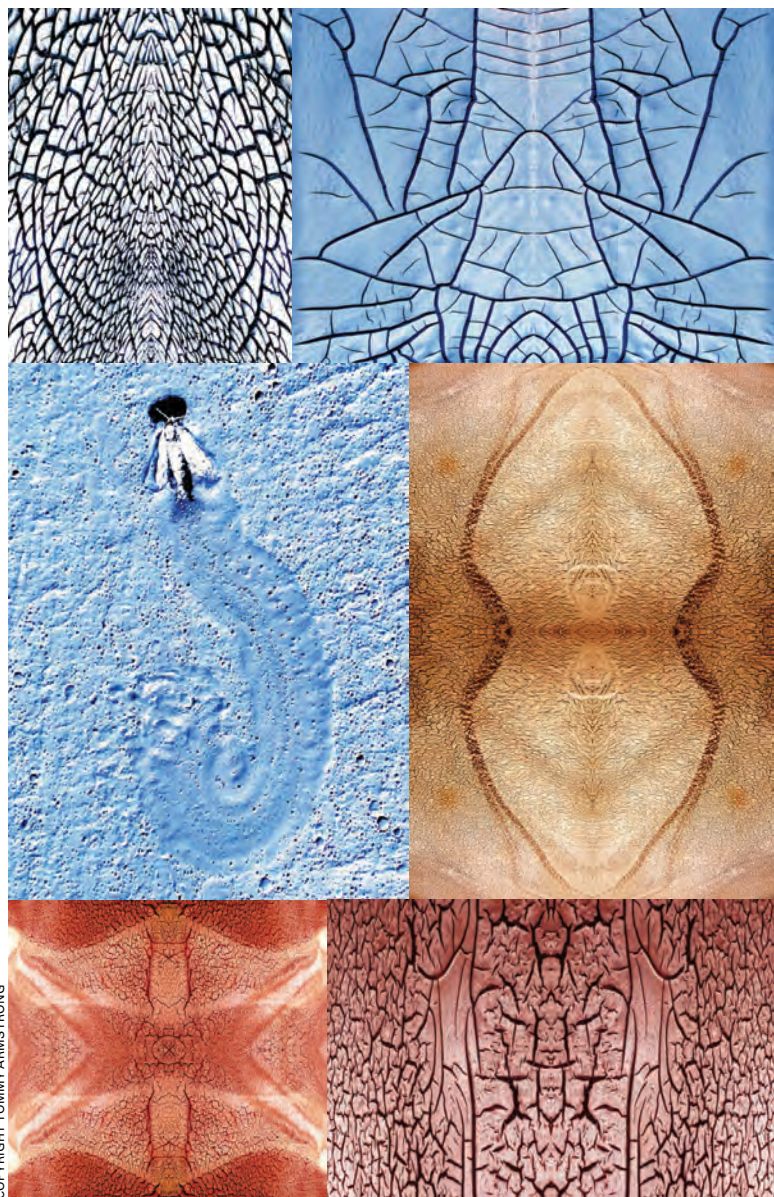
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SQUIGGLES & CRACKS

Creating Art from Biosolids

When Tommy Armstrong stares at the cracking mud of a dewatering bed, he sees more than drying biosolids. Take a look at how this North Carolina operator-turned-artist finds inspiration in the seemingly ordinary as he takes advantage of a controlled drying process. Trust us: You'll have a hard time picking a favorite.

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OVERHEARD ONLINE

“Perhaps it’s easy to assume you’ll be fine without a gas detector or confined-space gear ... But familiarity breeds complacency.”

Wait! Did You Check Your Gas Detector?

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PEDAL POWER

Going Green at the Plant

Forget golf carts and utility vehicles. At the Field’s Point Wastewater Treatment Facility in Rhode Island, workers are making their rounds at the 23-acre site via tricycles. But these aren’t the tricycles of your childhood. See how the idea is working, and why management hopes the change will save money and promote employee wellness.

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ON THE JOB

How to Train a Rookie Operator

Do you remember your first day on the job? Now that you’re the experienced one, how do you introduce a newcomer to wastewater treatment? Your rookie operator will probably be anxious about starting a new career, but you can help settle those nerves. Take this advice from an experienced manager, and see how you should handle those first days — and weeks — of training.

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Combining *Talents*

A PENNSYLVANIA WATER TREATMENT PLANT IMPROVES OPERATIONS TO MEET STRINGENT TURBIDITY GOALS AND RECEIVES PARTNERSHIP FOR SAFE WATER PRESIDENTS AWARD

STORY: **Trude Witham**

PHOTOGRAPHY: **Christopher Weddle**

WHEN THE PHILIPSBURG WATER TREATMENT PLANT received its first Partnership for Safe Water Directors Award in 1999, it already met combined filter effluent turbidity goals.

Still, the operations staff wanted a better way to analyze individual filter turbidity information from the SCADA system. The team developed a report that automatically analyzed the data to show the percentage of time individual filters met the turbidity goal of <0.1 NTU, a requirement for the Partnership Presidents Award.

“Our water quality supervisor, Scott Sharp, and our SCADA manager, Roger Sandak, developed the report, which calculates the 95th and 99th percentile for turbidity,” says Jane Moore, production supervisor. “That gave us a better way to accumulate the data so we could show that we were meeting the turbidity requirements.”

Source-water turbidity changes from drought and rain used to be a challenge. The Partnership program changed that. “It made us more equipped to handle source-water changes,” says Moore. “We added shutdown parameters in the SCADA and alarms that allow operators to troubleshoot problems before the system automatically shuts down.”

The changes paid off. With consistent individual filter turbidities of less than 0.1 NTU, and typically in the range of 0.04 NTU or lower, the plant received the Presidents Award in March 2014. It was only the fourth plant in the state to do so.

ADSORPTION PROCESS

Owned and operated by Pennsylvania American Water, the 2.3 mgd Philipsburg plant was built in 1988 and serves 20,000 people in the boroughs of

Scott Sharp, water quality supervisor with Pennsylvania American Water, performs a particle analysis using a microscope connected to a Zeta-Meter.

“ [The Partnership program] made us more equipped to handle source-water changes. We added shutdown parameters in the SCADA and alarms that allow operators to troubleshoot problems before the system automatically shuts down.”

JANE MOORE

Philipsburg, Osceola Mills, Chester Hill and Wallacetown, and portions of Rush, Morris, Graham, Decatur, Bradford and Boggs townships.

The heart of the system is a Microfloc Trident adsorption clarification packaged treatment plant (WesTech Engineering), chosen after a pilot study to determine the best treatment option for the new facility.

Other equipment includes four mixed-media filters (WesTech), liquid chemical feed pumps (LMI Pumps), Wallace & Tiernan chlorinators (Evo-



Philipsburg (Pa.) Water Treatment Plant

FOUNDED: | 1881

POPULATION SERVED: | 20,000 (7,600 metered customers)

SERVICE AREA: | **Boroughs of Philipsburg, Osceola Mills, Chester Hill and Wallaceton; parts of Rush, Morris, Graham, Decatur, Bradford and Boggs townships**

SOURCE WATER: | **Cold Stream**

TREATMENT PROCESS: | **Conventional, adsorption clarification**

DISTRIBUTION: | **293 miles of pipeline**

SYSTEM STORAGE: | **3.8 million gallons**

KEY CHALLENGE: | **Keep meeting Partnership for Safe Water goals; stay ahead of regulatory changes**

WEBSITE: | **www.amwater.com**

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qua Water Technologies), Depolox chlorine analyzers (Evoqua), 1720E turbidimeters (Hach Company), streaming current detector (Milton Roy) and actuators (AUMA) on the filter and clarifier flow control valves.

The water source is Cold Stream, a tributary to Moshannon Creek via one reservoir, along with a spring and three wells. Raw water is monitored for turbidity, treated with chlorine gas and alum, then monitored for pH, residual chlorine and streaming current. Treated raw water flows through



Dale Warner (left) and Dave Wildman, plant operators, with the plant's SCADA system.

ALLIANCE FOR PROTECTION

As part of its community outreach program, Pennsylvania American Water's Philipsburg treatment plant is a founding member of the Central Pennsylvania Source Water Alliance for Protection. This coalition of water companies and government agencies was formed to protect the watershed in Rush Township, Centre County.

The group meets monthly to discuss how to educate the public on watershed protection. "This includes issues like a new industry or highway and potential changes in regulations not directly associated with water that we need to monitor, such as coal mining or transportation," says Jane Moore, production supervisor.

Moore often speaks at civic group meetings and luncheons. She starts by asking where the group's drinking water comes from and is surprised how many don't know. "Most don't even think their tap water is safe to drink," she says. "If I can help the public understand how high quality their tap water is and how important source-water protection is, I believe they will take ownership of keeping their water resources safe."

The Philipsburg plant gives tours to civic groups, community leaders, school districts and Penn State University students and faculty. Operators help with the tours. "Dale Warner volunteered to handle the tour for the Philipsburg-Osceola Elementary School fourth graders this year, and did a really great job," says Moore. "Visitors seem to like to see the clarifier flush, so the operators will perform a flush from the control room while I am with the tour at the clarifier."

two adsorption clarifiers, which contain 4 feet of buoyant plastic granular media that traps and removes coagulated particles. Contact flocculation and clarification occur as the coagulated particles move through the media.

Clarifier effluent is monitored by turbidimeters and flows to the mixed-media filters. Combined filter effluent is treated with chlorine, caustic soda, fluoride and corrosion inhibitor before flowing to an underground clearwell.

Wastewater from filter backwash and clarifier flushes is collected in the wastewater clarifier. Settled solids are pumped to a drying bed, and the clarifier supernatant is recycled to the head of the plant each day.

SMALL TEAM

Three operators and a maintenance/relief operator run the Philipsburg plant and the chemical-only 1.5 mgd Penn 5 treatment plant, which treats Trout Run well water with chlorine, caustic soda, corrosion inhibitor and fluoride. Both plants feed into the same pressure

gradient so if one plant shuts down, the other delivers water.

"There is a 1-million-gallon tank in the pressure gradient," says Moore. "When both plants are operating, the excess water fills that tank when demand is low, and water from that tank provides water when demand is high. We determine what flow rate to set at each plant by the level in the tank."

Philipsburg operators test for turbidity, pH, chlorine residual, fluoride, hardness, alkalinity, chloride, iron, manganese, aluminum, zinc, conductivity and odor. The Penn 5 plant lab is equipped to analyze process chemicals for proper feed calibration; microbiological samples are analyzed at the Philipsburg lab.

Operators analyze grab samples from the clarifier and filter every day and check coliform levels in the reservoir. They also flush the clarifiers and filters and fill the day tanks. "They make treatment decisions based on water quality and operational issues," says Moore. "For example, if we know we are going to get a lot of rain, we will probably run the plant harder and make sure all the tanks in the system are full so we can slow down when the water is more difficult to treat."

Weekly, the operators inspect booster pump and pressure relief valve stations. They collect all compliance samples in the distribution system and handle customer water-quality inquiries in the field. "Typically, Scott and I get the service order that a customer has a question or problem with water quality," says Moore. "One of us talks to the customer to understand the problem, and then an operator will go out and



Water samples are tested regularly for chlorine content.

(continued)

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get a sample. Most of the time, the solution requires flushing a line.”

Operators also inspect the reservoir, wells and spring, collect samples, maintain equipment and keep an eye on the overall health of the watershed.

OPTIMIZING THE PROCESS

To continually meet Partnership for Safe Water goals, Philipsburg operators diligently collect and record the turbidity data and regularly clean and calibrate the turbidimeters. They use alum as a coagulant, and a streaming current detector to control the dose. When the source-water turbidity changes, they adjust the detector setpoint.

Under the Partnership, the staff began analyzing clarifier runtimes and pressure to optimize flushing. “When I started in 1992, the clarifiers flushed automatically based on time,” recalls Moore. “We were getting 16-hour runtimes and pressures less than 1.0 psi. Now, we look at pressure and performance to decide when to flush.”

“My team is really interested in their work, and they get excited when they figure out how to solve a problem or how to do something better.”

JANE MOORE

In normal conditions, the plant now achieves 72-hour runtimes. Operators typically flush at 1.5 psi for about 30 minutes. “They have complete control of each step and can make adjustments based on what they are seeing, which has been a tremendous improvement,” says Moore.

Typically less than 1.0 NTU, the raw water turbidity has sometimes increased to 5 or even 10 NTU. “One year we had 2 feet of snow followed by a spring rain that melted the snow overnight,” says Moore. “The resulting high turbidity in the reservoir made the water very difficult to treat.

“The first time this happened was in March 1993, and I had only been working as an operator for a few months. We already had a lot of snow from multiple storms. The turbidity was around 20 NTU, and the plant kept shutting down because we couldn’t treat the water.”

Although the plant’s permit allows it to operate the filters at 4 gpm/square foot, operators had to run at 1.5 gpm/square foot. “We didn’t have generators then, so when we did get the plant going, the power would go out and it

would shut down again,” says Moore. “This happened 11 times during that March storm.”

Now, the plant has automatic generators, and under high-turbidity conditions the operators minimize water drawn from the reservoir by slowing the plant down and using more water from the wells and spring. They can also increase the Penn 5 plant’s flow to make up the difference.

“Because we’ve optimized treatment with clarifier flushing and SCADA setpoints, we can achieve a higher removal percentage through the clarifiers,” says Moore. “We were getting 30 to 40 percent removal, and now we get around 75 percent during storms.”

(continued)

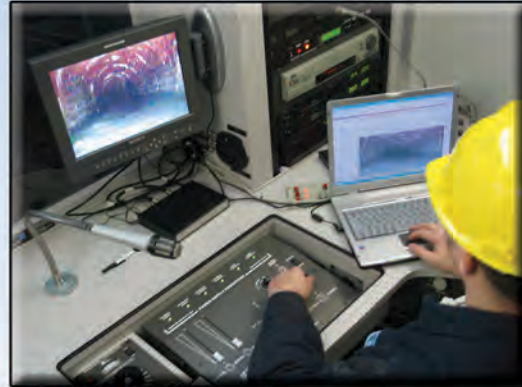


Jane Moore, production supervisor, in the water treatment plant filter room.

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MEETING CHALLENGES

Although the plants are automated, the numerous tanks, pumping stations and pressure-reducing stations keep operators on their toes. “Their biggest challenge is making sure all the systems are working properly,” says Moore. “They must do preventive maintenance and troubleshoot, and since we’re in a very rural area, sometimes just getting to the site can be a challenge, especially in winter.”

Pennsylvania American Water maintenance and water-quality groups lend support when needed, but Philipsburg operators are the first on site during a problem. “I am extremely fortunate to have such a great group of operators,” says Moore. “When there’s a problem, they work as a team to fix it. Each situation can require different skills. They combine their talents to come up with solutions we never would have thought of otherwise.”

Moore has been with the plant for 22 years. She began as an operator and was promoted to supervisor in 1998. Sharp, with Pennsylvania American Water for 20 years, is responsible for compliance sampling and reporting and assists with water treatment issues. Operators Charles Jones (28 years), Dale Warner (14 years) and Dave Wildman (six years) and maintenance/relief operator Harry Foster (seven years) report to Moore.

Jones has been with the Philipsburg plant since the beginning and has done everything from installing water mains and fixing leaks to reading meters and plant operations. Foster began as an operator before moving to his current position. The Philipsburg plant is staffed seven days a week from 7 a.m. to 11 p.m. Operators rotate on the second shift. The unmanned Penn 5 plant is remotely monitored.

ALWAYS IMPROVING

The Philipsburg and Penn 5 plants are constantly upgrading equipment to keep up with changing technology. “We find that the equipment we use rapidly becomes obsolete and should be replaced with the newer version,” says Moore. “For example, we upgraded to radio communication a few years ago. It is much more dependable with no wires to go down during a storm. I get paged and receive an email to let me know if there are tank level issues or a communication failure.”

Radio communication has saved time and money. Moore used to get an autodialed call for a plant alarm: “It could be at 3 a.m. and would just say ‘check water treatment.’ I had no idea what was wrong and had to call an operator to check it out. Now, I receive a text message that says ‘raw water turbidity high,’ and I can check on my home computer to see if the clarifiers and filters are working properly. So, it’s a great tool when deciding what action to take.”

As for future regulatory changes, the company’s water-quality group keeps an eye on what is happening. Says Moore, “We are usually in compliance with new regulations long before they actually take effect.”



Harry Foster, maintenance/relief operator, checks the valve panel.

Plant staff will continue to evaluate procedures to improve the treatment process. “The objective of the partnership is to challenge the industry to continuously improve the drinking water quality, and that is our goal,” says Moore. “My team is really interested in their work, and they get excited when they figure out how to solve a problem or how to do something better. If we have a really bad storm, the operators who are off that day will call in just to check and see if everything is OK.”

Moore also sees dedication in her team members’ personal lives: “They all have different interests that they’re passionate about, whether it’s Little League with their kids, working on or riding their motorcycles, or just being out in the woods. They’re excited about life.” tpo

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Judges rated the microbrews on several criteria, including taste, hue and smoothness.

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Effluent Lager?

CLEAN WATER SERVICES HELPS SPONSOR A CONTEST IN WHICH OREGON CRAFT BREWERS CREATE BEER FROM RIVER WATER COLLECTED DOWNSTREAM OF WASTEWATER TREATMENT PLANTS

By Craig Mandli

Hand a man a beer and you've made a friend. But hand a man a homebrewed craft beer made from the finest effluent available, and you've created the perfect context for discussing purified wastewater.

That's the basis of Oregon's Pure Water Brew Competition, which last September pitted 13 homebrewers in a taste-test contest with one key caveat — all had to start with water from a river downstream of a wastewater treatment plant. The competition was a public/private collaboration of the Oregon Brew Crew, Clean Water Services and Carollo Engineers.

ADVICE FROM THE "GODFATHER"

"It really started with a few of us just sitting around the table one evening, spitballing ideas on how to educate the public on our purification process," says Mark Jockers, government and public

“The true measure of success was that it got people talking about the technology, regulations and mindset needed to purify effluent water.”

MARK JOCKERS

affairs manager for Clean Water Services, a water resources management utility that serves 550,000 residents in northwest Oregon.

The utility operates four wastewater treatment facilities, constructs and maintains flood management and water-quality projects, and manages flow into the Tualatin River. "The long-term supply of potable water in the world is a concern," says Jockers. "We know we have the technology to make effluent water potable once again, and it's our job to make sure the public knows it can be done safely."

Then the "Godfather of Oregon craft brewing," as Jockers calls him, came up with an idea. Art Larrance, founder of the Oregon Brewers Festival, owner of Cascade Brewing and member of the Clean Water Services Advisory Commission, told Jockers, "If you really want to get people talking about this water, you should brew beer with it."

THE RAW MATERIAL

On June 23 last year, Clean Water Services drew 1,000 gallons of Tualatin River water downstream of the Durham Advanced Wastewater Treatment Facility and the Forest Grove Treatment Facility, at a point where 30 percent of the river flow comes from the effluent. They purified the water using ultrafiltration, reverse osmosis, advanced oxidation and disinfection before making it available to the registered homebrewers.



Samples of purified water were on display at the competition. Competitors used Tualatin River water collected downstream of Durham Advanced Wastewater Treatment Facility and Forest Grove Treatment Facility.

The purified water was perfect to a fault: “It was a blank slate, to the point where the brewers actually needed to add minerals that would typically be found in a lot of water systems, to create the proper water profile,” Jockers says. “I’ve worked in the clean-water industry for 20 years and really had no idea that there were different water profiles, and how much science goes into making beer. Brewing hobbyists are certainly an innovative group and are always up for a challenge.”

According to Jockers, each mineral found in water has a flavor of its own. While faint, the minerals mingle with other ingredients and change how a brew tastes. The yeasts used to make beer need certain ingredients in order to ferment properly.

“One participant went to great lengths to replicate the raw water you would find in Belgian water systems,” says Jockers. “A big part of why beers have different tastes around the world is the raw water supply they are brewed from. Missing one simple mineral can completely alter the final flavor.”



Displays showed the background of the competition, sponsored by Carollo Engineers, Clean Water Services and the Oregon Brew Crew homebrewers club.

THE WINNERS

Following an eight-week brewing window, the 13 participants contributed 16 varieties of beer. The brews were judged Sept. 6 after a tasting by local celebrity judges. Ted Assur took Best in Show with his Vox Max Belgian, Jeremie Landers second with his German Pilsner, Mike Marsh third with his Single Grain Saison, and Nick Dahl fourth with his Kolsch German-inspired specialty brew.

Assur received \$150, while the other winners took home prizes of \$100 each. Every brewer in the competition received \$20 to offset ingredient costs. Jockers sampled all the entries and was impressed with the results.

“They were all very distinct and pretty much ran the gamut of beer types,” he says. “No one was really worried about trying it, either. Our regulators were prepared to see some backlash, but it never came. At the end of the day, we were working with the cleanest water on the planet.”

In addition, the four winning beers were featured at the WasteReuse Association’s One Water Innovations gala at WEFTEC 2014 in New Orleans last September. Jockers says it didn’t take a lot of work to get the word out about the event.

“The media coverage was tremendous, and not just from local sources,” he says. “I talked with a reporter from National Public Radio, and they posted the story to their Facebook page. The true measure of success was that it got people talking about the technology, regulations and mindset needed to purify effluent water.”

WHAT’S NEXT?

While the Pure Water Brew Competition is a conversation starter, purifying water to that extent on a municipal scale is not yet economically viable. “We proved to the masses that it can be done,” says Jockers. “The goal now is to find a way to make it an efficient and effective solution.”

There is progress, however. In late January, the Oregon Department of Environmental Quality approved the parameters of the 2015 Pure Water Brew Competition. Instead of using river water containing 30 percent effluent, this year’s source water will be 100 percent effluent, directly from the plants. Jockers sees it as a larger opportunity to showcase the purification technology he insists is the future of the industry.

“We’re going to supply enough purified water for 30 brewers to take part this year,” he says. “We’ve taken a lot of calls from other municipalities that are interested in doing their own brew competitions. The truth is, the technology is out there for anyone to do this anywhere they are. At the end of the day, this is about clean water and public health.” **tpo**



The judging was intense and the competition was keen. Organizers look forward to a bigger and better competition in 2015.

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 your ideas to editor@tpomag.com or call 877/953-3301.

Clamping Down on Leakage

A WEBSITE CREATED BY THE NATURAL RESOURCES DEFENSE COUNCIL LOOKS AT HOW WELL STATES AND UTILITIES APPLY POLICIES TO MEASURE AND REPORT WATER LOSSES AND SET REDUCTION TARGETS

By Ted J. Rulseh

Water utilities and the state agencies that regulate them are concerned about water losses in distribution systems. But how effective are their policies for measuring and reporting losses and devising remedies?

The Natural Resources Defense Council has created an interactive website, “Cutting Our Losses” (www.nrdc.org/water/water-loss-reduction.asp), where visitors can explore the strength of policies states have adopted to quantify, locate and report unnecessary water losses accurately, and set targets for water loss reduction.

The NRDC states that aging water pipes across the country experience some 237,000 breaks per year, resulting in \$2.8 billion per year in lost revenue and higher rates for consumers. The website highlights states that are setting the pace with policies requiring best practices, such as water loss accounting, to help in estimating, locating and reducing leaks.

Still, the NRDC observes that more needs to be done. Ed Osann, a senior water policy analyst with NRDC, talked about the website and the issue of water loss reduction in an interview with *Treatment Plant Operator*.

tpo: Why did NRDC decide to make water loss accounting a priority?

Osann: Water loss is experienced by municipal water systems all over the country. Its effects are a kind of tax on water systems and on utilities’ customers. The industry has made efforts in recent years to develop methods for characterizing and estimating the volume of losses from distribution systems. We want to encourage utilities to use new water loss accounting protocols developed by the AWWA, and encourage states to consider policies for consistent reporting of water losses and validation of water audit

“We need to be strategic about investments in water loss reduction and the related investments in main replacement. We simply don’t have the money to replace all the pipes that leak — not this year, in a decade or in 20 years.”

ED OSANN

data. Engineers are fond of saying you can’t manage what you can’t measure. In a literal sense, you can’t measure all of the leaks from a water distribution system, but you can apply the water loss audit process to infer the volume of losses.

tpo: What are the environmental impacts of water losses?

Osann: The top-of-mind issue is the waste of water, especially in areas experiencing or expecting scarcity or degradation of water supplies. But beyond that, in many cases, lost water is the least of the problems. There is

service disruption. There is potential for traffic disruption from any significant water main break. There is potential property damage, plus the cost of emergency repairs and overtime. In addition, when you have a system with leaks, there is potential for contamination that accompanies a substantial reduction in pressure.

tpo: What are the impacts of water losses on energy?

Osann: That is another dimension. When water is lost from the system, it carries with it all the energy that’s embedded in the water supply, from the point of withdrawal, through treatment process and out into the distribution system. There is typically energy added at every stage of that process. All these factors come together to underscore the importance of careful assessment of water losses and the development of strategic foundations to reduce losses cost-effectively.

tpo: What is the importance of accuracy in water loss auditing?

Osann: The water audit process as developed by the AWWA is very accommodating. It allows water suppliers to enter the information they have at hand at whatever stage of accuracy or precision may be available. For each value they enter into the water loss audit worksheet, there’s an associated data validity score that the user is asked to assign. It’s important especially in the early stages of this process for suppliers to be as candid and frank as possible about the data they have and its quality. We think it’s important to get as solid a factual foundation as possible with regard to water losses, so that water suppliers and their boards of directors can identify and adopt cost-effective strategies for dealing with the issue.

It is very informative and instructive to the industry to see candid reports on water losses from a variety of suppliers: east, west, north and south; large and small systems; arid areas and areas subject to frost; heavy-traffic areas and low-density areas. The AWWA audit software accommodates all that diversity with a consistent framework for characterizing and reporting the volumes of losses. It’s important at the state level and nationally to get a solid foundation of validated data to help understand the issue and to begin to formulate appropriate intervention strategies.

tpo: How would you characterize the NRDC’s system for rating states on water loss reporting?



Ed Osann

Osann: The rankings are not based on what the absolute water losses are. It's a system for presenting the status of water loss reporting across the 50 states — of how states are moving to progressively more useful reporting policies. For example, the rankings consider the breadth and frequency of the reporting requirement, whether the reports use the standard AWWA terminology, and whether the state uses the free AWWA software.

We encourage as much candor as possible in assessing the state of water losses. Our expectation is that most water managers will welcome having a standard water loss audit published for their water utility because that lays the groundwork at the local level for discussion of the issues facing the buried water infrastructure, which by all accounts is one of the most serious infrastructure issues facing the country.

tpo: What is the practical benefit of having this water loss information made public?

Osann: With understanding of water losses comes potential support for sensible strategies to address the issues and needs of the system. Water suppliers face a classic problem of “out of sight, out of mind.” The issues and concerns are not readily visible to the public, and the level of resources needed to manage that legacy investment is not as apparent to decision-makers. They've never actually seen an underground leak, so without information, how do they process a water manager's concerns versus other municipal service issues that are more visible?

tpo: What advances are you seeing in the quality and usefulness of water loss reporting?

Osann: The AWWA has released an updated version of its water loss software that has additional features, greater clarity and better descriptions of some terms. The data validity score system is also explained a little bit better. There's also new software AWWA is developing called the Component Analysis. It allows managers to take the overall snapshot of water losses that comes from the water audit software and aggregate them as to their type and their location around the water distribution system. There is also a new edition of the AWWA manual of practice on water loss that will be out in hard copy by the end of 2015.

tpo: How about advances on the technology front for detecting, measuring and controlling losses?

Osann: Technology has evolved quite a bit over the last 10 to 15 years. Acoustic assessments of water distribution systems have gotten better and more practical. You don't have to walk the whole system with headphones. For example, you can place movable loggers within the system from which data can be uploaded electronically. Similarly, there are now more practical and affordable pressure monitors.

tpo: What is the importance of pressure monitoring to water loss avoidance?

Osann: In the next few years we're likely to see increasing awareness of the importance of pressure management in the distribution system. Pressure management certainly will reduce losses, because if you can step down the pressure in a segment of supply piping, you are by that very fact reducing the running rate of any leaks in that piping.

But we also see growing recognition of pressure management for its potential to reduce the rate of main breaks. If we can better manage pressure and keep small leaks from becoming big breaks, that has huge implications. It means we can get more life out of legacy infrastructure. We need to be strategic about investments in water loss reduction and the related investments in main replacement. We simply don't have the money to replace all the pipes that leak — not this year, in a decade or in 20 years. The use of technology and analytical techniques to better manage systems and reduce water main breaks can be a great boon to the industry.

tpo: If you were to name a couple of states that are doing a good job



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“In the end, we want to encourage cross-fertilization of ideas. Let's get the best ideas out there and visible.”

ED OSANN

on the water loss reporting front, which ones might they be?

Osann: I would commend Texas for being the first to require statewide reporting of water losses through a consistent methodology. They were moving to adopt that requirement at the same time that the AWWA was developing its standardized methodology. In effect, Texas took an early version of the AWWA methodology and adopted it as a state requirement.

Georgia is also worthy of plaudits for enacting a statewide reporting requirement by statute in 2012. They have moved their water systems to use the AWWA software reporting format and standard terminology, and they have also established a process for validating the water loss audit reports. They have a team of knowledgeable professionals who are in touch with water suppliers to discuss their draft audit reports. That includes looking for anomalies and probing the level of confidence and the level of accuracy behind the numbers being submitted. That validation process is very important and we expect it to spread beyond Georgia very soon.

tpo: What can visitors to the Cutting Our Losses website expect?

Osann: The website is intended to be user-friendly. It contains loads of information. Visitors can scroll over a map of the United States, click on any state and see what level of water loss assessment that state's policies require, if any. If the state has a policy, there is a link to it, so it's easy to view and compare policies across states. In the end, we want to encourage cross-fertilization of ideas. Let's get the best ideas out there and visible. There are some big spaces on the map where there are no statewide water loss reporting requirements. We hope that will change, and very soon. **tpo**

Brewing Up a Solution

A SCALED PRIMARY AND SECONDARY WASTEWATER TREATMENT SYSTEM ENABLES A TEXAS CRAFT BREWERY TO MEET MUNICIPAL DISCHARGE LIMITS

By **Scottie Dayton**

Real Ale Brewing Co. discharges production and process graywater to the municipal sewers. As production increased from 5,000 barrels in 2006 to 60,000 barrels in 2014, graywater averaging 6,000 mg/L BOD and 750 mg/L TSS threatened to overwhelm the aging municipal wastewater treatment plant.

“Our city officials have always been strong partners,” says Tim Schwartz, director of brewing for Real Ale, a craft brewery in Blanco, Texas. “They allowed us to continue operations while we built a pretreatment facility. Meanwhile, we sidestreamed some high BOD items into a haul-off tank, which reduced BOD loading to 4,500 mg/L and TSS to 300 mg/L.”

ClearBlu Environmental designed the system with lift stations, screening and dewatering equipment, pH balancing and an aerated lagoon. The system, which went online in June 2013, has reduced BOD strength significantly.

MULTIPLE FLOWS

Operators run three to six batches per day through the 100,000-barrel (design) brewhouse. The beer ages for three weeks in fermenter tanks before packaging. As consumer demand increases, the company adds more fermenters and equipment until the facility builds out to design capacity. “Producing a gallon of beer generates 4.5 to 5 gallons of graywater,” says Schwartz. “Near the end of 2013, we averaged 77,000 gallons per week. A year later, it hit 80,000 to 90,000 gallons per week.”

The brewhouse, fermentation cellar and packaging hall generate graywater. To establish averages for the pretreatment plant’s design, Schwartz and Kathy Towns, quality manager, sampled waste streams around the clock for a week at a time, gathering BOD loading and estimated flows. “Our lab micro-samples beer,” says Schwartz. “It can measure TSS, but BOD samples went to a local lab, which reaffirmed our TSS numbers.” Data was sent to Robert Bixby, president of ClearBlu.

GROUNDWORK

A San Antonio engineering firm designed the lagoon and piping for the pretreatment system. Then local contractor Dirt Works built it at the back



PHOTO COURTESY OF VARACORP

Each pontoon turbine aerator (gray; foreground) generates an oxygen transfer efficiency in excess of 4 pounds of dissolved oxygen per horsepower-hour to ensure oxidation of BOD (VaraCorp).



The Tecweigh volumetric dry bacteria feeder (Tecnetics Industries) introduces bacillus and pseudomonas to accelerate aerobic digestion.



PHOTOS COURTESY OF CLEARBLU ENVIRONMENTAL

Close-up of the 0.5 mm wedgewire waterfall filter as grain and hop solids slide down the 55-degree slope.

of the 15-acre property. Two 55- by 150-foot cells hold 238,000 gallons each. “ClearBlu asked us to partially fill the lagoon with freshwater, enabling them to set, tie off and test the aerators,” says Schwartz. The city agreed to reduce the water rate during the fill period.

Workers are upgrading the aeration system with new VaraCorp turbine aerators with an oxygen transfer efficiency of more than 4.0 pounds of oxygen per horsepower-hour.

Another contractor built and plumbed the 20-by-30-foot-long pretreatment building. When ClearBlu arrived to install the wastewater treatment components, it took two weeks. “We were heavily involved because we wanted

to know what the equipment was, how it was installed and how it worked,” says Schwartz.

SINGLE TREATMENT TRAIN

A turn of a valve directed the graywater from sewer discharge to pretreatment. The system has three cylindrical fiberglass lift stations (Topp Industries). The first, at the front of the property, has dual 3 hp stainless steel submersible pumps with Shredder impellers (BJM Pumps) rated at 200 degrees F. A flow failure activates a bypass to the sewer.

The first station receives influent at 100 to 110 degrees F. “However, we wanted high-temperature pumps to handle spikes caused by 200 gallons of 150- to 160-degree caustic cleaning solution,” Schwartz says. The pumps send influent 400 yards to the pretreatment building. As liquid pours over a 0.5 mm wedgewire waterfall filter, its 55-degree slope helps push grain and hops solids into a dewatering hopper. The effluent at pH 4 enters a 10,000-gallon above-ground cone-bottom settling tank.

Water flows from the top of that tank through a 4-inch pipe to an automatic system that injects sodium hydroxide to adjust the pH to neutral. A Tecweigh volumetric dry bacteria feeder (Tecnetics Industries)

“We were heavily involved because we wanted to know what the equipment was, how it was installed and how it worked.”

TIM SCHWARTZ

then introduces bacillus and pseudomonas (Roebic Labs) to accelerate aerobic digestion. Dual 1.5 hp stainless steel sump pumps (Goulds) in lift station No. 2 send inoculated effluent to the lagoon, which has gravity-fed linear cells to prevent short circuiting and ensure a 21-day retention time.

Before effluent enters lift station No. 3 with dual 1.5 hp Goulds pumps, a flume (Plasti-Fab) with ultrasonic sensor (Hach) meters the flow. The SC200 controller (Hach) operating a butterfly valve (Hayward Flow Control) in front of the flume ensures a uniform discharge to the Blanco treatment plant. The controller’s data logger links to another controller in the pretreatment building via Modbus (Schneider Electric) to upload information.

SHAKEDOWN CRUISE

Within two months of operation, lift station No. 1 failed. “The pump floats stuck in the off position, and two came loose when the cables broke because the material wasn’t as flexible as on standard cords,” says Schwartz. “Changing out the floats and cables were simple repairs.”

Improving the waterfall filter took longer. Without sufficient pressure, the automatic spray bar on the back of the screen stopped moving up and down. As the wedgewire clogged, influent ran off and filled the hopper. “The filter’s stainless steel walls bulged a little, allowing the air seals along them to leak,” says Schwartz. “Working with ClearBlu, we installed

stainless steel turnbuckles and pulled the walls back in line. This greatly improved the pressure and nozzle action.” They also replaced the seals with more robust rotating units.

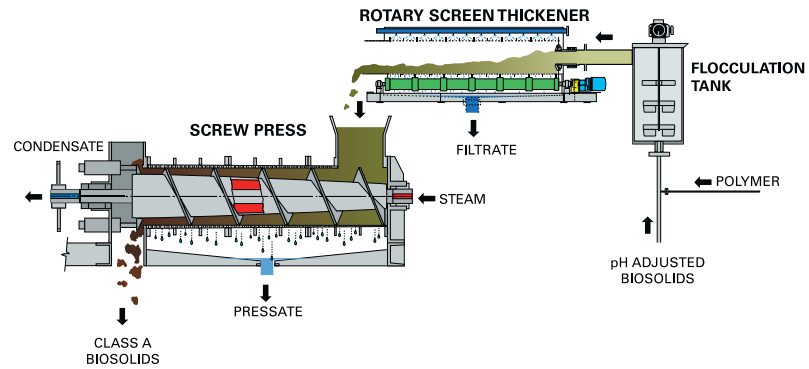
The maintenance staff also noticed some dispersed bacteria that wouldn’t clump and drop out. “That was interesting,” says Schwartz. “We played with the microbiology and increased oxygen levels until the problem cured itself.” They eventually added eight more aerators to Cell 1 and four more to Cell 2, for a total of 30 units. The first cell lowered BOD from 4,000 or 5,000 mg/L to 1,200 mg/L. Cell 2 reduced it further.

MICROBES AND MAINTENANCE

The brewery met its discharge limits in summer 2014, but cooler weather brought a slight increase in numbers that puzzled the staff. Schwartz believed some microorganisms were slipping through. “We had 300 to 400 mg/L TSS

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A Plasti-Fab flume with Hach ultrasonic sensor meters flow to the sewer.

entering the lagoon and solids as high as 600 mg/L passing through the flume,” he says.

The source could be a small area at the end of Cell 2 with no aeration. “We’re definitely growing a lot of bugs and they’re doing a great job,” says Schwartz. “Currently, we’re discharging 150 to 400 mg/L BOD.” The brewery will consider adding a clarifier at the back of the treatment train to stabilize discharge and meet limits.

The pretreatment system requires weekly maintenance such as cleaning the screens, emptying and rotating the hoppers, and topping up caustic and microbe levels. Twice daily, staff members pump the cone-bottom tank for five minutes, sending a total of 80 gallons of dense sludge to a diversion tank.

“The lab measures TSS, dissolved oxygen and chemical oxygen demand and checks pH,” says Schwartz. “Fortunately, the pretreatment system is fairly hands-off, because we’re brewers, not wastewater operators. That was the most challenging aspect of running the system.” **tpo**

Share Your Ideas

TPO welcomes news about interesting methods or uses of technology at your facility for future articles in the How We Do It column.

Send your ideas to editor@tpomag.com or call 877/953-3301.



“The team members are the greatest resource at this plant. They do the work. I’m support staff. I coordinate what they do, and the best way for me to do that is to listen to what they have to say.”

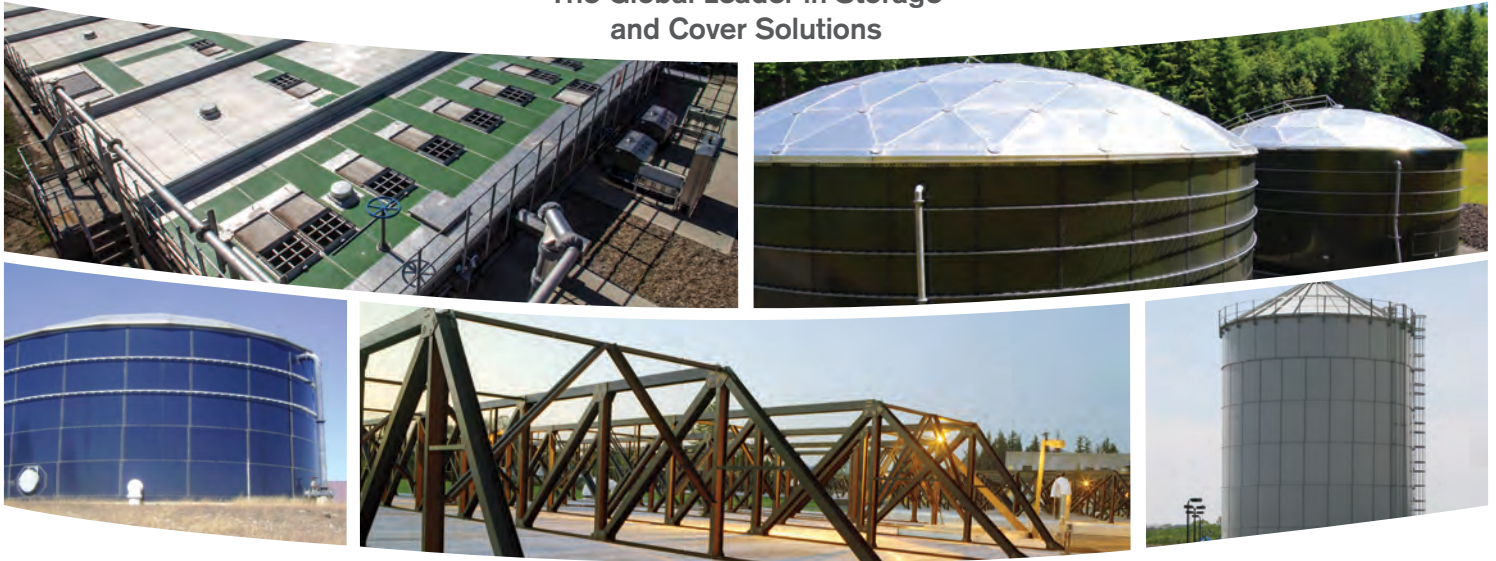
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CAREER BUILDER

JOSH WILLISON MADE ALL THE RIGHT MOVES AS A YOUNG MISSOURI WASTEWATER OPERATOR, LEARNING THE TREATMENT BUSINESS, SERVING THE COMMUNITY AND WINNING A PRESTIGIOUS AWARD

STORY: **Jack Powell**
PHOTOGRAPHY: **Kris Wilson**

WITH BARELY EIGHT YEARS IN THE WASTEWATER INDUSTRY, OPERATOR Joshua “Josh” Willison is a young man with a bright future. Serving the Franklin County (Missouri) Water & Sewer District, Willison is focused on advancing his career — and already has an award to show for his commitment to clean water.

Last September, Willison, 30, received the Young Professional of the Year award from the Missouri Water and Wastewater Conference. The award recognizes top performing members who go the extra mile to complete jobs efficiently and to the highest of standards.

That description fits Willison perfectly, according to senior executives at Alliance Water Resources, which provides contract water and wastewater services to Franklin County. “Josh is very proficient, constantly striving to improve our operations to see that our facilities have the best performance possible,” says Mike Dougherty, Alliance division manager. “We are glad Josh is part of our team and appreciate the good work he does for us and our customers.”

Self-effacing, Willison sees the recognition as just another step forward in his career: “I was really surprised that I won the award. I knew I’d been nominated, but it came as quite a shock when I got it at the MWWC dinner in Jefferson City, with all those other water and wastewater professionals there.”

FROM COLLEGE TO CAREER

Willison’s career traces its roots to his lifelong interest in the outdoors, including hunting and fishing. He was born and raised in Greensboro, North Carolina, but during his sophomore year of high school, his father got a job transfer and moved the family to Liberty, Missouri, a city of 29,000 near Kansas City. After high school, Willison went to the University of Mis-



Josh Willison, wastewater treatment operator for the Franklin County Water & Sewer District.

souri, where in 2007 he earned a bachelor’s degree in fish and wildlife.

His first job out of college was as an operator at a wastewater treatment plant in California — not the state, but a small city by that name in central Missouri. “I was attracted to wastewater because it offered steady work, a chance to use my background in science, and the opportunity to improve the environment and make the community a better place to live,” Willison recalls.

He stayed there until December 2010, when he joined the Missouri Department of Natural Resources in Jefferson City as an environmental specialist I and made himself a valuable resource to the agency’s Water Protection Program. “Josh was very helpful to me in getting started with the Compliance and Enforcement Section,” says John Fraga, unit chief for the program, who nominated Willison for the Young Professional award. “Josh did a lot of things to help us maintain clean drinking water. That included looking after the state’s 2,700 water systems, which required heavy data entry as well as tracking and lots of enforcement activities.”

ENFORCEMENT SUPPORT

At the DNR, Willison helped Fraga and his team implement the U.S. EPA’s 2011 Enforcement Response Policy (ERP), aimed at ensuring consistency

and fairness in setting priorities for enforcement actions against public water systems. The policy emphasized compliance rather than addressing violations, helping to increase the EPA’s effectiveness in protecting public health. Willison did everything from recording data to tracking the results of water-assessment sampling some communities were required to perform monthly to ensure that they met clean-water standards.

With the ERP came an Enforcement Targeting Tool (ETT), a calculation system states use to help identify and prioritize public water systems



Willison, shown collecting a mixed liquor sample at the Ming Estates treatment plant in Villa Ridge, has progressed rapidly during an eight-year career in the profession.

“ I was attracted to wastewater because it offered steady work, a chance to use my background in science, and the opportunity to improve the environment and make the community a better place to live.”

JOSH WILLISON

Joshua “Josh” Willison, Alliance Water Resources, Franklin County, Missouri



POSITION: **Wastewater operator**

EXPERIENCE: | **8 years in the industry**

DUTIES: | **Operate six small wastewater treatment plants serving residential subdivisions**

EDUCATION: | **Bachelor’s degree, fish and wildlife, University of Missouri, Columbia**

CERTIFICATIONS: | **Class C municipal wastewater operator**

GOALS: | **Continue to grow in the wastewater career while helping the environment and maintaining clean water for the community**

GPS COORDINATES: | **Latitude: 38°29’9.10”N; longitude: 90°53’7.92”W**

“Josh is easy to get along with and the kind of worker every boss likes. He’s not afraid to do the dirty jobs or take the lead when the situation requires it.”

BOB HATHCOCK



A GOOD CAREER CHOICE

You could do a lot worse than working in the wastewater industry. That’s the sentiment of several professionals trying to convince young people that providing clean water makes a rewarding career. It’s often a tough sell.

Young professionals are important to the clean-water industry, given an aging workforce. A 2012 report, “Career Pathways in the Drinking Water and Wastewater Sector,” observes: “Nationally, industry estimates are that 30 percent to 50 percent of the current water workforce will be eligible to retire in the next five to 10 years. Concern about these retirements and the associated ‘brain drain’... is shared by environmental regulators and national, regional and state professional associations.”

One reason the Missouri Water and Wastewater Conference (MWWC) established the Young Professional of the Year award for those 35 and under was to spur interest in the water and wastewater field. And it’s why John Fraga of the Missouri Department of Natural Resources nominated Josh Willison for the 2014 award: “I thought it would be a good way to help launch his career a bit by shedding a little light on him and to encourage other young people to get involved in this vital industry.”

Willison comments, “Sure, you need a little bit of a strong stomach because you’re dealing with wastewater, but otherwise it’s a great career. That’s particularly true if you want to stay in your community and help with the environment. Also, it’s a good job. The pay is OK, and the skills are highly transferrable. I’ve moved around and have been able to find a job. And, you get to deal with all kinds of problems as they come up, so every day there’s something different. There are plenty of opportunities to learn and develop yourself.”

Willison’s boss at Alliance Water Resources, Bob Hathcock, is equally enthusiastic, having spent the last 25 years in the wastewater business. “Wastewater has been good to me,” he says. “There are a lot of challenges. Yes, you get your hands dirty, and some of the new environmental regulations make it hard to be an effective operator. But in the end, I look at what we do as true environmentalism. We’re doing something that is good for our communities.”

for enforcement. As part of the ETT, Fraga’s group got quarterly reports from the EPA that ranked Missouri drinking water systems that were in noncompliance. The DNR unit was required to evaluate those reports and then take formal enforcement action to return the systems to compliance.

Willison’s drive and knack for data entry made a big difference. “Before we hired Josh, we’d been floundering around with the ETT, but once he got

Josh Willison, holder of a Class C operator’s license, is responsible for six small treatment plants in capacities from 5,000 to 60,000 gpd, serving about 4,000 customers in several subdivisions.

on board he really helped us sort things out,” says Fraga. “We had to analyze about 250 systems each quarter, all their violations, and check to see if EPA had a method for returning them to compliance.

“We also worked with the Safe Water Information System, in which each state enters its drinking water systems so the EPA can track them. Josh had a pretty big role in all this. He became instrumental in creating a database, making it a whole lot easier to analyze those lists. In working with Josh, I found him eager to jump in and help, very supportive of new ideas and always willing to do whatever it took to get the job done.”

STRONG WORK ETHIC

In July 2014, after his wife, Rebecca, got her master’s degree in statistics from the University of Missouri, the couple moved to Chesterfield, a second-ring suburb of 47,000 west of St. Louis.

Willison, by this time an environmental specialist III, left the DNR and went to work for Alliance Water Resources, which provides contract operations and management services for municipal and community water, wastewater and public works systems in Missouri, Iowa and Tennessee.

Alliance manages 19 small extended-aeration package wastewater treatment plants scattered over 150 square miles of Franklin County (population more than 100,000) on the outskirts of St. Louis. The package plants work in a manner similar to septic systems and sewage lagoons: Solids settle out of the water, the remaining organic matter is broken down by microorganisms and treated water is discharged to creeks. Sludge is pumped out of the systems and hauled off.

Willison, who has a Class C wastewater operator’s license, is responsible for six of those plants, in capacities from 5,000 to 60,000 gpd serving some 4,000 customers in several subdivisions. He also works on some of the 30 miles of county sewer lines Alliance maintains, using a high-pressure water jetter (Sewer Equipment Company of America) to clean the lines of grease, soil and ice buildup.

Alliance, which has managed the Franklin County water and wastewater operations since 1994, staffs the plants from 8 a.m. to 4:30 p.m., Monday through Friday. Operators rotate on-call duty during off hours and weekends; Willison is usually available to come in when needed.

“During a typical day, I’ll check on all the plants to make sure they’re

running properly,” Willison says. “Then I’ll do my pH and BOD tests and work on the pumps to make sure they’re OK. We have ABS grinder pumps (Sulzer Pumps Solutions Inc.) at most of the sites we serve. They’re basically small pumps with an opening much like a garbage disposal. When the pump kicks on, it grinds the larger sewage and pumps the ground material up and out. If there are any problems, we’re responsible for fixing them or sending them out for repair.”

EAGER TO HELP

Although he hasn’t had any floods or other disasters to deal with, Willison has encountered heavy summer rainfall that has caused inflow and infiltration (I&I) issues, creating spikes in flow at the treatment plants. He takes such occurrences in stride: “The biggest problem with heavy rain is making sure you’re processing the wastewater and not having it washed back into the creeks untreated.”

Such a strong work ethic hasn’t escaped the notice of Willison’s co-workers and boss: They admire his eagerness to pitch in and help, regardless of the task on the water or wastewater side. Fellow wastewater operator, Lonnie Madole, who operates five plants, calls Willison, “A real good guy, easy to work with and ready to do anything. You have to be prepared to get your hands dirty in this job, and Josh is willing to do that on a daily basis.”

Bob Hathcock, project manager, who supervises 11 water and wastewater operators, observes, “Josh



Willison continues to further his education in the business and aims to step up to a Class B license in the near future.

is easy to get along with and the kind of worker every boss likes. He’s not afraid to do the dirty jobs or take the lead when the situation requires it.”

With an award under his belt, plenty of on-the-

job training, and encouragement from colleagues and supervisors, Willison has his eyes set on moving up in the wastewater industry. He continues to take classes as part of the state’s continuing education requirement of 30 hours of annual coursework. By the end of 2015, he expects to take the exam for his Class B license.

“I really like serving the public, and I want to continue in the field and grow in my career,” says Willison. “So far, wastewater has been a great fit.” **tpo**

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Vision Made Real



A TENNESSEE UTILITY DISTRICT BUILDS AN AWARD-WINNING
MEMBRANE WATER TREATMENT PLANT, SAVING MONEY
AND ENSURING A QUALITY SUPPLY TO MEET RAPID GROWTH

STORY: **Trude Witham**
PHOTOGRAPHY: **ALM Photo**

ELEVEN YEARS AGO, THE SOUTH BLOUNT COUNTY Utility District was buying potable water from two utilities in neighboring cities. This posed problems: increasing costs and the possibility of water shortages, especially in summer.

When the price of water from one supplier more than doubled over two years and the number of customers increased by a third, the district had to act. In 2004, the district commissioned its own water treatment plant, the first in eastern Tennessee to use membrane filtration for a municipal water

supply. Today, the J. Isom Lail plant in Maryville provides an average of 2.6 mgd for 14,300 customers.

The plant benefits from exceptionally pure source water (0.4 NTU turbidity) from Lake Tellico, a hydroelectric reservoir in Blount County. The operating team solved a lead and copper issue in 2011 and went on to win the 2014 Award of Excellence in the midsize treatment plant category from Kentucky/Tennessee AWWA. The utility has saved some \$100,000 per month on water costs since it built the plant.

TREATING ITS OWN

The district began providing water service in 1958 to 1,300 customers and purchased water from neighboring communities until September 2004. “Our district manager, Isom Lail, had a vision to begin treating our own water,” recalls Danny Gregory, plant manager. “He presented his idea to our board commissioners, and they agreed. We had to lay 30 miles of new waterlines, but it was worth it.”

Plant construction began in 2002, and the facility went online in summer 2004. Besides the membrane filtration system (Pall Corporation) and UV disinfection (WEDECO), the \$20 million project includes:

- ClorTec sodium hypochlorite generator (Severn Trent Services)
- Cal-Flo lime system (Burnett Inc.)
- Carbon dioxide tank (Tomco2 Systems)
- Three large air compressors (Atlas Copco)
- SCADA system (MR Systems)

The engineering firm that designed the plant recommended the membrane technology. Preliminary water sampling and a pilot study showed that microfiltration followed by UV would do the best job.

“Isom and our commissioners talked to several membrane companies and liked the membrane plant’s small footprint compared to a conventional plant,” says Gregory. “They also liked the finished water’s low turbidity [average 0.02 NTU] and the system’s low maintenance.”

The UV system enhances log removal of parasites and helps ensure that the plant can meet future disinfection rules. “We get great log reduction credits with the microfiltration system, but the UV gives us one more log credit, for a total of 8.5 credits,” explains Tom Flynn, assistant manager.

The engineering firm selected the pumps, and plant operators choose the valves and laboratory equipment. Since 2004, the plant has added or upgraded some equipment:

- 120 membrane filter cartridges for more capacity
- Turbidimeters (Hach 1720e)
- Additional UV bulbs and programming
- SCADA programming

J. Isom Lail Water Treatment Plant, Maryville, Tennessee

COMMISSIONED: | 2004

POPULATION SERVED: | 14,300

SERVICE AREA: | Blount County

SOURCE WATER: | Lake Tellico

TREATMENT PROCESS: | Membrane filtration

DISTRIBUTION: | 450 miles of pipeline

SYSTEM STORAGE: | 7.2 million gallons

KEY CHALLENGE: | Stay ahead of regulatory changes, find qualified operators

WEBSITE: | www.southblountutility.org

GPS COORDINATES: | Latitude: 35°45'2.27"N; longitude: 83°59'12.04"W



Membrane filters at the J. Isom Lail plant yield high-quality water. Tom Flynn, assistant plant manager, is shown performing a pH analysis and alkalinity test with an Oakton Ion 510 Series multimeter (Cole-Parmer).



TRAINING THE TEAM

Since the J. Isom Lail plant was the district's first treatment facility, it had to hire and train an operations and maintenance team. Danny Pardue, lead operator, came on board in January 2004, along with Eugene Durant, maintenance supervisor. Operator Danny Davis was also hired at that time, while Flynn, David Borum, Luther Crass and James Lawson joined a few years after plant startup. Pardue had worked at a conventional treatment plant, and Flynn at a membrane plant.

Gregory, a 15-year district employee at the time, helped train the team. "Before the plant went online, Pall came to the facility and conducted hands-on training," he says. "Now, they visit quarterly to answer questions. Learning the system is a never-ending process. We make notes when we have a question so we can ask when they stop by."

Says Flynn, "Although the plant is 10 years old, we still run into new situations, like changing cleaning recipes on the filters because of water temperature changes, or valves not closing fast enough. Pall comes in every quarter to calibrate the system and check valve programming and recipes. This plant is so high-tech. A conventional plant looks like a swimming pool, but we never see the water in this plant, since it's pumped from the lake and goes through the system. Fortunately, the system can't produce bad water."

Training on the UV system involved learning how to clean the quartz sleeves and change the lamps. Pardue came from a plant with a manual system and had to learn how to operate the SCADA system; Pall and MR Systems provided that training.

“Our district manager, Isom Lail, had a vision to begin treating our own water. He presented his idea to our board commissioners, and they agreed. We had to lay 30 miles of new waterlines, but it was worth it.”

DANNY GREGORY

GETTING THE LEAD OUT

In 2006, the district's drinking water exceeded the 15 ppb U.S. EPA standard for lead — the concentration sometimes went as high as 110 ppb. The source turned out to be corrosion from lead-rich pipes and solder in older homes.

The district invited Dr. Marc Edwards from Virginia Polytechnic Institute to conduct a nine-week study to solve the problem. Water from the plant was subjected to various phosphate inhibitors, disinfection with free chlorine and pH adjustment to simulate nine different conditions. A solder-copper coupling was then exposed to each water sample.

It was Flynn who contacted Edwards after the plant team had battled the problem for five years. "It was a slow process, and Tom saw it through to a successful conclusion," says Gregory.

Recalls Flynn, "The study concluded that dosing with orthophosphate would bring us in compliance with the lead and copper rule. Additional studies showed that the lead levels were significantly reduced, indicating that the orthophosphate treatment effectively reduced solder corrosion in the system."

But then, SBCUD noticed a rise in lead leaching out of brass in household plumbing. "Virginia Polytech noted that orthophosphate had not been shown to control lead leaching from brass," says Flynn. "They recommended adding liquid lime and carbon dioxide to the orthophosphate to obtain an alkalinity of 40 mg/L at 7.6 pH." The new treatment protocol went into effect in June 2011, and within six weeks the lead and copper in all 40 samples fell below EPA standards.

Danny Gregory, left, plant manager, and Tom Flynn, assistant manager, with the plant's membrane filtration system (Pall Corporation).

(continued)

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The J. Isom Lail Water Treatment Plant.



WINNING AWARDS

The district's total of 37 team members take pride in their work and the facility's appearance. "We all work well together," says Gregory. "Most of us started at the bottom and worked our way up, so we take pride in what we do." The plant is staffed around the clock with two operators per shift. The operations team meets once a week to review operations and discuss budgets, the employee handbook and personnel issues. Gregory and the district leadership team strongly encourage staff input.

For the 2014 excellence award, the plant stood out from among 150 mid-size facilities in the state. "They looked at a number of things, including our state sanitary survey score, our maintenance program, employee training and emergency plans," says A.L. Scott, district assistant manager. In 2013, the district received a perfect score on the Tennessee Department of Environment and Conservation sanitary survey, a two-day inspection of the plant from intake to delivery at the customer's meter.

Says Pardue, "The excellence award was the result of things we do every day, like running tests in our laboratory, routine cleaning and alternating our pump operation every few days or at least once a week. Preventive maintenance is important — Eugene [Durant] does a great job."

"Our biggest maintenance challenge is training," says Flynn. "A maintenance staff has to be well trained in electrical, programming, pumps, motors and plumbing, and it's a struggle sometimes to find training schools in each field for them."

Most team members have many years of experience, and a few have worked for the district for more than 30 years. Gregory has been with the utility for 19 years, and Flynn, who holds Class 4 water treatment and Class 2 water distribution certification, has seven years with the utility. Besides those already mentioned, the team includes:

- Distribution employees Kenneth Bully, Norman Clark, David Dyer, Melvin Farmer, Stacy Gregory, Shannon Icenhower, Michael Jackson, Allen Lail, William Long, John Myers, Christopher Payne, Michael Russell and Larry Teaster
- Maintenance/sampling specialist Shannon Boring
- Backflow prevention specialists Quentin Caldwell and William Thomas
- Collections specialists Stephen Boring and Ronnie Hutsell

PRODUCING GREAT WATER

When the South Blount County Utility District decided to build a water treatment plant, it chose microfiltration (Pall Aria) after conducting a pilot study.

"The pilot system used the same size membrane modules as the full-scale system, so we were able to accurately judge its operation and performance at 15 gpm," says Danny Gregory, plant manager. It produced less than 0.1 NTU, 40 gallons per square foot per day flux and 96 percent recovery.

"Although our source-water turbidity is low, we liked the fact that the membrane system can achieve a six-log reduction of *Giardia* and *Cryptosporidium* without the addition of coagulants," says Gregory.

Based on this success, the district installed a full-scale 8 mgd system with 400 hollow-fiber membrane modules (0.1 micron pore size) in six trains. The system has since been expanded to 12 mgd.

Raw water from Lake Tellico is pumped uphill to a raw water storage tank, then sent to the J. Isom Lail Water Treatment Plant, where it passes through the membrane system and UV disinfection. From there it flows to a clearwell, where it is dosed with a 0.08 percent chlorine solution before being pumped to the distribution system.

Operators clean the membranes every week with chlorine and use caustic, citric acid and bleach for the system clean-in-place (CIP) process every 45 days. "There are no costs for chemicals other than for the CIP," says Gregory. "Costs for replacement parts, downtime and labor are minimal. It is a very efficient system."

PLANNING FOR THE FUTURE

The plant has plenty of capacity for growth. "We are getting about 16 new taps a month, but of course we're not growing as fast as before the economy fell," Gregory says. "We're running at around 3 to 5 mgd today, and we're designed for 8 to 12 mgd, which is plenty."

(continued)

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“Our biggest maintenance challenge is training. A maintenance staff has to be well trained in electrical, programming, pumps, motors and plumbing, and it’s a struggle sometimes to find training schools in each field for them.”

TOM FLYNN

The utility’s greatest challenge will be keeping up with regulatory changes and finding qualified operators. “I see THM and HAA5 limits becoming more stringent,” Gregory says. “We’re already working on lowering those levels.

“As for qualified operators, right now we have little turnover, but some of our people are planning to retire. The certification test is very difficult, since they changed it a few years ago. The state has to do something to attract people to the industry and make it easier for them to become certified.”

Staying proactive is key, Scott observes. “I think what sets us apart from other utilities is our proactive approach to doing business. We strategically plan for line replacements, infrastructure improvements, plant maintenance and additions so that we will always be prepared to handle our customers’ current and future needs.” **tpo**

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LEFT: The operating team at the J. Isom Lail plant won the 2014 Award of Excellence in the midsize treatment plant category from Kentucky/Tennessee AWWA. BELOW: Danny Gregory (left) and Tom Flynn control facility operations with a SCADA system.



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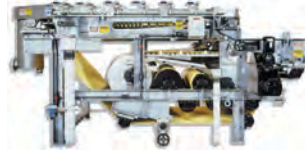
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Far and Wide

PUERTO RICO'S GOVERNMENT-OWNED UTILITY TAKES ON A MASSIVE PROGRAM TO UPDATE FACILITIES, ENHANCE ENERGY EFFICIENCY AND IMPROVE PERFORMANCE

By Doug Day

The Puerto Rico Aqueduct & Sewer Authority is the only source of water and wastewater services for nearly all of Puerto Rico's 3.7 million people.

With annual electricity costs of \$209 million, the government-owned utility has plenty of incentive to cut its power bill, second in size only to labor costs. One reason for the high bill is the price of energy — 22 cents per kWh, more than twice the United States national average. The authority paid 28 cents before its rates were reduced by an act of the Puerto Rico Legislature.

“Our system is quite complex,” says Lynnette Ramirez, executive director of infrastructure. “We have 121 water treatment plants, 52 wastewater treatment plants and eight dams — big numbers for an island that is only 100 miles by 35 miles.” The authority also has nearly 1,500 storage tanks, 1,800 pump stations and 270 wells, all connected to more than 10,000 miles of water mains and aqueducts and 2,000 miles of sewage lines across the island's 3,500 square miles.

In its first year of a new five-year strategic plan to upgrade its entire system, PRASA is already seeing success, reducing its annual electric demand from 750 million kWh to 720 million. “We have a goal to become more efficient, have excellent operations, focus on sustainability, and reduce electricity costs and consumption,” says Ramirez. “We want to be a world-class utility.”

“We have a goal to become more efficient, have excellent operations, focus on sustainability, and reduce electricity costs and consumption. We want to be a world-class utility.”

LYNNETTE RAMIREZ

MULTIPLE PROJECTS

One company helping is Honeywell, which has 10- to 15-year energy performance contracts at four wastewater plants and two drinking water plants. The \$53 million in contracts will be funded through guaranteed energy savings of more than \$7.5 million a year, says Pete Chase, a Honeywell engineer. He says the work involves “a little bit of everything” as determined by the authority and its engineering firm, Arcadis. Work is to be completed in 2015 and 2016.

At one wastewater treatment plant, the work included replacement of an 80 mgd influent pump system and bar screens, new blowers for the grit chamber and the addition of a SCADA system. Another facility received new blow-



PHOTOS COURTESY OF PUERTO RICO AQUEDUCT & SEWER AUTHORITY

ABOVE: Workers install a new aeration diffuser (Environmental Dynamics International) as part of an update to one of the four PRASA wastewater plants covered by energy performance contracts with Honeywell. RIGHT: New wastewater pumps (Flygt) installed across the PRASA wastewater treatment plants include this 2,000 hp, 100 mgd pump.



ers, diffusers, controls and influent pumps, and its belt press dewatering system was replaced by a centrifuge. Another plant received a new aeration system and centrifuge dewatering. All plants received lighting improvements and other smaller efficiency projects.

The dewatering upgrades will enhance performance at the Puerto Nuevo plant's biosolids incinerator to meet new limits on mercury emissions. “We'll be burning the material and making steam to generate electricity,” says Chase. “We should get about 75 percent of the electrical needs of the plant.”

The incinerator burns solids from three wastewater treatment plants; reducing water content increases electrical generation while saving on transportation. Honeywell adapted technologies from the mining industry to help make the project affordable — less than half of what the authority had budgeted.

Two drinking water plants, each more than 100 mgd, are receiving new pumps, and one will have a major electrical upgrade to support synchronous bypass controls. “It has one variable-frequency drive that can be applied to any one of the five pumps,” says Chase. “VFDs are expensive, so we have the redundancy of five pumps and only have to buy one VFD. We have the cost

reduction, the redundancy and the energy savings.”

Honeywell used Flygt pumps on all the wastewater projects. Blowers came from Houston Service Industries, diffusers from Environmental Dynamics International and centrifuges from Alfa Laval.

In addition, the authority is replacing a 1.1 MW hydroturbine at the Carraizo Dam to increase its generation. That alone will save about \$1 million a year in purchased power. The utility has also signed a series of purchased power agreements that will provide around 40 MW of renewable energy at reduced rates from 11 to 16 cents per kWh, saving \$1.2 million annually.

Internally, the authority has been optimizing its system since 2009. It has eliminated 10 water treatment plants, eight wastewater plants and about 300 pump stations. Another 17 treatment plants are planned for retirement by 2018. An initiative to identify and reduce water losses is already paying dividends. Nonrevenue water has been reduced from 62 percent to 58 percent in two years.

GETTING IT DONE

Six plants have individual performance contracts. Planning at each began with a walk-through. “We take a pretty high-level look,” says Chase. “We try to get the best readings to assign energy load to every-



A new centrifuge dewatering system will help reduce transportation costs and improve power output from the incinerator at the Puerto Nuevo wastewater treatment plant. The incinerator uses biosolids from three PRASA plants to generate electricity for the facility.

thing. We don’t just use nameplate ratings. We put data loggers on equipment and monitor it for a period of time. We put a lot of effort into defining what energy they’re using and where they’re using it.”

Operational improvements also contribute to more efficient processes and improved operations. “They had six 900 hp and three 350 hp centrifugal blowers at the Barceloneta wastewater plant,” notes Chase. “That’s a lot of equipment to maintain. That all goes away and you have five high-speed turbo blowers in their place, and we took a digester offline.”

Honeywell will handle preventive maintenance on the new equipment for the life of the contracts, and the schedule is aggressive. “Electricity costs are high, so you get the benefits back from things like diffuser cleaning a lot sooner,” says Chase. “In places where power costs are lower, that cleaning schedule may be double what we see in Puerto Rico.”

CAPITAL VS. O&M

Dave Robinson, Honeywell energy services senior

marketing manager, adds that many treatment plants have been delaying capital expenditures for lack of funds: “We see more and more that they are deferring upgrades three or four years. The net effect is to lose all that energy savings during that time. They’re spending money on energy when they could be putting it into capital improvements instead.”

Ramirez adds that once work at the first six facilities is completed, the authority will continue with other projects across its system as it updates its strategic plan every two years. “It’s a very holistic approach,” she says. “We’re doing a lot, and we’re seeing the results.”

That includes monthly metrics to guide more than 5,000 employees through the changes needed to achieve the strategic goals. “Employees say it is good that they have clear goals that are achievable,” Ramirez says. “We have seen the cultural change. It’s been a very positive experience. Challenging, but we’re working really hard.” **tpo**

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The Hollywood Road Wastewater Treatment Plant team includes, front row, from left: Stephen Greenlee, Weldon O'Dell, James Farmer, Kirk Paulhamus, Francis Living, Randall Highsmith, Jesus Diaz and Steve Conley; back row: Shane Bramblett, David Westmoreland, Robert Salazar, Charles Moreno, Jorge Vasquez, Michelle Bates and Mike Followill.



Handmade Excellence

TEAMS AT AMARILLO'S TWO CLEAN-WATER PLANTS ACHIEVE PLATINUM-QUALITY PERFORMANCE BY APPLYING MANUAL METHODS INSTEAD OF RELYING ON AUTOMATION

STORY: **Jim Force**

PHOTOGRAPHY: **Shaie Williams**

NO ONE CAN SAY THAT HIGH-TECH INSTRUMENTS are responsible for the award-winning performance of the two clean-water plants in Amarillo, Texas.

The 50 team members at the city's River Road and Hollywood Road plants rely on their knowledge, their observations and manual adjustments to keep the facilities producing top-quality effluent.

Operators do rounds every two hours, monitoring key parameters like dissolved oxygen, chlorine content and total solids. They take grab samples and run laboratory analyses themselves, an approach that helps teach staffers the ins and outs of the entire treatment process, according to Jim Stover, wastewater treatment superintendent.

A software package (AllMax) helps both plant teams manage preventive maintenance, tracking work orders, repairs and work history on all processes, including parts and labor. Other than that, it's operators' skills that keep the activated sludge processes in constant balance and win Platinum Awards for perfect compliance year after year from the National Association of Clean Water Agencies.

The operators' long years of experience are both a blessing and a concern: The city's workforce is aging, and replacing them as they retire will be a significant challenge, notes Stover, who is responsible for both plants. "Nobody grew up wanting to

City of Amarillo (Texas) Wastewater Treatment Plants



BUILT: | **River Road plant 1926, latest upgrade 1983; Hollywood Road plant 1963, latest upgrade 1992**

POPULATION SERVED: | **196,000**

DESIGN FLOWS: | **River Road, 16 mgd; Hollywood Road, 12 mgd**

TREATMENT LEVEL: | **Tertiary**

TREATMENT PROCESS: | **Both plants, activated sludge**

RECEIVING WATER: | **River Road to local power plants, Hollywood Road to Upper Prairie Dog Town Fork, Red River**

BIOSOLIDS: | **River Road land-applied, Hollywood Road landfilled**

STAFF: | **25 at each plant**

ANNUAL BUDGET: | **\$7.5 million (operations)**

WEBSITE: | **www.amarillo.gov**

GPS COORDINATES: | **River Road - Latitude: 35°20'1.95"N, Longitude: 101°48'11.91"W; Hollywood Road - Latitude: 35°15'54.83"N, Longitude: 101°52'17.33"W**

be a wastewater treatment operator," he says. "We all wanted to be president, or a lawyer, or a doctor."

SIMILAR PROCESSES

Both River Road (16 mgd design) and Hollywood Road (12 mgd) use conventional activated sludge treatment, preceded by bar screens, grit chambers and primary clarifiers, and followed by gravity media filtration.

At River Road, the two bar screens have motorized cog mechanisms that remove screenings and dump them to a conveyor. Two Detritor grit pumps (Ovivo) move grit to a Krebs cyclone separator (FLSmidth). Wastewater flows on to a set of four circular primary tanks, two 80 feet and two 70 feet in diameter. The secondary system consists of five rectangular aeration basins, each with fine-bubble aerators (Sanitaire – a Xylem Brand) fed by Roots blowers (GE Energy). The water is decanted in six 80-foot-diameter secondary clarifiers.

Michael Brogdon, assistant superintendent at the River Road Wastewater Treatment Plant.



**Amarillo wastewater treatment plants
PERMIT AND PERFORMANCE**

	CBOD IN	CBOD OUT	PERMIT CBOD	TSS IN	TSS OUT	PERMIT TSS	AMMONIA IN	AMMONIA OUT	PERMIT AMMONIA
River Road	239 mg/L	2.2 mg/L	10 mg/L	209 mg/L	1.6 mg/L	15 mg/L	28.1 mg/L	0.4 mg/L	3 mg/L
Hollywood Road	216 mg/L	2.0 mg/L	7 mg/L	214 mg/L	1.3 mg/L	15 mg/L	27.6 mg/L	0.4 mg/L	2 mg/L

Effluent is disinfected with gaseous chlorine, dechlorinated with sulfur dioxide (Evoqua Water Technologies) and routed to a reservoir. From there, the water is pumped to the Xcel Energy Nichols Power Station, where it is treated further and used for cooling water makeup.

Effluent is discharged to the receiving stream (East Amarillo Creek) only for biomonitoring. When that occurs, the effluent passes through a multimedia gravity filter (Infilco Degremont) before chlorination-dechlorination.

At Hollywood Road, preliminary and primary treatment are the same as at River Road. The secondary system includes six rectangular aeration basins with fine-bubble diffusers, followed by clarifiers, a traveling bridge tertiary filter (Aqua-Aerobic Systems) and a Capital Controls chlorination-dechlorination system (Severn Trent Services). The plant discharges to tributaries of the Red River and to Tanglewood Lake. The primary clarifier outfalls are covered to contain odors. Kirk Paulhamus, assistant superintendent and plant manager of Hollywood Road, says his staff never uses a bleach-based odor control system because odors are simply not an issue.

The plants' biosolids trains are also similar. River Road uses dissolved air flotation and gravity thickening before feeding to thermophilic digestion, used because of its smaller footprint. The plant is equipped with two belt presses (Charter Machine Company).

Hollywood Road uses mesophilic digestion. Dissolved air flotation thickens waste activated sludge and primary sludge is thickened in the clarifiers ahead of a pair of belt filter presses (Komline-Sanderson). The dewatered cake is landfilled. The cake averages 18 to 20 percent solids, and the annual volume is about 2,000 dry tons, according to Paulhamus.

At River Road, the belt filter presses are not used — about 20 million gallons a year of liquid biosolids are injected into a 110-acre farm field next to the treatment plant. It's a matter of economics, according to Michael Brogdon, assistant superintendent, who manages that facility.

AWARD WINNERS

In 2013, the River Road plant received an NACWA Platinum Award for eight years of continuous compliance with its discharge permit, and the Hollywood Road facility received a Platinum Award for seven consecutive years of compliance.

Platinum Awards recognize 100 percent compliance with NPDES permits over five consecutive years as a base, and then honor plants for additional consecutive years of compliance after that. Platinum status continues for each additional year of perfect compliance. In 2013, only 15 plants nationwide received the Platinum recognition for eight consecutive years of com-

pliance, and 12 received Platinum recognition for seven consecutive years.

For Stover, it isn't sufficient for the plants to operate "well enough." He observes, "We operate the plants as best as they can be operated." The data bears him out. At both plants, effluent CBOD averaged 2.1 mg/L and TSS 1.4 mg/L last year. Ammonia was reduced to about 0.4 mg/L. The high-quality effluent easily complies with Amarillo's discharge permit.

"We're very proud of our record," says Stover. One reason for the outstanding performance is a cadre of veterans Stover supervises. At River Road, the key people are Brogdon and Michael Jesse, operations control supervisor. Their counterparts at the Hollywood Road plant are Paulhamus and Jorge Vasquez, operations control supervisor.

"They are our keys to success," says Stover. "If there's a problem, they identify it and resolve it. They are our go-to people." The group also leads the city's teaching and certification efforts, and some management team members are registered teachers for the Texas Water Utility Board.

HANDS-ON APPROACH

Hands-on is the main method for training new employees, and that old-fashioned approach is also Amarillo's choice for process operations. Stover prefers that his team members monitor and adjust plant processes by hand, instead of relying on automation and instrumentation.

"With activated sludge, we're taking care of a life form, keeping it healthy

“Nobody grew up wanting to be a wastewater treatment operator. We all wanted to be president, or a lawyer, or a doctor.”

JIM STOVER

BEFORE RECYCLING WAS COOL

Jim Stover says the Amarillo wastewater utility was recycling treated wastewater before there was recycling. In 1955, the city's River Road Wastewater Treatment Plant hooked up to an old Texaco refinery and began pumping effluent for use in the refinery process.

"We were reclaiming wastewater before reclaim was cool," says Stover, wastewater treatment superintendent. The refinery no longer exists, but since 1960 the River Road plant has been sending its effluent to the Nichols Power Station, where it is treated further, then used for cooling at Nichols and Harrington Power Stations, both owned by Xcel Energy.

According to the Xcel website, "Nichols Station pioneered the use of reclaimed, treated sewage effluent for cooling and other vital power plant functions. The technology ... is a mainstay of environmentally conscientious industrial operations nationally."

The Nichols Station is a three-unit, natural-gas-fired plant generating steam and electricity. The Harrington Station is coal-fired. After being used for cooling, the water is recycled for irrigation in the area.



Jim Stover, wastewater treatment superintendent



The River Road plant team includes, front: Petra Carrillo; second row, from left: Michael Brogdon, assistant superintendent, Jeannetta Fields and Danny Martinez; third row: Tommy Langham, Dave Stephenson and Michael Castleberry; fourth row: Patrick Ownes, Chris Beard and Duane Evenson; back: Jim Strack.



Michael Brogdon, assistant superintendent, displays the River Road plant's 2014 Platinum Award from the National Association of Clean Water Agencies.



The River Road plant (above) and the Hollywood Road plant both use a conventional activated sludge process.

“With activated sludge, we’re taking care of a life form, keeping it healthy 24 hours a day. Even though the basins are built to be hydraulically equal, we need to adjust flows, return sludge and air.”

JIM STOVER

force where the average age is high among the 50 employees, split evenly between the two plants, 17 miles apart as the crow flies. Pending retirements make it essential to attract new talent.

Stover and his staff would like to be surprised by an increase in applications to work in wastewater treatment. “We used to have dozens to choose from,” says Stover, who has worked 32 years with Amarillo. “But these days we’re lucky to get three or four to apply when a position opens up. I’ve made suggestions that since most people won’t consider working in the wastewater field, we might need to pay wastewater treatment plant operators more than other city jobs, but that hasn’t been received well.”

Management staff members recruit in local schools. As an incentive to operators, the department pays for certification of those who sign on and advance up the ladder. Operators are promoted and receive pay raises each time they advance in certification. Maintenance personnel are on a similar program.

And the atmosphere at the plants is friendly and welcoming: “Whenever I’m at one of the sites, the operators holler ‘Hey, Mr. Stover,’ and we talk about the plant and their projects. Every holiday, we have a staff dinner at the plants. Everybody brings a home-cooked item. We call it food made with love.”

Nonetheless, recruitment remains at the top of the priority list: “We may have to do more. We can’t continue this way.” **tpo**

24 hours a day,” Stover says. “Even though the basins are built to be hydraulically equal, we need to adjust flows, return sludge and air. We do that manually — even our DOs — and we use our on-site laboratory to do the analyses. Each basin needs to be balanced. Treatment plants have a life of their own. There are always surprises.”

Stover and his team believe that the more operators perform the work themselves, the more they understand the process. Besides, he adds, automation costs money, and Amarillo is currently focused on improvements to its collections system infrastructure and replacing antiquated equipment at the treatment facilities.

Plant leaders are true believers in the hands-on approach, which enables operators to get fully familiar with the equipment. “We do rounds every two hours,” Brogdon says. “If a pump sounds different than it should, we can find the problem quicker.”

According to Paulhamus, nine operators staff the Hollywood Road plant around the clock. “They inspect all meters and take samples, which they analyze in the plant laboratory,” he says. All operators are trained in basic laboratory procedures. They write the results down and enter them into spreadsheets.

“We have a small SCADA system that monitors things like influent flow, but it doesn’t have any control features,” Paulhamus says. When new operators come on board, they spend the first month or two assigned to one of the veterans. “We believe in this approach to training and developing an understanding of how the plant works.”

RECRUITMENT NEEDS

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THE TECON DOUBLE-MEMBRANE BIOGAS STORAGE SYSTEM OFFERS A FLEXIBLE SOLUTION THAT CAN BE TANK- OR GROUND-MOUNTED AND IS QUICK AND COST-EFFECTIVE TO INSTALL

By Ted J. Rulseh

As biogas gains favor as a valued renewable fuel, clean-water plants need effective ways to collect and store it. Using the gas to heat processes and generate electricity saves money and keeps a potent greenhouse gas out of the atmosphere.

A virtue of any biogas storage system is the ability to expand and contract as gas production and usage fluctuate. Metal floating covers have that capability, as do inflatable membrane-based containers. Infilco Degremont (SUEZ ENVIRONNEMENT) offers the Tecon biogas storage system, which uses a double-membrane design.

An outer membrane provides protection and is kept under pressure to withstand wind, snow loads and climate extremes. An inner membrane expands and contracts as biogas is generated and consumed. The membranes can be mounted to a tank or to on-the-ground infrastructure, such as a concrete pad.

Jongmin Kim, biosolids application engineer, and Sudhakar Viswanathan, biosolids product manager, talked about the technology in an interview with *Treatment Plant Operator*.

tpo: What need was addressed by bringing this technology to the market?

Kim: The Tecon system was invented by an Austrian researcher who was exploring pressurized covers using plastic fabric as an alternative to fixed or floating metal covers. The intent is to use less material while serving the purpose just as well or better.

Viswanathan: In the past, most gas containment systems were sin-

gle-layer, so the barrier between the biogas and the atmosphere was just one layer of metal or plastic. The concept with the Tecon cover is to have a double layer of protection. The outer membrane withstands the elements, and the inner membrane contains the biogas within the system.

tpo: Is this system only for new installations? Or can it be retrofitted?

Kim: It is suitable for both, and it can be retrofitted to any shape of digester or other gas collection system. A common perception is that this is just a giant spherical balloon, but in reality we can do a square, a triangle or any shape a customer wants.

Viswanathan: These covers are built in a manner similar to the way fabric is used in designing structures like stadiums. You can build it to any shape you want. If a customer has a long, rectangular lagoon or an oval-shaped lagoon, we can build to the existing footprint. The shape is only limited by the imagination.

tpo: What do the two layers of material consist of?

Viswanathan: It is a thick, woven polyester fabric with very high tensile strength. We use fabric of the same thickness for both the outer and inner membranes, both for safety reasons and because our covers are designed to meet very stringent regulations in Germany and Austria. We want to bring the same level of detail and the same level of safety to projects worldwide. In case of damage on the outer membrane, we want the inner fabric to be able to withstand external forces just as if both membranes were intact.

tpo: Are different membrane colors available to fit the appearance of individual facilities?

Viswanathan: The constituents in biogas can discolor a membrane. For that reason, we give the inner membrane a yellow tint, so that if it were to be exposed, it would not give the appearance of being degraded. We can supply the outer membrane in any color the customer wants.

tpo: How does this double-membrane system function as the containment fills with biogas?

Kim: A blower forces air from outside in between the inner and outer membranes, so that externally it appears that the vessel is always full. A manually weighted check valve regulates the pressure, so that the pressure in the space between the membranes is always constant. As biogas pressure builds up, the inner membrane fills more of the space. The blower operates continuously, so that air containing methane or sulfurous gases is constantly blown out.

Viswanathan: The fluctuation of biogas production in the digester doesn't affect the operation or the appearance of the system. We don't use any external instrumentation to control the blower to turn the air on and off. The only instrumentation we have is on large membranes, where we use a level sensor to detect the extent to which the inner membrane is full. That enables the customer to determine how best to use the biogas that is available.

tpo: Is this a cost-competitive gas storage solution?

Viswanathan: The capital cost would generally be significantly lower than for a metal cover. The maintenance cost over a 20-year period would also be less.

tpo: What maintenance does this system require?

Viswanathan: The main moving part is the blower, which requires routine maintenance. The water- and glycol-based check valve also needs to be inspected periodically. Once every 10 to 15 years, the membrane should be inspected to see if it is deteriorating, and if so, it needs to be replaced.

Kim: Minimum membrane life is approximately 15 years in geographic areas with high UV light intensity, and 20 years in low-UV areas.

tpo: What is involved in membrane system installation?

Viswanathan: Typically, we can install a cover in less than a week. It takes a supervisor and a couple of laborers. If the cover is extremely large, we might require a crane. In general, installation is rather easy. We just need to prepare the surface on which to mount the membranes.

If a gas holder is ground-mounted on a concrete foundation, a bottom membrane is required to seal the gas storage system to the foundation.

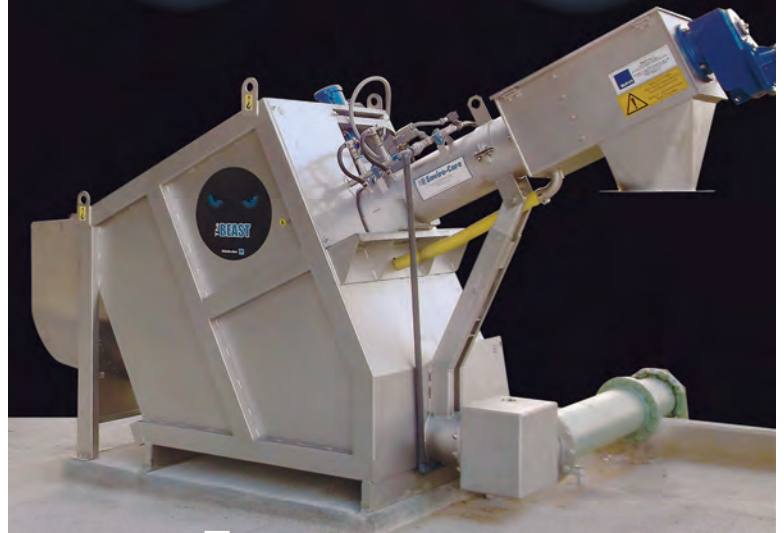
tpo: What is your experience with this technology in actual applications?

Viswanathan: We have more than 2,000 installations of these dual-membrane covers worldwide. It's a very well accepted technology. Its application is not limited to anaerobic digesters. It can also be used at landfills with biogas recovery, industrial wastewater treatment plants, agricultural biogas recovery facilities and activated sludge treatment systems where the customer needs to limit the amount of oxygen escaping from the process. **tpo**

“The concept with the Tecon cover is to have a double layer of protection. The outer membrane withstands the elements, and the inner membrane contains the biogas within the system.”

SUDHAKAR VISWANATHAN

The BEAST

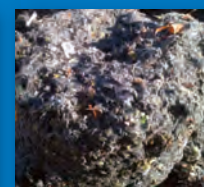


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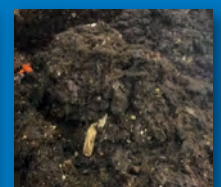
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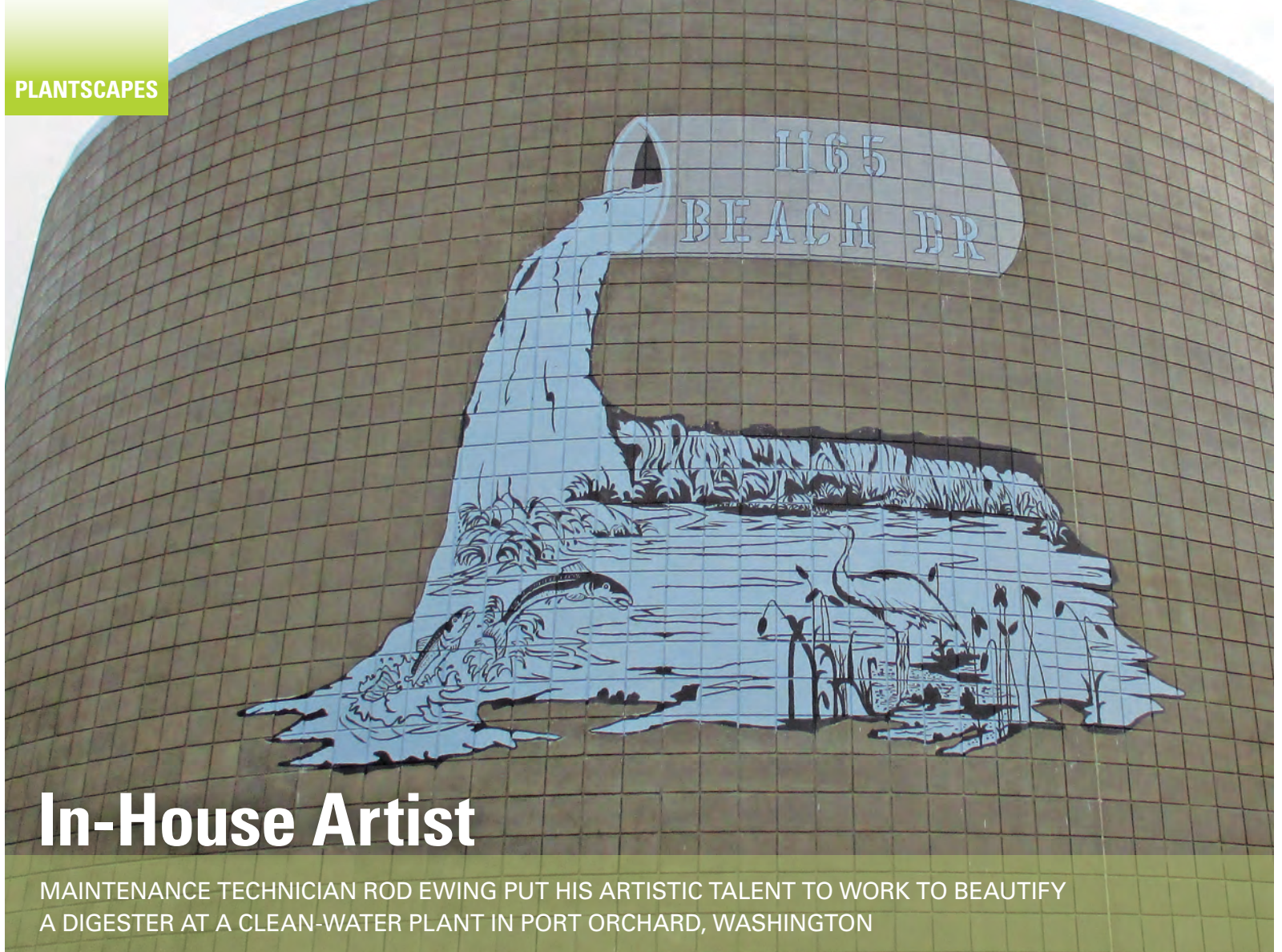
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In-House Artist

MAINTENANCE TECHNICIAN ROD EWING PUT HIS ARTISTIC TALENT TO WORK TO BEAUTIFY A DIGESTER AT A CLEAN-WATER PLANT IN PORT ORCHARD, WASHINGTON

By Jeff Smith

When South Kitsap Fire and Rescue asked the South Kitsap Water Reclamation Facility to enlarge the street address numbers displayed on a small sign at the plant entrance, facility maintenance technician Rod Ewing had a creative idea.

Ewing, who is a 29-year veteran of the plant in Port Orchard, Washington, as well as an accomplished artist, volunteered to paint a mural on the digester tank that would comply with the request while enhancing the plant's overall appearance.

ON PUBLIC VIEW

The 1.87 mgd (average) activated sludge facility nestles in a cove surrounded on three sides by homes and businesses. Only a well-traveled two-lane road separates it from Sinclair Inlet, a popular recreational and commercial waterway and a major tributary to Puget Sound.

Street numbers were painted on the concrete digester when it was built in 1987, but they were small and had weathered over the years. It was Ewing's idea to improve and enhance them, says Randy Screws, plant manager. The new enlarged numbers and street name letters appear on an effluent discharge pipe shown on the mural. Water from the pipe is shown flowing into a stream with fish in the water and wildlife nearby.

"Rod wanted to present an image and theme that demonstrates our work of protecting our receiving waters and the environment," says Screws. The mural measures about 10 feet square and took less than a week to complete. Preparation of the brick surface involved grinding and cleaning. Ewing

Plant maintenance technician Rod Ewing: Mural artist at work.

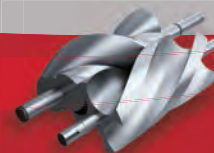


used polyurethane paint for the mural atop a white undercoat primer. The entire surface was sealed with a clear coat.

MANY PROJECTS

Ewing discovered his artistic talent when he was about 7 years old and taught himself to paint. "My childhood ambition was to become a school teacher, but then I realized I had this gift as an artist," he says.

Since then, he has displayed his talent in varied projects. He has painted portraits of famous people, such as TV's Ellen DeGeneres and Seat-



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“My childhood ambition was to become a school teacher, but then I realized I had this gift as an artist.”

ROD EWING

the Seahawks quarterback Russell Wilson. Recently he painted a portrait of Michael Jackson and will send it to Donald Trump, who is a huge Jackson fan. A portrait of former Seahawks running back Shaun Alexander eluding a Green Bay Packer tackler is one of his favorites.

Public art restoration has also exhibited Ewing's talent. The Port Orchard library features a centennial mural of a seaside scene by now-famous muralist Eric Grohe. Dimmed, weathered and ravaged by moisture and sunlight, the mural was fast deteriorating. In 2009, the city commissioned Ewing to restore it. Using lighter colors dabbed on to create a faded appearance, he preserved the original image as shown in photographs of the original.

“I didn't want to take away from the rest of it,” Ewing said in an interview at the time with the local newspaper. “I'm just purely honored to do this.”

FITTING RIGHT IN

While Ewing's digester mural receives many compliments from the public, Screws says the staff as a general practice tries to make the facility fit in and look as good as possible: “We maintain the property to make sure



The team at the South Kitsap Water Reclamation Facility includes, from left, Randy Screws, plant manager; Jessy Mottinger, maintenance technician; Wesley Morrell, instrumentation technician; Kevahn Steinke, maintenance supervisor; Brian McCown, operator; Rod Ewing, maintenance technician; Bryan Gallagher and Lance Hunt, operators; and Lorisa Watkins, laboratory analyst.

we are not an eyesore and that we blend in, and the mural has really helped.”

Plant tours are a popular form of outreach at the South Kitsap facility. “People will call to get our address to set up a tour and say, ‘I just drove by your place and didn't even notice it,’” says Screws. “When they're not noticing it, I guess that's a good thing.” **tpo**

The Change Game

AS A NEW PLANT SUPERINTENDENT, JEFF MAHAGAN WASN'T CONTENT WITH 'THE WAY WE'VE ALWAYS DONE THINGS.' HE PATIENTLY AND SUCCESSFULLY CHANGED AN ESTABLISHED CULTURE.

By Ann Stawski

Jeff Mahagan arrived in 2005 as superintendent at the Town of Hillsborough (North Carolina) Wastewater Treatment Plant.

He came with clear ideas on how to run the facility. He also encountered a plant where the previous management had been in place for more than 30 years. The transition to new ways of doing things was bumpy at times, but with time and patience, Mahagan made the changes he considered necessary. His challenges included leading his team through a complete plant upgrade, ending in 2014.

"The first years with Hillsborough were difficult," Mahagan says. "It took a lot of patience and understanding by the staff to accept a new direction and management style. Change is difficult for most people. Luckily, I inherited some great staff members, and they made all the difference."

EQUIPPED WITH EXPERIENCE

Hillsborough is a small, progressive town, nestled between the University of North Carolina at Chapel Hill and Duke University. It is home to numerous historical sites and includes a riverwalk along the Eno River that is part of the North Carolina Mountains-to-Sea Trail.

The wastewater treatment plant (3.0 mgd design flow, 0.950 mgd average) has a two-stage activated sludge process followed by tertiary treatment.



The Town of Hillsborough team includes, from left, Jeff Davis, operator; Ethan Oles, maintenance; Mike Lane, operator; Shawn Maines, chief operator; and Benjamin Bani, laboratory supervisor.



Jeff Mahagan, during a cleanup project on the Eno River.

It serves a population of nearly 12,000 and discharges to the Eno River. The plant employs six full-time staff members, down from 10 through transfers and retirements over the past several years.

Mahagan came to Hillsborough from his hometown wastewater treatment facility in Castle Rock, Colorado, where he had worked for 18 years, making constant modifications and upgrades and learning how to keep an aging facility in operation while building a new one. His experience gave him the skills to lead and develop the Hillsborough staff.

CHANGE IS GOOD

The Hillsborough employees were unsure of their new leader's expectations, but Mahagan had come prepared with a plan to promote a team atmosphere while fostering personal growth. He included the new team on his first project: developing a plant mission statement, vision statement and objectives.

"Everyone had a voice in the process," says Mahagan. "They committed to its ownership. The document gives a clear picture of the expected ethics and goals that we as a staff want to achieve." The plant's mission is: *To protect, preserve and enhance the Eno River by managing the wastewater treatment processes in an efficient and economical manner.*

tell us about your team

This feature in TPO aims to help clean-water plant leaders develop strong, cohesive operating teams. We welcome your story about team-building at your facility.

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Fishing is good below the Town of Hillsborough treatment plant.

The benefits of morning coffee are not always tangible, but Mahagan finds it encourages staff members to communicate and care about each other. “One morning an employee came in, obviously not feeling well,” he says. “Within 10 minutes, the sick employee was heading back home. The team had all of his scheduled duties covered, and I didn’t have to say a word.”

Mahagan also promotes involvement with organizations outside work — with local and state entities that monitor and protect the region’s water, soil and air. Maine is on the town Wellness Committee and attends North Carolina Professional Wastewater Operators Committee (NCPWOC) meetings when possible. Operator Mike Lane serves on the town Safety Committee.

Mahagan serves on the North Carolina Wastewater Board of Education and Examiners and is a past chairman of the NCPWOC. He is a member of

Mahagan then turned to team-building and employee growth and development. He instituted performance reviews, established daily responsibilities and set expectations for certification. “Providing a clear and written path for individual growth is important,” he says. The annual performance reviews clearly communicate each person’s strengths and specify areas for improvement, along with suggested actions.

EMPLOYEE DEVELOPMENT

To ensure that the team atmosphere fosters growth, Mahagan provides ongoing internal training. He also advocates external training, promotes staff communication and challenges team members to excel.

The plant offers several forms of internal safety training, but the staff members prefer online safety training they can complete at their own pace. All training counts toward continued education units needed to maintain certifications. During semi-monthly meetings, Mahagan encourages team members to come up with the topics for future discussion, sometimes inspired by certification exams or equipment issues.

Mahagan made it a goal to improve the operators’ skills and knowledge in their daily duties and to prepare them for certification exams. Since 2005, employee certification levels have increased greatly. Hillsborough now has four operators certified Grade IV (highest), one Grade 3 and one Grade 1. Team members have also earned certifications including wastewater laboratory analyst, biosolids land application, maintenance technologist and collections system.

“We offer cross-training and include staff as part of the decision-making process,” says Mahagan. “This gives staff the opportunity to grow and develop their skills.” Recent internal promotions include Shawn Maines to chief operator and Benjamin Bani to laboratory supervisor.

BETTER COMMUNICATION

Mahagan also improved communication by encouraging his staff to gather each morning. “I want my staff to come together for 15 to 30 minutes and talk,” he says. “Most of the time they discuss projects and tasks for the day, so I call that a meeting. Sometimes they talk about family and personal issues, so then I call it team-building.”

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and volunteer for the Eno River Association, where he works on stream monitoring of macroinvertebrates, and is an active member of Trout Unlimited.

IMPROVING THE PLANT

Teamwork has come strongly into play in improving the performance of the plant, built in the 1970s. In 2006, the team evaluated all processes for efficiency. Knowing that a major plant upgrade would be years away, the team set out to improve the two-stage activated sludge process. With a tight budget, they eliminated the need for alkalinity control, reduced effluent total nitrogen from 15 mg/L to 6 mg/L, reduced chemical feed for phosphorus removal by 41 percent and reduced electricity usage by 6.22 percent.

The staff's commitment was evident during the 2014 upgrade, focused on technology to meet extremely low future nutrient limits. Nearly every part of the plant was modified or replaced, and the project team included engineers, construction contractors and regulatory agencies. "Maintaining positive communication with everyone was extremely important," says Mahagan.

Whiteboards helped communicate project updates. Maines observes, "Everyone knew exactly what was going on. There were daily changes and reroutes, so we had to be flexible. It's also important to have a superintendent who stays on top of these items."

“Jeff encouraged us to go from reactive to proactive, to take chances and to be flexible.”

SHAWN MAINES

Knowing the handrails were necessary, the staff came up with an innovative design that met safety criteria while allowing easy access to equipment for repairs and maintenance. "The solution ultimately saved considerable money versus having the contractor install the handrails," says Mahagan.

LOOKING AHEAD

The Hillsborough plant has changed significantly since Mahagan's arrival. His staff sees the changes as beneficial. "Jeff encouraged us to go from reactive to proactive, to take chances and to be flexible," says Maines.

Mahagan's vision is simple: to see continued growth and improvements. "I know change is inevitable," he says. "Several of my staff have or will have the skills and knowledge to become superintendents and will most likely leave to continue their careers at other plants. We will just have to continue on and begin developing the next generation of wastewater leaders." **tpo**

Award winners

Jeff Mahagan encourages his staff members to pursue awards. Besides receiving multiple awards for innovation and customer service from the Town of Hillsborough, the plant received the 2009 North Carolina Central Region Operations and Maintenance Excellence Award.

Mahagan has received several awards in Colorado and North Carolina but is most proud of the William D. Hatfield Award he won in 2013 from the North Carolina Water Environment Association. "The pursuit of awards and recognition motivates the staff to excel and improve," says Mahagan. "I love competition, and I want the staff and the plant to be the best they can be."

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Settleability Test: A Valuable Tool

BY PAYING CLOSE ATTENTION TO THIS SIMPLE TEST, OPERATORS CAN GAIN VALUABLE INSIGHT INTO THE BIOLOGICAL TREATMENT PROCESS AND MAINTAIN HIGH-QUALITY EFFLUENT

By Ron Trygar, CET

Think of the last time you ran a settleability test at an activated sludge wastewater treatment plant. It was probably nothing to write home about.

Sometimes you might wonder why you run the test so much. It never really changes, so why not just run it once a month instead of once a week? It seems every plant has its own standard operating procedure (SOP) for running the settleability test.

As ordinary as this test may seem, it's important to understand how it should be performed and the valuable data it provides. A case study will show how the test can prevent poor treatment plant performance — if we pay attention to trends in settling characteristics.

WHAT IS A SETTLEABILITY TEST?

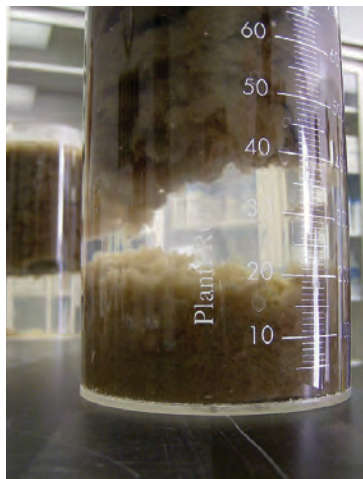
The settleability test is an analysis of the settling characteristics of the activated sludge mixed liquor suspended solids (MLSS). It is often referred to as “running a settleometer.” The test is normally done at the treatment plant rather than a certified laboratory. It includes five basic items:

- A clear container to hold the MLSS
- A timer or clock to track elapsed time
- A paddle or other mixing device
- A place to record the readings
- Operator patience, attentiveness and diligence

The idea of the test is to provide a place where the MLSS can quietly separate from the liquid water. The MLSS solids consist mostly of bacteria with some organic and inorganic debris mixed in. The debris can be finely shredded toilet paper, paper towel fibers, vegetable fibers, plastic material, seeds, insect parts — you name it.

During the first five minutes of the settleability test, the bacteria clump together, forming large clumps (floc). These floc particles are slightly denser than water — this helps with settling and compaction. After initially clumping together, the floc begins to settle toward the bottom of the container, squeezing the clear liquid out and up toward the surface.

Compare the perfect settling sludge with the Goldilocks analogy:



Rising sludge during a settleometer test is generally an indication of something amiss with the treatment process.



Settleometers come in a variety of shapes and sizes.

A large, open and irregularly shaped floc particle that has little density will settle slowly, perhaps compacting poorly by the end of the test. This biomass settles too slowly. Conversely, you may see an MLSS that has small, rounded floc particles that are dense and settle rapidly. This type of MLSS may leave much turbidity (cloudiness) in the liquid water above the settled sludge. The biomass appears granular and settles too fast.

What most operators hope to see is the perfect settling: not too fast, not too slow. First, it should form a large floc particle that settles well and also traps fine particles that make up the turbidity around the floc. Second, the biomass should produce a clear liquid above the settling solids — the liquid that will become the plant effluent. This biomass settles just right!

THE PATH TO PERFECT

While today's operators have access to a great deal of monitoring and process control technology, the settleability test is still one of those old-fashioned tests that relies on operator awareness and skill. The results can be entered into computer spreadsheets and used to perform calculations like sludge volume index, but the settleability analysis is still operator based. Here is a summary of how to run a settleability test:

- Use a clean, clear container (like a beaker) marked with graduations. If a 1,000 mL beaker is used, the graduations are usually 100 mL. A true settleometer is actually 2 liters (2,000 mL), but is marked with graduations based on the number 1,000.
- Collect at least 2 liters of fresh, well-mixed MLSS from the last point in the biological treatment process before the final clarifiers.

- Mix the contents of the sample container by inverting several times; do not violently shake or agitate the MLSS sample.
- Fill the test container to the 1,000 mL mark. Run the test on a flat surface, out of direct sunlight. (Direct sunlight warms one side, causing uneven settling.)
- Gently mix the contents with a paddle or stirrer one more time, slowing the current almost to a standstill.
- Start the timer or note the start time.
- Every five minutes, collect readings of the top of the settling sludge blanket as best you can. Sometimes there are high and low spots; use an average in these instances.
- Observe the settling conditions; watch the formation of the floc and the speed of the settling.
- Collect and record settleability readings every five minutes for the first 30 minutes.
- Collect and record settleability readings every 10 minutes for the next 30 minutes.
- The test will conclude at the one-hour mark, but a common practice is to allow the container to sit for an hour longer. If the sludge rises or splits before the end of the test, record the time this occurs.

Once the test is complete, use graph paper or a computer program to enter the data into a trend chart. This is one of the most crucial steps in the test: analyzing the settleability test results.

WHAT YOU MIGHT MISS

Many operators go through the motions of the settleability test without really paying attention to the valuable information it provides. We collect the sample, pour it into the settleometer, set the timer for 30 minutes and walk away. When the 30-minute alarm sounds, we get the reading, write it down or log it in somewhere, and pour out the container.

When we collect the readings every five minutes, we stay close to the test while it's running. We pay closer attention to what's happening during the settling, watch the flocculation during the first five minutes, see the compaction occur as the flocculated sludge gains weight, and notice the little canals or channels of water rising above the sludge as it settles toward the bottom.

At the 30-minute mark, the biomass has settled and compacted, hopefully leaving clear supernatant above the blanket of solids. Additional settling time (the next half-hour) might show some additional compaction of the biomass or clarification of the supernatant. This is also important to note.

I learned a tip from a trainer during an activated sludge troubleshooting class many years ago that I found very useful and true: You will notice that when the biomass is settling well, the 30-minute reading will be half of the five-minute reading. For example, if the five-minute reading is 900, the 30-minute reading will be about 450. Compare that to when settling is too rapid and is leaving much turbidity in the supernatant: The five-minute reading might be 350, and the 30-minute reading 300. If we plot these results on a graph, the line looks like an L.

- What do we *not* want to see during the settling test?
- Settling too rapidly. Biomass does not first flocculate together during the first five minutes; it just "drops out." During the first five

minutes, the biomass settles quickly to the bottom and does not show additional settling qualities.

- Settling too slowly. Biomass slowly forms flocculated particles that may take all 30 minutes to begin clumping together. Compaction is poor; there is no real thickening of the biomass. Supernatant might be clear, or somewhat cloudy with a green or gray appearance. Very clear supernatant above the settling biomass may indicate a filament bulking condition; get the microscope out and take a look! A young sludge condition (low MLSS) may cause the supernatant to have a gray to green cloudy appearance.
- Rising sludge during the test, especially the first 30-minute period (see sidebar).
- Rapid settling of sludge, leaving a dirty, brown and turbid supernatant, especially if the settleability test yesterday (or since the last test)

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looked completely normal. This could be caused by deflocculation, which sometimes occurs with a toxic shock to the biomass, or excessive solids loss from over-wasting or solids washout.

A CASE STUDY

A good friend who is a consultant and trainer shared a story of a plant upset that occurred mostly because the plant operators were not really paying attention to the settleability test, among other things. The SOP was to collect the MLSS sample, run a settleability test, record the five-minute and 30-minute readings and also run an MLSS test on the sample using the gravimetric method (filter paper, drying oven, analytical balance, desiccator). The results were recorded on a lab bench sheet and filed away. Constant MLSS was the facility process control strategy, with a target MLSS of 3,200 mg/L.

The plant upset happened slowly, and the final effluent turbidity and effluent total suspended solids became too great for public access reuse. Therefore the effluent had to go to reject percolation ponds. The golf courses that relied on the plant's reclaimed water for irrigation had to resort to alternate sources. How did this happen?

The settleability test is an analysis of the settling characteristics of the activated sludge mixed liquor suspended solids (MLSS). It is often referred to as "running a settleometer." The test is normally done at the treatment plant rather than a certified laboratory.

The evidence indicated that while the MLSS quantity increased very little, staying close to 3,200 mg/L, the MLSS characteristics changed quite a bit. Over time the MLSS became a rapid-settling biomass that left behind much turbidity. While the 30-minute reading stayed close to normal (about 300), the five-minute reading changed greatly.

When the plant was running well, the five-minute reading was about 650 to 700. This reading gradually decreased, until eventually all settling took place in the first five minutes (a reading of 300). If these results are plotted on a graph, one can see the difference in the path the biomass took to get to the 300 mark (see graph).

The MLSS remained close to the target, but the SVI and settleability test results did not. The five-minute results were recorded, but no attention was paid to them. In the final analysis, seasonal flows had changed, causing less food as BOD available for the biomass. This reduction in the food-to-microorganism (F/M) ratio, and the increase in sludge age, could have been avoided by maintaining a lower MLSS during the low-flow season.

IT'S ALL ABOUT SLUDGE QUALITY

A pioneer in our field, Alfred West taught and practiced activated sludge process control using total sludge quality principles including the settleability test, SVI and F/M ratio. He also championed the use of a laboratory centrifuge as a quick process control tool for sludge age calculations and process adjustments. If we go back to these basic principles of sludge quality, paying attention to what the settleability test tells us, we can prevent poor operating conditions, just as he described in the 1970s.

My friend in the case study worked with the operators to improve sludge quality by increasing the waste rate to remove some of the old, dense solids. They also added a supplemental source of organic material (manure) to the MLSS to increase the F/M ratio. This jump-start caused a shift in activity and population among the groups of bacteria working together in the biomass.

It took about two weeks to achieve the quality of biomass they were looking for — one that produces high-quality reclaimed water. In the meantime, they made sure the dissolved oxygen was in the range of about 2.0 mg/L in the aeration basins and kept the effluent filters backwashed properly. Closer

IT'S A GAS, GAS, GAS

Sludge blankets may split during a settling test. Operators often blame denitrification — trapped microscopic nitrogen bubbles released from the bacteria — as the cause of rising sludge. Sometimes that's true, but not always. Let's look at alternate possibilities:

Scenario 1. A plant uses a high wasting rate to maintain a five-day or less solids retention time (SRT). The sludge in the settling test rises before the 30-minute time is complete. Is nitrogen gas causing the rise? Probably not, since the SRT is five days or less. Nitrifying organisms are relatively slow-growing compared to the more common bacteria that make up about 95 percent of the biomass. Nitrification will not take place until the SRT is greater than five days, along with other proper environmental conditions. The gas most likely responsible for the rising sludge in this situation is carbon dioxide (CO₂). In the early stages of bacteria growth, the reproduction rate can be quite high. Organic material in the influent wastewater under aerobic conditions is being converted into water, carbon dioxide and energy for new cell growth.

Scenario 2. A plant runs an SRT greater than 10 days. The settleability test can be completed over the entire 60 minutes, but the sludge may rise afterward. Denitrification (nitrogen gas) might be the cause, but CO₂ may be present, as well as gases like nitrous oxide (N₂O) and nitric oxide (NO), also formed during denitrification. New cell growth has slowed; the F/M ratio has decreased. Ammonium in the MLSS is decreasing, nitrate is forming.

Scenario 3. Hydrogen sulfide (H₂S) and methane (CH₄) are common gases present when the biomass has become septic. They can cause rising sludge in the settleability test and cause dark brown to black clumps to rise in the clarifiers. Odors consistent with hydrogen sulfide (rotten eggs) are present, and plant effluent BOD and ammonia values are high. This condition might be caused by under-aeration of the aeration basin, septic wastewater from the collections system, or both. Dark brown to black sudsy foam may be seen on the aeration tank surface, and a sour odor may be present.

monitoring of the settleability test results along with regular microscopic examination of the MLSS and tracking of the F/M ratio has also helped.

By now presumably you can see that the settleability test is a simple yet valuable tool for operators of any activated sludge treatment plant. Remember that each plant runs differently and will exhibit its own biomass settling characteristics. By running and observing the settleability test often, and taking time to analyze the data it provides, operators can gain a window into the world of biomass.

ABOUT THE AUTHOR

Ron Trygar is a process control specialist with the Hillsborough County (Florida) Public Utilities Department. He can be reached at TrygarR@hillsboroughcounty.org. tpo



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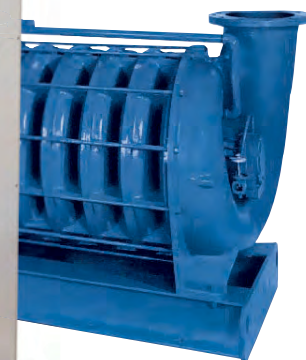
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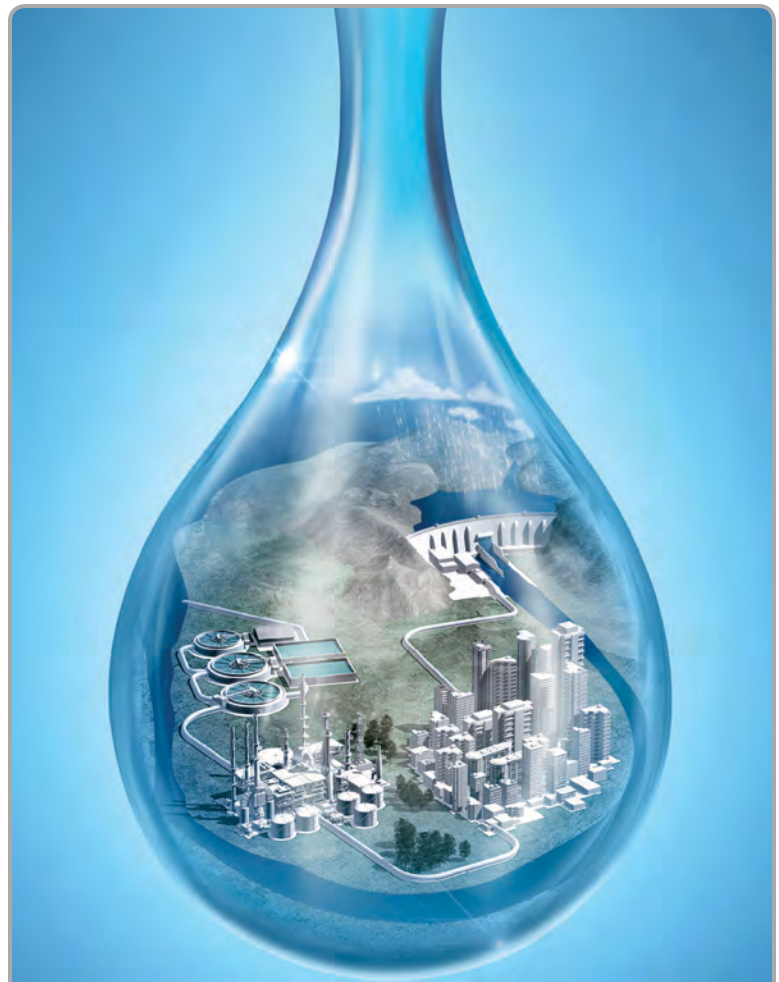
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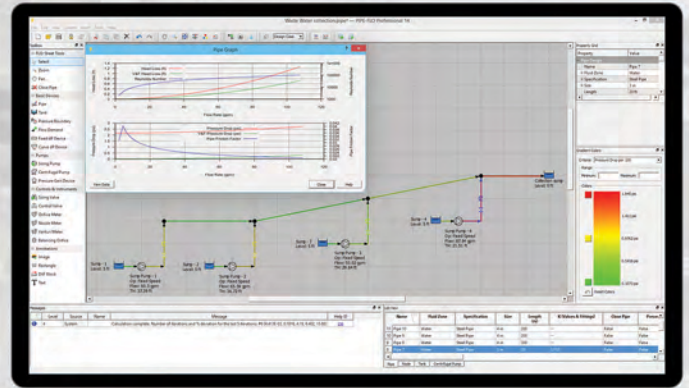
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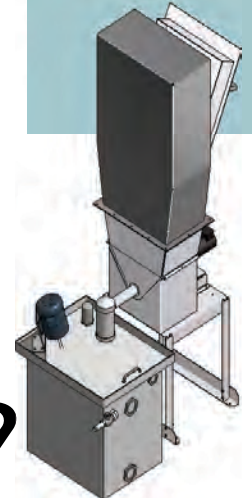
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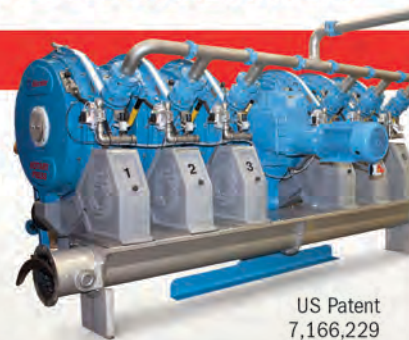
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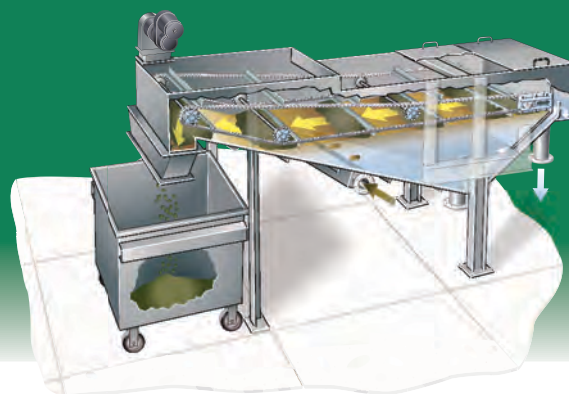
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www.mistymountaintankoi.com
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Trico Corporation
Pewaukee, WI
262-691-9336
rmccormick@tricocorp.com
www.tricocorp.com

Sludge - Collectors/Measurement

AMWELL, A Div. of McNish Corp.
Aurora, IL
630-898-6900 • Fax: 630-898-1647
phaizman@amwell-inc.com
www.amwell-inc.com

Brentwood Industries
Reading, PA
610-374-5109 • Fax: 610-685-0127
water@brentwoodindustries.com
www.brentwoodindustries.com

Garland Manufacturing Company
Saco, ME
800-727-1900 • 207-283-3693 • Fax: 207-283-4834
wastewater@garlandmfg.com
www.garlandmfg.com/plastics/wastewater.html
Ad on page 4

Hawk Measurement America
Lawrence, MA
888-429-5538 • 978-304-3000 • Fax: 978-304-1462
info@hawkmeasure.com
www.hawkmeasure.com
Ad on page 97

Liquid Waste Technology, LLC
New Richmond, WI
800-243-1406 • 715-243-2140 • Fax: 715-246-2573
ecompanion@lwtredge.com
www.lwtredge.com

Nasco Whirl-Pak
Fort Atkinson, WI
800-558-9595 • Fax: 800-372-1236
info@enasco.com
www.enasco.com
Ad on page 131

Sludge - Dewatering/Presses

Alfa Laval Ashbrook Simon-Hartley
Richmond, VA
866-253-2528
customerservice.usa@alfalaval.com
www.alfalaval.us/wastewater

Aqua Ben Corporation
Orange, CA
877-771-6041 • 714-771-6040 • Fax: 714-771-1465
www.aquaben.com
Ad on page 123

AQUA-Zyme Disposal Systems, Inc.
Van Vleck, TX
979-245-5656 • Fax: 979-244-8239
zymme@aqua-zyme.com
www.aqua-zyme.com
Ad on page 109



Aqualitec Corp.
Los Angeles, CA
855-650-2214
info@aqualitec.com
www.aqualitec.com

Azzuro, Inc.
Scottsdale, AZ
602-903-3918
info@azzuro.com
www.azzuro.com



BCR Environmental Corporation
Jacksonville, FL
904-819-9170 • Fax: 904-998-3828
www.bcrenv.com



BDP Industries, Inc.
Greenwich, NY
518-527-5417 • Fax: 518-695-5417
kelly@bdpindustries.com
www.bdpindustries.com

Boerger, LLC
Chanhassen, MN
612-435-7300 • Fax: 612-435-7301
america@boerger.com
www.boerger.com



Bright Technologies, div. of Sebright Products, Inc.
Hopkins, MI
800-253-0532 • 269-793-7183 • Fax: 269-793-4022
julie@brightbeltpress.com
www.brightbeltpress.com
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Centrisys Corporation
Kenosha, WI
877-339-5496 • 262-654-6006 • Fax: 262-764-8705
info@centrisys.us
www.centrisys.com
Ad on page 99

Charter Machine Company
Metuchen, NJ
732-548-4400
walterk@chartermachine.com
www.chartermachine.com

Compositech Products Manufacturing
Pearland, TX
888-719-1870 • 281-648-3557 • Fax: 281-648-4515
sales@compositech-filters.com
www.compositech-filters.com

DEL Tank & Filtration Systems
Scott, LA
800-468-2657 • 337-237-8400 • Fax: 337-266-7800
sales@deltank.com
www.deltank.com

FKC Co., Ltd.
Port Angeles, WA
360-452-9472 • Fax: 360-452-6880
mail@fkcscrewpress.com
www.fkcscrewpress.com
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Flo Trend Systems
Houston, TX
800-762-9893 • 713-699-0152
sales@flotrend.com
www.flotrend.com
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Flottweg Separation Technology, Inc.
Independence, KY
859-448-2300 • Fax: 859-448-2333
sales@flottweg.net
www.flottweg.com



Fournier Industries, Inc.
Thetford Mines, QC
Canada
418-423-6912 • Fax: 418-423-7366
s.fournier@fournierindustries.com
www.rotary-press.com
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Garland Manufacturing Company
Saco, ME
800-727-1900 • 207-283-3693 • Fax: 207-283-4834
wastewater@garlandmfg.com
www.garlandmfg.com/plastics/wastewater.html
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GEA Westfalia Separator
Northvale, NJ
800-722-6622 • 201-767-3900 • Fax: 201-767-3901
info.wsus@gea.com
www.wsus.com



Huber Technology, Inc.
Huntersville, NC
704-949-1010 • Fax: 704-949-1020
marketing@hhusa.net
www.huberforum.net
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Hydro International
Hillsboro, OR
866-615-8130 • 503-615-8130 • Fax: 503-615-2906
questions@hydro-int.com
www.hydro-int.com

JDV Equipment Corporation
Dover, NJ
973-366-6556
www.jdvequipment.com
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Komline-Sanderson
Peapack, NJ
800-225-5457 • 908-234-1000 • Fax: 908-234-9487
info@komline.com
www.komline.com
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Liquid Waste Technology, LLC
New Richmond, WI
800-243-1406 • 715-243-2140 • Fax: 715-246-2573
ecompanion@lwtredredge.com
www.lwtredredge.com

Noxon North America, Inc.
Concord, ON
Canada
416-843-6500
pg@noxon.com
www.noxon.com
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OVIVO USA, LLC
Austin, TX
512-834-6000 • Fax: 512-834-6039
info.us@ovivowater.com
www.ovivowater.com



Prime Solution, Inc.
Otsego, MI
269-694-6666 • Fax: 616-516-1451
info@psirotrary.com
www.psirotary.com



Schwing Bioset, Inc.
Somerset, WI
715-247-3433 • Fax: 715-247-3438
springer@schwingbioset.com
www.schwingbioset.com

See Water, Inc.
San Jacinto, CA
888-733-9283 • 951-487-8073
info@seewaterinc.com
www.seewaterinc.com

Smith & Loveless, Inc.
Lenexa, KS
800-898-9122 • 913-888-5201 • Fax: 913-888-2173
answers@smithandloveless.com
www.smithandloveless.com
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SUEZ ENVIRONNEMENT
Richmond, VA
800-446-1150 • 804-756-7600
info-inflico@degremont.com
www.degremont-technologies.com
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TenCate Geotube
Commerce, GA
888-795-0505 • 706-693-1897 • Fax: 706-693-1896
spec@tencate.com
www.geotube.com
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Weir Specialty Pumps (WEMCO)
Salt Lake City, UT
801-359-8731 • Fax: 801-530-7828
wsprfq@weirgroup.com
www.weirpowerindustrial.com

Sludge - Dryers



BCR Environmental Corporation
Jacksonville, FL
904-819-9170 • Fax: 904-998-3828
www.bcrenv.com

Huber Technology, Inc.
Huntersville, NC
704-949-1010 • Fax: 704-949-1020
marketing@hhusa.net
www.huberforum.net
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Komline-Sanderson
Peapack, NJ
800-225-5457 • 908-234-1000 • Fax: 908-234-9487
info@komline.com
www.komline.com
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Parkson Corp.
Ft. Lauderdale, FL
888-727-5766 • Fax: 954-974-6182
technology@parkson.com
www.parkson.com
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Schwing Bioset, Inc.
Somerset, WI
715-247-3433 • Fax: 715-247-3438
springer@schwingbioset.com
www.schwingbioset.com



SUEZ ENVIRONNEMENT
Richmond, VA
800-446-1150 • 804-756-7600
info-inflico@degremont.com
www.degremont-technologies.com
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Sludge - Hauling/Disposal



BCR Environmental Corporation
Jacksonville, FL
904-819-9170 • Fax: 904-998-3828
www.bcrenv.com

Carylon Corporation
Chicago, IL
800-621-4342 • 312-666-7700 • Fax: 312-666-5810
info@caryloncorp.com
www.caryloncorp.com
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JDV Equipment Corporation
Dover, NJ
973-366-6556
www.jdvequipment.com
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Kuhn North America, Inc.
Brodhead, WI
608-897-2131 • Fax: 608-897-2561
chris.searles@kuhn.com
www.kuhnnorthamerica.com
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Schwing Bioset, Inc.
Somerset, WI
715-247-3433 • Fax: 715-247-3438
sspringer@schwingbioset.com
www.schwingbioset.com

Sludge - Heaters

CleanTek Water Solutions
Fridley, MN
866-929-7773
info@cleantekwater.com
www.cleantekwater.com



HRS HEAT EXCHANGERS
Phoenix, AZ
623-915-4328
info@hrs-heatexchangers.com
www.hrs-heatexchangers.com

Hydro-Thermal Corporation
Waukesha, WI
800-952-0121 • 262-548-8900 • Fax: 262-548-8908
info@hydro-thermal.com
www.hydro-thermal.com

JDV Equipment Corporation
Dover, NJ
973-366-6556
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Sludge - Mixers/Thickeners

Aeration Industries International
Chaska, MN
800-328-8287 • 952-448-6789 • Fax: 952-448-7293
aai@aireo2.com
www.aireo2.com

AMWELL, A Div. of McNish Corp.
Aurora, IL
630-898-6900 • Fax: 630-898-1647
phaizman@amwell-inc.com
www.amwell-inc.com



BCR Environmental Corporation
Jacksonville, FL
904-819-9170 • Fax: 904-998-3828
www.bcrenv.com



Centrisys Corporation
Kenosha, WI
877-339-5496 • 262-654-6006 • Fax: 262-764-8705
info@centrisys.us
www.centrisys.com
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Charter Machine Company
Metuchen, NJ
732-548-4400
walterk@chartermachine.com
www.chartermachine.com

CleanTek Water Solutions
Fridley, MN
866-929-7773
info@cleantekwater.com
www.cleantekwater.com

DEL Tank & Filtration Systems
Scott, LA
800-468-2657 • 337-237-8400 • Fax: 337-266-7800
sales@deltank.com
www.deltank.com

FKC Co., Ltd.
Port Angeles, WA
360-452-9472 • Fax: 360-452-6880
mail@fkcscrewpress.com
www.fkcscrewpress.com
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Flo Trend Systems
Houston, TX
800-762-9893 • 713-699-0152
sales@flotrend.com
www.flotrend.com
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Flygt - a Xylem Brand
Charlotte, NC
855-995-4261 • Fax: 704-295-9080
www.flygtus.com

Huber Technology, Inc.
Huntersville, NC
704-949-1010 • Fax: 704-949-1020
marketing@hhusa.net
www.huberforum.net
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JDV Equipment Corporation
Dover, NJ
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www.jdvequipment.com
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Komline-Sanderson
Peapack, NJ
800-225-5457 • 908-234-1000 • Fax: 908-234-9487
info@komline.com
www.komline.com
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Kuhn North America, Inc.
Brodhead, WI
608-897-2131 • Fax: 608-897-2561
chris.searles@kuhn.com
www.kuhnnorthamerica.com
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Lightnin, an SPX Brand
Rochester, NY
888-649-2378 • Fax: 585-436-5589
lightnin@spx.com
www.spx.com



Ovivo USA, LLC
Austin, TX
512-834-6000 • Fax: 512-834-6039
info.us@ovivowater.com
www.ovivowater.com

Parkson Corp.
Ft. Lauderdale, FL
888-727-5766 • Fax: 954-974-6182
technology@parkson.com
www.parkson.com
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Smith & Loveless, Inc.
Lenexa, KS
800-898-9122 • 913-888-5201 • Fax: 913-888-2173
answers@smithandloveless.com
www.smithandloveless.com
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SPX
Delavan, WI
800-252-5200 • 262-728-1900 • Fax: 262-728-4904
ft.amer.info@spx.com
www.spx.com
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Vaughan Company, Inc.
Montesano, WA
888-249-2467 • 360-249-4042 • Fax: 360-249-6155
info@chopperpumps.com
www.chopperpumps.com
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Walker Process Equipment, A Div. of McNish Corp.
Aurora, IL
800-992-5537 • 630-892-7921 • Fax: 630-892-7951
walker.process@walker-process.com
www.walker-process.com
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Sludge Reduction/Treatment

Airmaster Aerator LLC
DeRidder, LA
888-813-3680 • 337-463-6567 • Fax: 337-463-9119
deanc@airmasteraerator.com
www.airmasteraerator.com



Aqualitec Corp.
Los Angeles, CA
855-650-2214
info@aqualitec.com
www.aqualitec.com

AQUATURBO SYSTEMS, Inc.
Springdale, AR
479-927-1300 • Fax: 479-927-0700
ats@aquaturbo.com
www.aquaturbo.com



BCR Environmental Corporation
Jacksonville, FL
904-819-9170 • Fax: 904-998-3828
www.bcrenv.com

BDP Industries, Inc.
Greenwich, NY
518-527-5417 • Fax: 518-695-5417
kelly@bdpindustries.com
www.bdpindustries.com

Bionetix International
Ste-Anne-de-Bellevue, QC
Canada
514-457-2914 • Fax: 514-457-3589
info@bionetix.ca
www.bionetix.ca
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Bright Technologies, div. of Sebright Products, Inc.
Hopkins, MI
800-253-0532 • 269-793-7183 • Fax: 269-793-4022
julie@brightbeltpress.com
www.brightbeltpress.com
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Carylon Corporation
Chicago, IL
800-621-4342 • 312-666-7700 • Fax: 312-666-5810
info@caryloncorp.com
www.caryloncorp.com
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CNP - Technology Water and Biosolids Corp.
Kenosha, WI
262-764-3651 • Fax: 262-764-8705
gerhard.forstner@cnp-tec.com
www.cnp-tec.com
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D3W Industries
Northville, MI
248-465-9841
nlionas@d3windustries.com
www.d3windustries.com

Flo Trend Systems
Houston, TX
800-762-9893 • 713-699-0152
sales@flotrend.com
www.flotrend.com
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Flottweg Separation Technology, Inc.
Independence, KY
859-448-2300 • Fax: 859-448-2333
sales@flottweg.net
www.flottweg.com

Fluidyne Corporation
Cedar Falls, IA
319-266-9967 • Fax: 319-277-6034
fluidyne@fluidynecorp.com
www.fluidynecorp.com

Huber Technology, Inc.
Huntersville, NC
704-949-1010 • Fax: 704-949-1020
marketing@hhusa.net
www.huberforum.net
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Hydro-Thermal Corporation

Waukesha, WI
800-952-0121 • 262-548-8900 • Fax: 262-548-8908
info@hydro-thermal.com
www.hydro-thermal.com

JDV Equipment Corporation

Dover, NJ
973-366-6556
www.jdvequipment.com

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Kemira

Lawrence, KS
800-879-6353 • 785-842-7424 • Fax: 785-842-2629
us.info@kemira.com
www.kemira.com

Liquid Waste Technology, LLC

New Richmond, WI
800-243-1406 • 715-243-2140 • Fax: 715-246-2573
ecompanion@lwtredge.com
www.lwtredge.com

Misty Mountain Aqua Products

Young Harris, GA
800-493-0564 • 706-379-2671
www.mistymountainkoi.com

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Ovivo USA, LLC

Austin, TX
512-834-6000 • Fax: 512-834-6039
info.us@ovivowater.com
www.ovivowater.com

Parkson Corp.

Ft. Lauderdale, FL
888-727-5766 • Fax: 954-974-6182
technology@parkson.com
www.parkson.com

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Prime Solution, Inc.

Otsego, MI
269-694-6666 • Fax: 616-516-1451
info@psiroatary.com
www.psirotary.com



Schwing Bioset, Inc.

Somerset, WI
715-247-3433 • Fax: 715-247-3438
sspringer@schwingbioset.com
www.schwingbioset.com

TenCate Geotube

Commerce, GA 30529
888-795-0505 • 706-693-1897 • Fax: 706-693-1896
spec@tencate.com
www.geotube.com

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**Software - Operations/
Maintenance**

ABZ, Incorporated

Chantilly, VA
800-747-7401 • Fax: 703-631-5282
mps@abzinc.com
www.abzinc.com

AllMax Software, Inc.

Kenton, OH
800-670-1867 • 419-673-8863 • Fax: 419-673-8864
sales@allmaxsoftware.com
www.allmaxsoftware.com

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Engineered Software, Inc.

Lacey, WA
800-786-8545 • 360-412-0702 • Fax: 360-412-0672
lincoln.hollis@eng-software.com
www.eng-software.com

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**Hydromantis Environmental
Software Solutions, Inc.**

Hamilton, ON
Canada
905-522-0012 • Fax: 905-522-0031
info@hydromantis.com
www.hydromantis.com

ProComSol, Ltd

Lakewood, OH
216-221-1550 • Fax: 216-221-1554
sales@procomsol.com
www.procomsol.com

RoviSys

Aurora, OH
330-562-8600
www.rovisys.com

Trihedral Engineering Limited

Bedford, NS B4A 1C1
800-463-2783 • 902-835-1575 • Fax: 902-835-0369
pcooke@trihedral.com
www.trihedral.com

**Software - Process
Control/Regulatory**

ABZ, Incorporated

Chantilly, VA
800-747-7401 • Fax: 703-631-5282
mps@abzinc.com
www.abzinc.com

Engineered Software, Inc.

Lacey, WA
800-786-8545 • 360-412-0702 • Fax: 360-412-0672
lincoln.hollis@eng-software.com
www.eng-software.com

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Hach Company

Loveland, CO
800-227-4224 • 970-669-3050
orders@hach.com
www.hach.com

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**Hydromantis Environmental
Software Solutions, Inc.**

Hamilton, ON
Canada
905-522-0012 • Fax: 905-522-0031
info@hydromantis.com
www.hydromantis.com

RoviSys

Aurora, OH
330-562-8600
www.rovisys.com

Trihedral Engineering Limited

Bedford, NS B4A 1C1
800-463-2783 • 902-835-1575 • Fax: 902-835-0369
pcooke@trihedral.com
www.trihedral.com

**Spill Control - Equipment/
Products/Services**

See Water, Inc.

San Jacinto, CA
888-733-9283 • 951-487-8073
info@seewaterinc.com
www.seewaterinc.com

**Stormwater Monitoring/
Treatment**

Aqua Ben Corporation

Orange, CA
877-771-6041 • 714-771-6040 • Fax: 714-771-1465
www.aquaben.com

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Aqua-Aerobic Systems, Inc.

Loves Park, IL
815-654-2501 • Fax: 815-654-2508
solutions@aquaaerobic.com
www.aquaaerobic.com

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Baseline a MOCON company

Lyons, CO
800-321-4665 • 303-823-6661 • Fax: 303-823-5151
info@baselineindustries.com
www.baselineinc.com



Duperon Corporation

Saginaw, MI
800-383-8479 • 989-754-8800 • Fax: 989-754-2175
bbauer@duperon.com
www.duperon.com

Enaqua

Vista, CA
760-599-2644 • Fax: 760-599-2642
info@enaqua.com
www.enaqua.com



Gorman-Rupp Company

Mansfield, OH
419-755-1011 • Fax: 419-755-1251
grsales@gormanrupp.com
www.GRpumps.com

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Greyline Instruments Inc.

Massena, NY
888-473-9546 • 315-788-9500 • Fax: 315-764-0419
info@greyline.com
www.greyline.com

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Hydro International

Hillsboro, OR
866-615-8130 • 503-615-8130 • Fax: 503-615-2906
questions@hydro-int.com
www.hydro-int.com

Keller America Inc.

Newport News, VA
877-253-5537 • 757-596-6680 • Fax: 757-596-6659
sales@kelleramerica.com
www.kelleramerica.com

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Kemira

Lawrence, KS
800-879-6353 • 785-842-7424 • Fax: 785-842-2629
us.info@kemira.com
www.kemira.com

PMC Engineering LLC

Danbury, CT 06810
203-792-8686 • Fax: 203-743-2051
sales@pmc1.com
www.pmc1.com

Solvay Chemicals, Inc.

Houston, TX
800-765-8292 • 713-525-6500 • Fax: 713-525-7806
john.maziuk@solvay.com
www.solvaychemicals.us

Trihedral Engineering Limited

Bedford, NS B4A 1C1
800-463-2783 • 902-835-1575 • Fax: 902-835-0369
pcooke@trihedral.com
www.trihedral.com

YSI, a xylem brand

Yellow Springs, OH
800-765-4974 • 937-767-7241 • Fax: 937-767-9353
info@ysi.com
www.yசி.com

Struvite Removal/Recovery



**CNP - Technology Water and
Biosolids Corp.**

Kenosha, WI
262-764-3651 • Fax: 262-764-8705
gerhard.forstner@cnp-tec.com
www.cnp-tec.com

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Switches/Relays

ElectroSwitch Corporation
Weymouth, MA
781-335-5200
www.electroswitch.com

Tanks - Chemical Storage

AmTech Tank Lining & Repair

Plymouth, NH
888-839-0373 • Fax: 603-947-9500
info@amtechtanklining.com
www.amtechtanklining.com

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Assmann Corporation of America

Garrett, IN
888-357-3181 • 260-357-3181 • Fax: 888-826-5329
info@assmann-usa.com
www.assmann-usa.com



CST Industries

Lenexa, KS
913-621-3700
www.cstindustries.com

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DEL Tank & Filtration Systems

Scott, LA
800-468-2657 • 337-237-8400 • Fax: 337-266-7800
sales@deltank.com
www.deltank.com



Dragon Products, Ltd.

Beaumont, TX
800-231-8198
sales@modernusa.com
www.dragonproductsltd.com



Hawkins, Inc.

Roseville, MN
800-328-5460 • 612-331-6910 • Fax: 612-331-5304
customer.service@hawkinsinc.com
www.hawkinsinc.com

Imperial Industries, Inc.

Wausau, WI 54402
800-558-2945 • 715-359-0200 • Fax: 715-355-5349
toma@imperialind.com
www.imperialind.com

Lutz-JESCO America Corp.

Rochester, NY
800-554-2762 • 585-426-0990 • Fax: 585-426-4025
mail@jescoamerica.com
www.jescoamerica.com

Tank Connection Affiliate Group

Parsons, KS
620-423-3010 • Fax: 620-423-3999
sales@tankconnection.com
www.tankconnection.com

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Tanks - Cleaning/ Inspection/Repair



AmTech Tank Lining & Repair

Plymouth, NH
888-839-0373 • Fax: 603-947-9500
info@amtechtanklining.com
www.amtechtanklining.com

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Carylon Corporation

Chicago, IL
800-621-4342 • 312-666-7700 • Fax: 312-666-5810
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Compositech Products Manufacturing

Pearland, TX
888-719-1870 • 281-648-3557 • Fax: 281-648-4515
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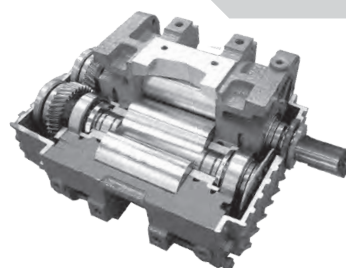
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AGM DECANTER CENTRIFUGE FROM GEA WESTFALIA SUITS STATIONARY OR MOBILE DEWATERING

By Craig Mandli

Biosolids are increasingly recognized as a valuable source of plant nutrients but require smart management. Municipalities are on the lookout for efficiency, and one product at the Water & Wastewater Equipment, Treatment & Transport (WWETT) Show drew municipal operators and private contractors seeking a cost-effective dewatering analysis.

The AGM decanter centrifuge from GEA Westfalia Separator is a continuously operating centrifuge with a horizontal solid-wall bowl developed specifically to dewater biosolids and manure. According to Jim Hanson, technical manager, the show provided a good cross-section of the target market for the product.

“We talk to a lot of municipalities at this show, which is really our bread and butter,” says Hanson. “But with liquid hauling getting so expensive, private waste haulers and farmers are looking to cut costs, too. This product serves them as well.”

Centrifuges are available in a range of sizes and can be built on mobile units with pumps and other equipment for transport to different locations. The technology removes particles as small as 40 microns without added chemicals and without blocking or plugging. The unit is compact and easy to install, operate and maintain. PLC automated controls adjust automati-

“In this market, it’s really a symbiotic relationship, especially with more municipalities looking at both land application of biosolids and production of biogas.”

JIM HANSON

cally to changing feed streams. The unit requires little energy. “For municipalities, this product is all about efficiently managing costs,” says Hanson.

In treatment plants, the unit can significantly reduce solids volumes and mechanical thickening of waste-activated sludge, which reduces the load on the digester and improves digestion and gas yield. It is available in sizes from 8- to 41-inch bowl diameters with flow rates from 5 to 1,500 gpm. The versatile unit can also be used in the drilling mud market for oilsands cleanup and in mines for water buildup and reuse. Hanson says attending events such as WWETT not only provides the opportunity to market the product, it gives him the chance to see it from a different perspective.



PHOTO BY CRAIG MANDLI

Jim Hanson, technical manager for GEA Westfalia, discusses the applications of the AGM decanter centrifuge dewatering device with an attendee at the 2015 WWETT Show. The continuously operating centrifuge with a horizontal solid-wall bowl is used to dewater biosolids and manure.

“We get different ideas all the time,” he says. “I had one WWETT attendee ask about how the product would apply to tank-bottom cleaning. That’s an application we hadn’t really explored.” GEA Westfalia shared its booth with sister company GEA Farm Technologies, focused on manure management and land application.

“In this market, it’s really a symbiotic relationship, especially with more municipalities looking at both land application of biosolids and production of biogas,” says Hanson. “The technologies are very similar, and those are practices the agriculture industry has been using for decades.”

Hanson hopes to bring the technology back to next year’s show: “This show enables us to bring awareness to many people who may not have considered this technology as a money-saver,” he says. “We had a lot of serious leads out of this show, which tells me that versatility is on their minds. I’ve seen more plant operators here than in the past, too. I think that trend will only continue as more consider biosolids application.”

800/722-6622; www.westfalia-separator.com. tpo



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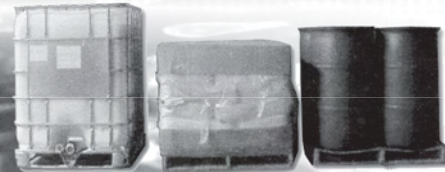
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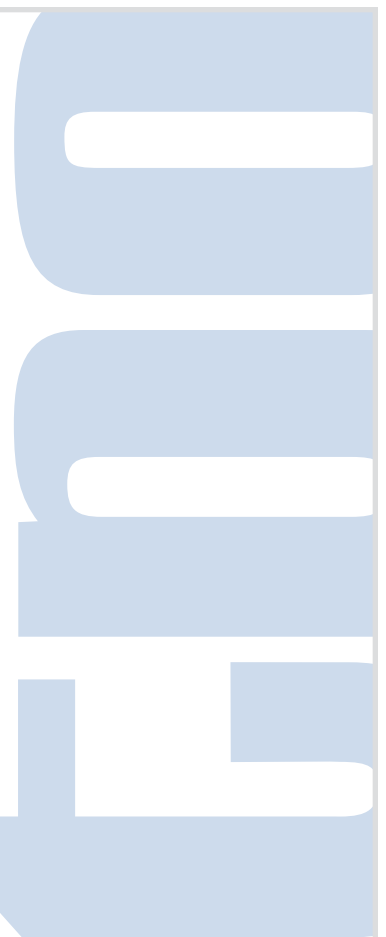
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Z Series solenoid diaphragm metering pumps from Hayward Flow Control feature front-facing controls and tube connections for flexible installation. Available with analog or digital controls in three pump sizes, flow rates range from 1 to 14 gph. Other features include 120 to 300 strokes per minute, 4-20mA or pulse input and outputs, NEMA 4X IP65 rated, double check valves with dual ceramic balls, and backlit LCD display with intuitive programming. **888/429-4635; www.haywardflowcontrol.com.**

2. SENSORAY MULTIFUNCTION VIDEO PROCESSOR FOR PIPELINE INSPECTION SYSTEMS

The Model 2253P A/V Codec with GPS receiver and incremental encoder interfaces from Sensoray can simultaneously encode, decode and preview A/V content. Independent video processors allow for two different video streams to be simultaneously produced from a single composite input. Image transformation such as resolution, rotation and mirroring are independently configurable for each stream, as are compression type and bit rate. **503/684-8005; www.sensoray.com.**

3. BLUE-WHITE DIAPHRAGM METERING INJECTOR PUMPS

The Chem-Feed C-1500N diaphragm metering injector pump from Blue-White Industries has a maximum feed to 228.1 gpd and maximum output pressure to 125 psi. Features include ball bearing, permanently lubricated gear motor, double-ball inlet and outlet cartridge-style ceramic check valves. The valve body and fittings are made of chemical-resistant PVDF. Valves have FKM static seals and TEF/P ball seat O-rings. The diaphragm is PTFE-coated EP. **714/893-8529; www.blue-white.com.**

4. FCI ANALYZER FLOW SWITCH/MONITOR

The Model FS10A analyzer flow switch/monitor from Fluid Components

International is approved for FM Division 1, Zone 1 on remote probe configurations. Designed to continuously verify flow within gas or liquid process analyzer sampling systems, the flow switch/monitor has no moving parts and requires little maintenance. Wetted parts are made from corrosion-resistant 316L stainless steel with Hastelloy-C22 sensor tips. **800/854-1993; www.fluidcomponents.com.**

5. METTLER TOLEDO TWO-WIRE TRANSMITTER FOR LIQUID ANALYTICS

The M100 two-wire transmitter for liquid analytics from Mettler Toledo Process Analytics, approved for use in hazardous areas, combines multiparameter measurement with remote access to predictive sensor diagnostic tools over the HART communication protocol. The transmitter covers pH/ORP, dissolved oxygen and conductivity measurements. **800/638-8537; www.mt.com.**

6. ASAHI/AMERICA WAFER CHECK VALVE

The 3-inch PVC wafer check valve from Asahi/America, installed on the discharge side of pumps, is designed to prevent backflow flooding. The valve's body, disc and stopper assembly are machined from solid PVC plate stock that conforms to ASTM D1784 cell classification 12454A. The check valve is available in 3- through 12-inch PVC with EPDM seals and no spring. All 3- through 8-inch check valves operate at a maximum pressure of 150 psi; 10- and 12-inch at 90 psi and up to 120 degrees F. **800/343-3618; www.asahi-america.com.**

7. SENSOREX LED TRANSMITTANCE MONITOR

The UVT-LED transmittance monitor from Sensorex Corp. takes automatic measurements every 60 seconds to ensure proper UV dosing and efficient operation. Integrated wiping prevents fouling and buildup.

wastewater: product spotlight



Air-sweep inlet tray
from The Witte Co.

Perforated inlet tray keeps moist material from clogging in fluid bed dryers

By Ed Wodalski

The **air-sweep inlet tray** from **The Witte Co.** is designed to prevent sludge in the 35 to 50 percent moisture range from clogging in fluid bed dryers. Installed within the in-feed section where material enters the drying system, the tray directs the heated airstream through a series of openings (about 1 mm) in the steel plate that faces downstream and parallel to the in-feed deck. Incoming material immediately begins drying and advances to the primary drying zone, reducing the potential for sticky material to block the in-feed.

“In many instances we handle material that is difficult to feed into our fluid bed dryers because of high moisture content,” says Larry Stoma, design engineer with The Witte Co. “Typically, over the years we’ve had a sloped vibrating plate that the material would land on and be conveyed through vibration into the fluidized bed section. What we did was we took that sloped plate or inlet tray and pierced it so the openings are tangential to the slope of the plate. Then we take air and blow it through the openings.”

As material flows onto the plate, it strikes the high-velocity stream of air bled off from the dryer, and in many instances is carried directly into the fluid bed without touching the tray.

Not designed to handle raw municipal sludge, material with 50 to 75 percent moisture content would require dewatering before being fed into the dryer.

The 12- to 18-inch inlet tray, an option on Witte dryers, can be easily accessed and removed for cleaning. **908/689-6500; www.witte.com.**

11. NONCONTACT METERS PORTABLE ULTRASONIC FLOWMETER

The SMART portable clamp-on ultrasonic flowmeter from Noncontact Meters is designed to communicate with a smartphone through a downloadable app to monitor gpm rates or totalization in metal or plastic pipe from 2 to 20 inches in diameter. Transit Time technology sends a sound pulse across the pipe and monitors the return differential of the transmit pulse as well as the return time to calculate volumetric flow rate and total. **770/516-3999; www.noncontactmeters.com.** (continued)



Available as a hand-held portable meter or in-line process, a self-calibration check ensures continual accuracy. The hand-held model comes with battery power for use in the field or lab. The continuous in-line model runs on 24 VDC power and can be used in an open channel configuration or pressurized pipe. **714/895-4344; www.sensorex.com.**

8. BIONOMIC FLUIDIZED BED SCRUBBER

The RotaBed fluidized bed scrubber from Bionomic Industries is designed to handle gas capacities from 500 through 250,000 acfm. Features include a two-stage chevron mist eliminator that ensures complete droplet removal from gas exiting the scrubber and a turbulent, highly plug-resistant mass transfer bed. **800/311-6767; www.bionomicind.com.**

9. CENTORK MODULAR VALVE ACTUATION SYSTEM

CK modular electric valve actuators from Centork are compatible with hardwired digital or analog control protocols. The actuators are environmentally sealed to IP68 and comply with international design standards EN 15714-2 and EN ISO 5210. Features include multi-turn output torque of 7,966 ft-lbs and part-turn output torque up to 151,643 ft-lbs. **585/233-3353; www.centork.com/en/range.**

10. AQUA BIO NANOTECH WASTEWATER TREATMENT

The PrO2 Series wastewater treatment system from Aqua Bio Technologies uses nanotechnology to inject concentrated streams of oxygen-rich microbubbles into targeted waste streams, enabling bacteria to consume up to 95 percent of organic waste and reducing aeration costs by 75 percent. About the size of a household refrigerator, the system can be remotely monitored, adjusted in real time and sized from small retention ponds to large industrial use. **877/881-9141; www.aquabio.co.**

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12. PRECISION DIGITAL PANEL METER

The ProVu PD6400 panel meter from Precision Digital Corp. measures high voltage, current and apparent power. Independent, field-selectable current and voltage inputs accept up to 300 volts and 5 amps, AC or DC. The user-configurable, dual-line display features LED digits and warning lights with adjustable brightness. The PD6400 is NEMA 4X/IP65 rated for use in a panel or in the field. **800/343-1001; www.predig.com.**

13. FLUID CONSERVATION SYSTEMS PRESSURE CONTROLLER

The electronic controller for pressure reducing valves (PRVs) from HWM and available through Fluid Conservation Systems provides detailed multi-port PRV control without a flowmeter, either by flow or by time, together with intelligent closed-loop control. The controller permits immediate control of pressure within a distribution network and automatically adapts to network changes and events by analyzing data from up to three critical points. **800/531-5465; www.fluidconservation.com.**

14. GENERAL MONITORS SAMPLING PUMP MODULE

The SM100 sampling pump module from General Monitors draws combustible or toxic gases at 0.05 to 1 lpm from monitored areas to a gas detector. The pump is available in an aspirated model used with compressed air and a DC pump module. The pump has an operating range of -4 degrees to 131 degrees F and humidity range of 15 to 95 percent RH, noncondensing. It has a C-UL-US approved enclosure design for use in Class 1, Division 1, Groups A, B, C and D. **866/686-0741; www.generalmonitors.com.**

15. WALCHEM PANEL MOUNT CONTROLLER

The W100P panel mount controller from Walchem features a large display with icon-based programming and multiple language support. Two pH/ORP models are available for use with non-amplified electrodes (with or without a BNC connector). **508/429-1110; www.walchem.com.**

16. OMEGA ENGINEERING ELECTROMAGNETIC FLOWMETER

The FMG980 Series of insertion electromagnetic flowmeters from Omega Engineering are made for use in harsh environments and feature no moving parts. Applications include measuring change in viscosities and pulsating flows, such as air-driven diaphragm pumps. **800/826-6342; www.omega.com.**

17. WILDEN STAINLESS STEEL AODD PUMPS

Advanced FIT 430 and 830 stainless steel air-operated double-diaphragm (AODD) pumps from Wilden Pump & Engineering, part of PSG, a Dover Company, feature corrosion resistance in aggressive chemical applications. The pumps are direct replacements for Wilden 1 1/2- and 2-inch Advanced pump installations. **909/422-1730; www.wildenpump.com.**

18. SOR FLOAT-OPERATED LEVEL SWITCH

The 1780 float-operated level switch from SOR provides wireless monitoring for WirelessHART mesh networks in the oil and gas and wastewater industries. The switch uses a float mechanism that moves a magnetic array inside a sealed housing. **800/676-6794; www.sorinc.com.**

19. RUSSELECTRIC COMMUNICATIONS GATEWAY

DTWG Web server communications gateway from Russelectric provides access to automatic transfer switch (ATS) data from any personal computer, smartphone, tablet or other Web-enabled device. It also serves as a pass-through gateway, allowing access to the ATS through SCADA or building automation systems. **800/225-5250; www.russelectric.com.**

20. KOHLER AIR-COOLED, THREE-PHASE GENERATOR

The 14/20 kW air-cooled, three-phase generator from Kohler Power Systems is designed for commercial applications where 20,000 watts or less are needed during power outages. The generator runs on natural



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gas or LP and has a corrosion-resistant enclosure impact tested to -30 degrees F. **800/544-2444; www.kohlerpower.com.**

21. SEEPEX INTELLIGENT METERING PUMP

The intelligent metering pump from SEEPEX features an electronic programming module memory chip on which parameters can be pre-configured, enabling drives to be quickly programmed and reset. Each unit has a keyboard on the controller lid with operator elements for H-O-A selection, manual speed control, display of pump speed/rpm or flow, fault indication and the ability to change factory settings. **877/806-4152; www.seepe.com.**

22. VICTAULIC PLUG VALVE AND COUPLING

The Series 466 plug valve from Victaulic is available in 10- to 16-inch sizes with StrengThin or original groove system (OGS). It features a duplex body, bonnet and PTFE seats. The D08 rigid coupling is designed to join pipe, valves and fittings with StrengThin ends and has a ductile iron housing with VC-200 coating. **610/559-3300; www.victaulic.com.**

SPIRE METERING VORTEX FLOWMETER

The 602VF vortex flowmeter distributed by Spire Metering Technology is designed for accurate, low-maintenance flow measurement in gas, steam and liquid applications. **888/738-0188; www.spiremt.com.**

(continued)

water: product spotlight

Hollow fiber ultrafiltration cartridge system designed to withstand flow variations

By Ed Wodalski

The **PURON MP treatment system** with ultrafiltration cartridge from **Koch Membrane Systems** is designed for high-solids water and wastewater applications, including surface-water treatment, reverse osmosis pretreatment and tertiary wastewater treatment.

Made to handle feed TSS levels up to 250 mg/L, the filtration system features a single-potting cartridge that allows air scouring to penetrate the fiber bundle, releasing accumulated solids to the bottom where they are drained away. Each cartridge is 81 inches tall and about 8 inches in diameter.

“Because there’s no potting at the bottom of the cartridge, the loose fibers can handle higher upsets with more effective scouring and solids draining,” says Kevin Phillips, product development manager for Koch Membrane Systems. “When you have a storm event and higher feed turbidity, it operates at lower pressures and can ride those out without shutting down.”

Like the membrane used in the submerged PURON products for over a decade, PURON MP features a membrane that is structurally reinforced with a polyester braid.



PURON MP from Koch Membrane Systems

“There’s virtually no chance of fiber breakage, so it reduces your maintenance expenses while upholding permeate quality,” Phillips says. “The product can easily operate in wastewater applications coming off a secondary clarifier with high turbidity or flow excursions. It also can handle high coagulant doses for particular reuse applications; for example, to reduce permeate dissolved organics. In many water applications, the treatment system can eliminate clarifier pretreatment, minimize downtime and reduce chemical usage.”

When used for polishing, the system can filter effluent to low turbidity where solids are essentially no longer present in the permeate. Depending on the wastewater source, filtered water can be used for direct reuse, such as irrigation or mixing salt brine for deicing.

KMS offers packaged filtration systems with six to 10 cartridges per skid, which can handle about 50-250 gpm, while custom designs with 24, 40 or 64 cartridges per skid can handle up to 20 mgd or more. **888/677-5624; www.kochmembrane.com.**



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23. ELECTRO-SENSORS PROCESS METER

The PM500 process meter from Electro-Sensors can run as a stand-alone rate meter or can be configured to run as a complete control and display system. The fully programmable meter has two 4-20 mA sensor inputs that can be scaled to any user-selected units. The sensor can be powered by either 115 VAC or 230 VAC and includes a four-digit display that is switchable between two inputs and communicates via Modbus RS-485. **800/328-6170; www.electro-sensors.com.**

24. CLA-VAL ELECTRONIC VALVE CONTROLLER

The hand-held VC-22D electronic valve controller from Cla-Val provides remote or local setpoint control for valves in a variety of fluid applications, including pressure control with upstream or downstream feedback, flow control with mag meter or electronic flowmeter, modulating level control, ratio control, altitude and level control. Features include accurate and stable valve control, IP68 submersible enclosure and the ability to monitor and display multiple processes with accurate retransmission of parameters to SCADA systems. The controller has six analog 4-20mA and six digital inputs, four analog 4-20mA outputs, two output solenoid and two output relays. **949/722-4800; www.cla-val.com.**

25. MANTECH 15-MINUTE COD ANALYSIS

The PeCOD 15-minute chemical oxygen demand (COD) for municipal wastewater treatment facilities from Mantech eliminates the use of hazardous dichromate reagents previously required for COD analysis. The PeCOD unit features a nanotechnology-based sensor that includes a UV-activated nanoparticulate TiO₂ (titanium dioxide) photocatalyst that measures photocurrent charge originating from the oxidation of organic species contained in a sample. **519/763-4245; www.mantech-inc.com. tpo**

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industry news

Asahi/America names president, CEO

Asahi/America promoted Daniel S. Anderson to president and chief executive officer. Anderson, who joined the company in 1988, was senior vice president of sales and marketing. He replaces Hidetoshi Hashimoto, who remains chairman of the board for the Massachusetts-based company.



Daniel S. Anderson

Graco acquires GeoBlaster

Graco acquired abrasive blasting equipment manufacturer GeoBlaster Equipment Service and Sales of Dunnville, Ontario, Canada. GeoBlaster's product line will become part of Graco's Applied Fluid Technologies Division.

ONICON acquires Greyline Instruments

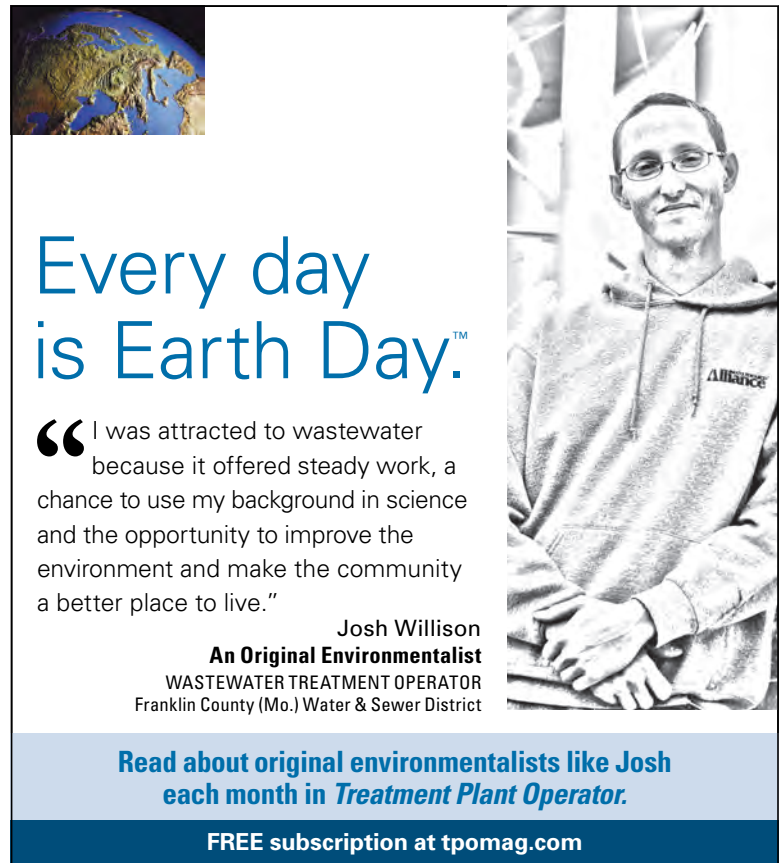
ONICON, a Harbour Group company, acquired Greyline Instruments. Greyline designs and manufactures ultrasonic flowmeters and level sensors that utilize Doppler, transit time and area velocity technologies.

DeZURIK knife gate valves earn SIL certification

DeZURIK's KGC knife gate valves, KSV severe service knife gate valves and KUL urethane knife gate valves have been certified safety integrity level (SIL 3) capable. Its KSV double block and bleed valves have been certified as SIL 2 capable. The certification means the valves are suitable for use in critical applications.

Xylem to distribute disk filter system

Xylem reached an exclusive agreement with Nuove Energie S.R.L. to distribute the Ultrascreen disk filter for wastewater reuse in the United States and Canada. Xylem will distribute the tertiary disk filter system under its Leopold brand. tpo

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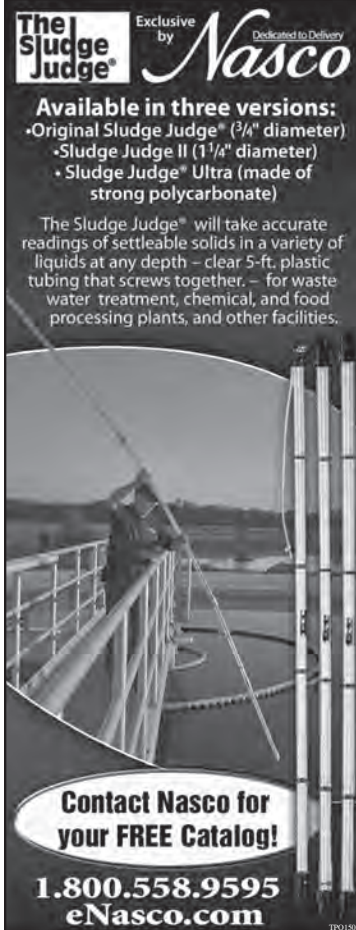
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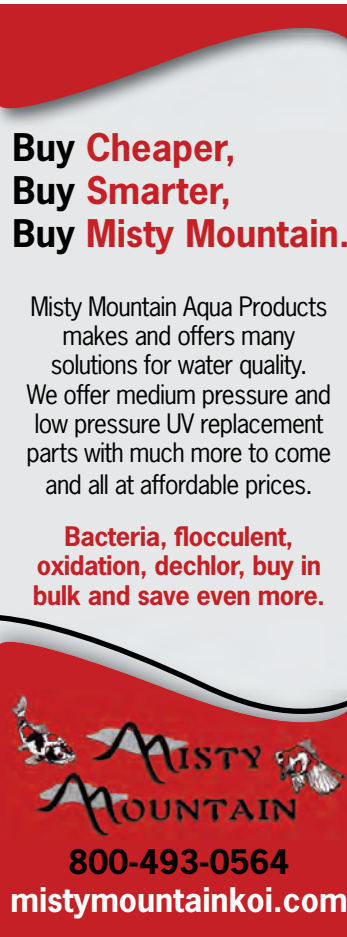
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people/awards

The **Clayton County Water Authority Environmental Compliance Division** in Jonesboro received the 2014 Georgia Fats, Oils and Grease Alliance Program of the Year Award in the 500-750 Qualifying Active Facilities category.

Connie Sanchez, a chemist with the Dublin San Ramon Services District, was named 2014 Lab Person of the Year by the San Francisco Bay Section of the California Water Environment Association.

The **Water Division of the Worcester (Mass.) Department of Public Works and Parks** was named a 2014 Utility of the Year in the Large-Size Systems category by the New England Water Works Association.

The **Kemmerer (Wyo.) Wastewater Treatment Plant** received a Good Housekeeping and Safety Award from the Joint Powers Board. The plant was nominated by Jason Palmer, president of the Wyoming Water Quality and Pollution Control Association Board of Directors.

Linda Schick, sewer/wastewater superintendent for the Town of Fairhaven, Massachusetts, won a Wastewater Treatment Plant Operator Award from the New England Water Environment Association.

Jay Kates Water Systems was hired to manage the wastewater system for Norway, South Carolina.

Gilbert G. Mesa was named executive director of the Camino Real Regional Utility Authority in New Mexico.

Todd McCleary was named wastewater superintendent for the City of Red Oak, Iowa. He succeeds Tom Bentley, who retired after 30 years with the city.

George B. Hayes was named the director of the Chesterfield County (Virginia) Department of Utilities. He succeeds Roy E. Covington, who retired.

Sally Kuzon, director of public works for the City of Batavia, New York, received the 2014 Professional Manager of the Year award from the Genesee Valley Branch of the American Public Works Association.

Ray Jones was named executive director of the Water Utilities Association of Arizona.

Jerry Atkinson, general manager of the Bell County (Texas) Water Control and Improvement District, has retired. During his 13-year tenure he led the district through three major water treatment plant expansions, increasing capacity from 53 mgd to 90 mgd.

The Detroit Metro Branch of the American Public Works Association presented the **Marysville Water Filtration Plant** with its 2014 Project of the Year Award in the environment category.

The California Association of Sanitation Agencies presented the **City of San Diego Public Utilities Department** with the Public Outreach and Education Achievement Award for its Water Purification Demonstration Project public outreach program. The project confirmed the feasibility of purifying recycled water to supplement local drinking water supplies.

Terry Gougeon, operator of the Alpena (Michigan) Water Treatment

Facility, has retired. In his 37 years with the plant he held nearly every job title, working as the operator for the last few years. **Mike Collins** will take over as plant manager.

TPO welcomes your contributions to this listing. To recognize members of your team, please send notices of new hires, promotions, service milestones, certifications or achievements to editor@tpomag.com.

education

AWWA

The American Water Works Association is offering these online courses:

- May 6 – Pipeline R&R Planning: Costs/Benefits of Advanced Analytical Approaches
- May 13 – How Do I Monitor My Distribution System – and Why?
- May 20 – Inspect Collection Systems and Optimize Cleaning

Visit www.awwa.org.

Alaska

The Alaska Water Wastewater Management Association is offering these courses:

- May 26-27 – Basic Electricity for the Non-Electrician, Anchorage
- May 28-29 – Electrical Troubleshooting and Preventive Maintenance, Anchorage

Visit www.awwma.org.

Alabama

The Alabama Rural Water Association is offering these courses:

- May 13 – Competent Person/Confined Space, Troy
- May 27-28 – AL/FL Joint Technical Training Conference, Orange Beach

Visit www.alruralwater.com.

Arkansas

The Arkansas Environmental Training Academy is offering these courses:

- May 5-20 – Advanced Water Distribution Night Class, Fort Smith
- May 11-15 – Backflow Assembly Tester, Fayetteville
- May 12 – Backflow Assembly Tester Recertification, Fayetteville
- May 19-21 – Basic Water Treatment, Camden
- May 26-28 – Backflow Assembly Repair, Little Rock
- May 26-28 – Intermediate Water Distribution, Blytheville
- May 27 – Backflow Assembly Tester Recertification, Little Rock

Visit www.sautech.edu/aeta/.

The Arkansas Rural Water Association is offering these courses:

- May 5-7 – Basic Distribution, Lonoke
- May 13-14 – Water License Renewal Class, Mt. Home
- May 19-21 – Advanced Distribution, Lonoke

Visit www.arkansasruralwater.org.

California

The California-Nevada Section of the AWWA is offering these courses:

- May 4 – Cross Connection Course, Rancho Cucamonga
- May 5 – T1-T2 Review, West Sacramento
- May 6 – T1-T2 Math Review, West Sacramento
- May 6 – T3-T4 Math Review, West Sacramento
- May 7 – T3-T4 Review, West Sacramento
- May 11 – Backflow Tester Course, West Sacramento
- May 19 – Desalination Workshop, San Diego
- May 21 – Desalination Workshop, San Jose
- May 26 – Water Use Efficiency Grade 1 Workshop, West Sacramento
- May 29 – Backflow Refresher, Escondido

Visit www.ca-nv-awwa.org.

events

April 28 - May 1

California Water Environment Association Annual Conference, San Diego Town and Country Resort. Call 510/382-7800 or visit www.cwea.org.

April 28 - May 1

Water Environment Association of Utah Annual Conference, Dixie Center, St. George. Visit www.weau.org.

May 3-6

Florida Water Environment Association Florida Water Resources Conference, Caribe Royale Resort, Orlando. Call 407/363-7751 or visit www.fwea.org.

May 4-6

Oklahoma Water Environment Association-Oklahoma Chapter American Public Works Association 2015 Joint Conference, Renaissance Hotel and Cox Convention Center, Oklahoma City. Visit www.owea.org.

May 5-7

Montana Water Environment Association-Montana Section American Water Works Association 2015 Joint Conference, Holiday Inn Grand, Billings. Visit www.montana-awwa.org.

May 6-8

Alaska Water Wastewater Management Association Annual

Statewide Conference, Hotel Captain Cook, Anchorage. Call 907/561-9777 or visit www.awwma.org.

May 6-8

Arizona Section AWWA Annual Conference, Renaissance Glendale Hotel, Glendale. Visit www.azwater.org.

May 18-20

Central States Water Environment Association Annual Conference, Drury Lane, Oakbrook Terrace, Illinois. Visit www.cswea.org.

May 18-21

West Virginia Section AWWA Annual Conference, Canaan Valley Resort, Davis. Visit www.wvawwa.org.

May 20-21

Puerto Rico Section AWWA Annual Conference, Sheraton Puerto Rico Hotel & Casino, San Juan. Visit www.prwea.org.

May 20-22

Connecticut Section AWWA Annual Conference, Crowne Plaza Hotel, Cromwell. Visit www.ctawwa.org.

May 27-30

British Columbia Section AWWA Annual Conference, Kelowna. Visit www.bcwwa.org.

Colorado/Wyoming

The Rocky Mountain Water Environment Association is offering these courses:

- May 5 – EPA Grant Seminar, Glenwood Springs, Colorado.
- May 19 – EPA Grant Seminar, Alpine, Wyoming.

Visit www.rmwea.org.

Illinois

The Illinois Section of the AWWA is offering these courses:

- May 5 – Chemical Properties, Safety and Security, Carpentersville
- May 6 – ILWARN: How to Register/Activate/Respond Webinar, online
- May 7 – Keeping the Water Inside Your Pipe and the Dirt Outside, Channahon
- May 12 – Pumps and Pump Maintenance, Moweaqua
- May 14 – Hands on Basic Water Quality Testing, Champaign
- May 19 – Phosphate Technology and Biofilm Control, Rockford
- May 19 – Distribution Systems O&M – Hydrants, Valves, Water Service Lines, Macomb
- May 20 – Chemical Properties, Safety and Security, Litchfield
- May 20 – Drinking Water Chloramine Chemistry 101 Webinar, online

Visit www.isawwa.org.

The Environmental Resources Training Center at Southern Illinois University - Edwardsville is offering these courses:

- May 12-15 – Cross Connection Control, Springfield
- May 18-22 – Wastewater Operator Short School, Edwardsville

Visit www.siu.edu.

Kansas

The Kansas Water Environment Association is offering these courses:

- May 5 – Special Topics: UV and Ultrasound, Hays
- May 6 – Asset Management, Wichita
- May 6-7 – Wastewater Treatment Systems, Kansas City
- May 12 – Special Topics: Introduction to Water and Wastewater Chemistry, Dodge City

- May 20 – An Examination of Your Safety, Scott City
 - May 22 – An Examination of Your Ethics, Scott City
- Visit www.kwea.net.

Michigan

The Michigan Water Environment Association is offering these courses:

- May 12 – Fundamentals of Solids Handling, Linden
- May 14 – Fundamentals of Activated Sludge I, Manistee
- May 21 – Sustainable Energy Seminar, East Lansing

Visit www.mi-wea.org.

The Michigan Section of the AWWA is offering these courses:

- May 12-14 – Short Course in Water Bacteriology, East Lansing
- May 20 – Distribution Practices Seminar, Bath

Visit www.mi-water.org.

New Jersey

The New Jersey Agricultural Experiment Station Office of Continuing Professional Education is offering these courses:

- May 6 – 8 Hour HAZWOPER Training, Egg Harbor Township
 - May 6-8 – Motor Control Circuits: Wiring to Troubleshooting, New Brunswick
 - May 12 – 8 Hour HAZWOPER Training, Newton
 - May 12-13 – Maintaining Water Quality in the Distribution System, New Brunswick
 - May 13 – Discharge Prevention Program: Compliance in NJ, North Brunswick
 - May 21-22 – Fundamentals of Generators and Transformers, New Brunswick
- Visit www.cpe.rutgers.edu.

New York

The New York Water Environment Association is offering a Class A and B Biosolids Drying Technologies Seminar May 21 in Rensselaer. Visit www.nywea.org.

(continued)

The New York Section of the AWWA is offering these courses:

- May 5 – Fundamentals of Occupational Chemical Exposure, Lyons
 - May 12 – Basic Laboratory Skills, Woodbury
 - May 13 – Process Verification and Calibration, Woodbury
 - May 26 – Microbiological Workshop for Water/Wastewater Testing, Troy
 - May 27 – Microbiological Workshop for Water/Wastewater Testing, Utica
- Visit www.nysawwa.org.

Ohio

The Ohio Water Environment Association is offering a Collections Systems Workshop May 14 in Lewis Center. Visit www.ohiowea.org.

Oklahoma

The Oklahoma Environmental Training Center is offering these courses:

- May 4 – Trenching and Shoring, Midwest City
- May 6 – Confined Space Entry, Midwest City
- May 11-15 – OSHA 40-Hour HAZWOPER Class, Midwest City
- May 15 – Proctored Exam, Midwest City
- May 18-22 – Operator Bootcamp, Midwest City

Visit www.rose.edu.

Accurate Environmental in Oklahoma is offering these courses:

- May 1 – Open Exam Session, Stillwater
- May 5-7 – D Water and Wastewater Operator, Stillwater
- May 8 – Open Exam Session, Tulsa
- May 13-14 – C Water Operator, Tulsa
- May 18 – General Refresher for Water Lab Operators, Stillwater
- May 18-21 – C Water Laboratory, Stillwater
- May 19-21 – D Water and Wastewater Operator, Tulsa

Visit www accuratelabs.com/classschedule.php.

Texas

The Water Environment Association of Texas is offering a Cybersecurity Webinar May 6. Visit www.weat.org.

The Texas Water Utilities Association is offering these courses:

- May 12 – Utilities Safety, Longview
 - May 13 – Utilities Safety, Corpus Christi
 - May 19 – Valve and Hydrant, Victoria
 - May 19 – Water Distribution, online
- Visit www.twua.org.

Utah

The Intermountain Section of the AWWA is offering a Leadership Forum May 7 in Sandy. Visit www.ims-awwa.org.

Wisconsin

The Wisconsin Department of Natural Resources is offering these courses:

- May 4 – Distribution Certification, Fond du Lac
- May 4 – Lab – Advanced, Green Bay

Visit www.dnr.wi.gov.

The University of Wisconsin Department of Engineering Professional Development is offering these courses in Madison:

- May 4-6 – Advanced Asset Management Practices for Water and Wastewater Utilities
- May 6 – Budgeting for Public Works
- May 12-14 – Pumps and Motors
- May 19 – Management Assessment
- May 20 – Labor and Employee Relations

Visit www.epdweb.engr.wisc.edu.

The Wisconsin Rural Water Association is offering these courses:

- May 5 – Sanitary Surveys/Capacity Development, Bayfield
- May 5 – Municipal Water Operator Exam Review, Plover
- May 5 – Small Water System Operator Basics, Bayfield

Visit www.wrwa.org. **tpo**

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Chuck Gray
Water Superintendent
Mount Vernon (Ind.) Water Works



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In 2011, Algonquin's Wastewater Treatment Facility was nominated for Class 1 Plant of the Year by IAWPCO (Illinois Association of Water Pollution Control Operators). Criteria for such nominations include exemplary levels of compliance and cleanliness, operator certifications, and ongoing safety programs. Through their hard work and dedication, the team at Algonquin has shown that they're up to the challenge of continued success.

Leading the crew is Chief Wastewater Operator Ed Brown. He works closely with USABlueBook to make sure his team always has the supplies they need to keep their facility up and running. "It's great to know that even when I don't know who to call, I can just call USABlueBook," shared Ed.

"I ordered parts in the morning, and they were here later that afternoon!"

Whether the team is ordering new chemical feed scales or miscellaneous items for around the plant, USABlueBook has them covered. "My biggest surprise is always USABlueBook's shipping. I ordered parts in the morning, and they were here later that afternoon! When one of our guys said 'The parts are here,' I said, 'What parts?'" Ed laughed.

USABlueBook is proud to serve Algonquin, and provide them with the best treatment possible. We look forward to a continued partnership for many years to come.

Ed Brown
Chief WW Operator
Algonquin WWTP
Algonquin, IL

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See page 139 in Master Catalog 126 for more information.



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