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APRIL 2016

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Power of shared values

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Primed for *Growth*

**SEMINOLE TRIBE OF FLORIDA
UPGRADES ITS WATER AND
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Chief Plant Operator
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Ammonia-based aeration control

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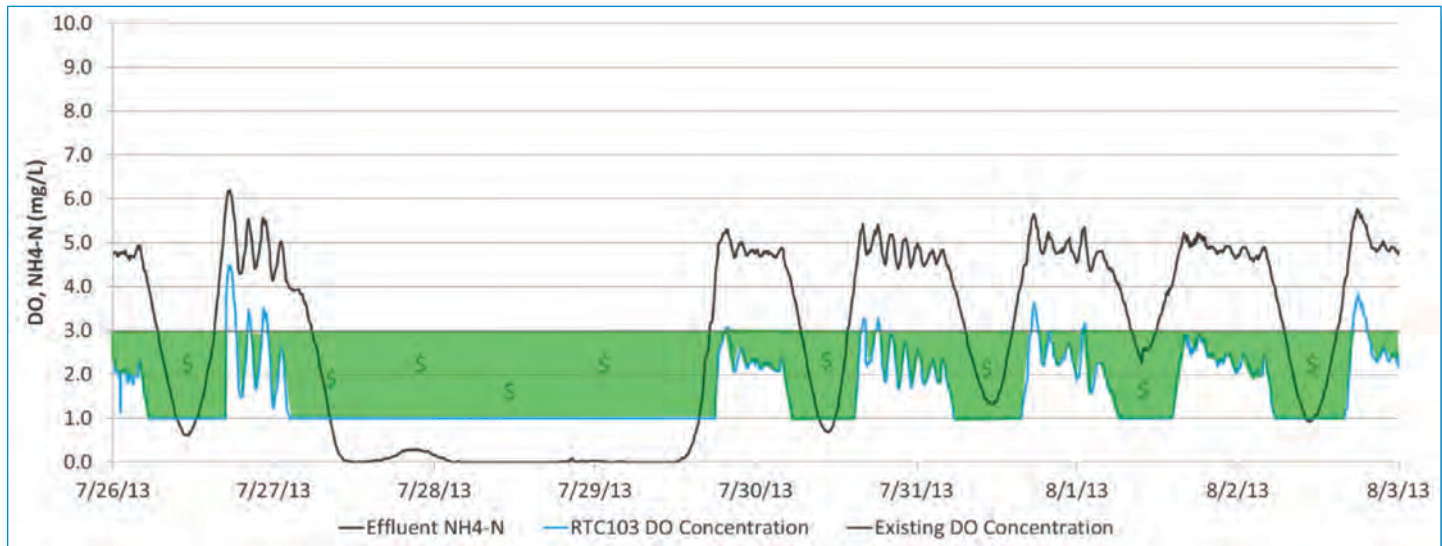
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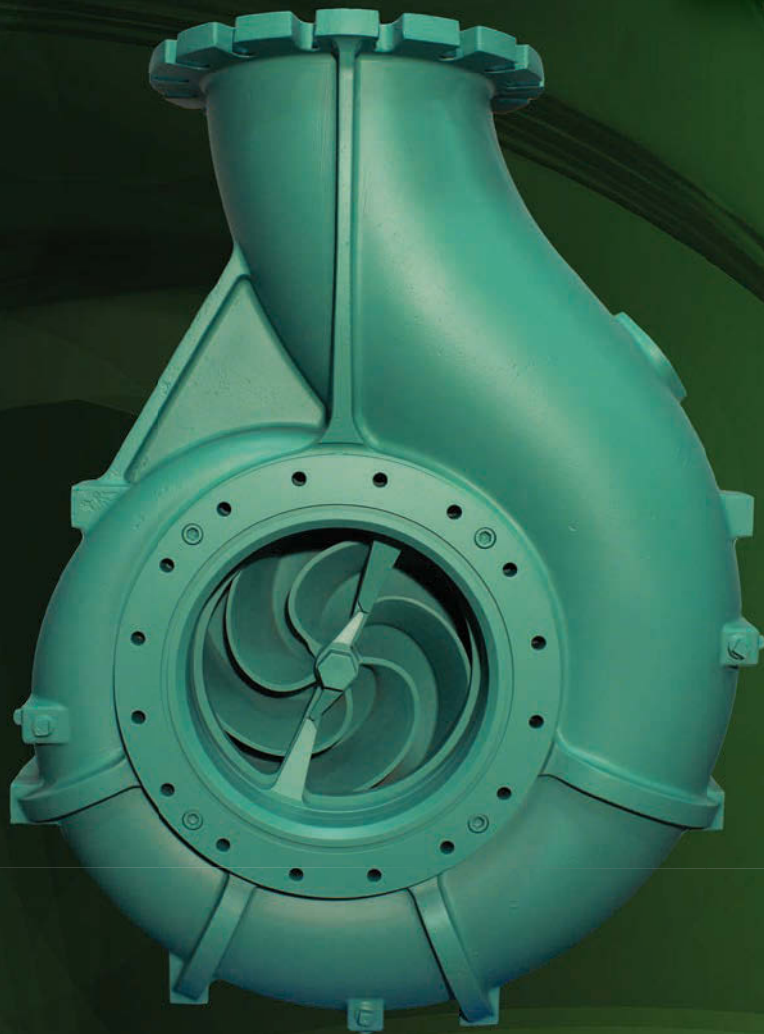
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let's be clear

Reflections on Earth Day

THERE'S REASON TO BE OPTIMISTIC THAT LESSONS FROM PROGRESS ON OTHER ENVIRONMENTAL ISSUES WILL EXTEND TO SOLUTIONS FOR CLIMATE CHANGE

By Ted J. Rulseh, Editor



I was a senior in high school at the time of the first Earth Day (April 22, 1970). What I remember from that day is showing up early on a chilly Saturday morning for a cleanup of the Lake Michigan beach in Two Rivers, Wisconsin, where I lived.

Only three of us turned out: the organizer, one other dedicated soul, and me. We left disheartened by the apathy of our classmates and community. We really shouldn't have been so gloomy. Earth Day and the movement it began led to incredible and rapid progress toward clean air and water.

To illustrate: Back then, PCBs were just becoming recognized as a serious pollutant of Lake Michigan; today,

they're barely mentioned in talk about the lake's health. And I don't have to enumerate for TPO readers all the progress in treating wastewater. That progress continues today, 46 years later, as we wrestle with nitrogen and phosphorus, and debate what to do about climate change.

FAMILIAR PATTERNS

Still, as our society contemplates next steps, some common scenarios play out. Ever since the first Earth Day, it seems, we've had environmental advocates on one side forecasting all manner of death and doom if regulations weren't enacted, and business groups on the other side claiming there really was no problem and that such regulations would bankrupt companies, kill jobs and destroy the economy.

We saw it with issues like acid rain, the ozone hole and the releases of toxic chemicals to air and water. In the face of it all, laws got passed, cleanups proceeded, businesses thrived. Now we see it all again with carbon dioxide emissions and global climate change.

Of course, climate change is a tougher issue. It's easy to argue for clean water when dead fish are washing up on shores and Lake Erie is a sewer. It's easy to argue for clean air when you can see clouds belching from smokestacks and soot collecting on the snow.

It's much harder to argue for reducing CO₂ emissions when climate change happens slowly and with few easily visible indicators, and when forecasts of its pace and impacts are based on mathematical models so arcane that few people understand them other than the scientists who use them.

I'd rather not believe in climate change, but — as one who believes in and trusts science — I don't see that I have much choice. The data does seem to come down quite hard on the side of climate change as something that's happening and that people are helping to cause.

BEING POSITIVE

Fortunately, I'm more optimistic now than in my younger and more cynical days. I've observed the old pattern of debate on environmental issues. Almost every time the advocates for the planet have won, business and the economy have churned along, and life has improved.

I believe that will happen again this time. In fact, this time many big businesses are well ahead of the curve, taking big steps to cut greenhouse gas emissions, doing far more, proportionally, than individual households are doing, and much more than the government requires. It's mainly a few industries and a recalcitrant group of politicians who are diligently denying the problem and fighting progress.

We saw a global agreement on climate change approved in Paris about four months ago. It remains to be seen how well the many parties stick to their commitments and whether those commitments go far enough, but clearly the trend is toward more energy conservation and cleaner energy sources. That momentum, once built, is likely only to increase.

CLEANER SOURCES

As for clean energy, you can mark me down as a believer in nuclear power. I believe those who say it has potential to produce emission-free energy on a large scale, and do so safely at a reasonable cost. Maybe I'm so confident because I grew up within 20 miles of two nuclear plants on Lake Michigan and never did see a downside to them.

I'd rather not believe in climate change, but — as one who believes in and trusts science — I don't see that I have much choice. The data does seem to come down quite hard on the side of climate change as something that's happening and that people are helping to cause.

You can also mark me down as a big supporter of clean-water plants' efforts to boost their energy efficiency and recover energy through generation and use of biogas. It's great to see this industry appreciate its role in a renewable energy economy and to see so many talented people working to capture the energy potential of the wastewater they treat.

So I look to the next Earth Day appreciating the size and difficulty of the challenges ahead, but with a lot more faith in a good outcome than I had 40-some years ago. As hard, as seemingly risky and expensive as many of the changes have been, it seems that as a human race we've always done the right thing on the environment's behalf.

For the sake of my children, Sonya and Todd, and of grandsons Tucker and Perrin and such others as may come, I hope we continue to do so. More to the point, I believe we will. **tpo**



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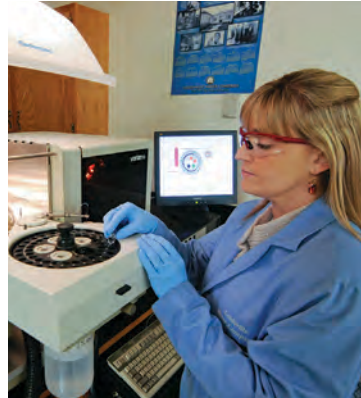
“Ultimately, the Flint situation might be a cautionary tale for utilities about the importance of consumer-utility interaction and the free flow of information.”

Worried Customers? Here's How to Discuss Lead Contamination
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LEAD DILEMMA

To Treat or Replace?

It's a tough question: replace all of the lead pipe in your drinking water system or add corrosion-control chemicals at the plant to prevent lead from leaching into the water supply. Find out how six different utilities have tackled the problem in this in-depth look at the country's hottest water-quality question.

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SURPRISE VISITS

How to Survive an Audit

So you're not a fan of surprises, huh? Then you're probably not a fan of surprise audits at your treatment plant, either. In this online exclusive, find out how to take the stress out of those unexpected visits from governing agencies. It's just a matter of staying organized.

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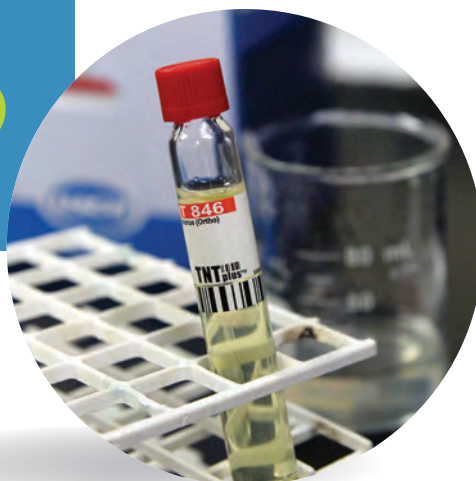


GAME NIGHT

Playing With Drought

Serious topics sometimes require a slightly light-hearted approach. California Water Crisis — a new board game created by Alfred Twu — tackles the tough topics of water supply, population growth, special interest groups and more. Find out more about this table topic game in this online exclusive article.

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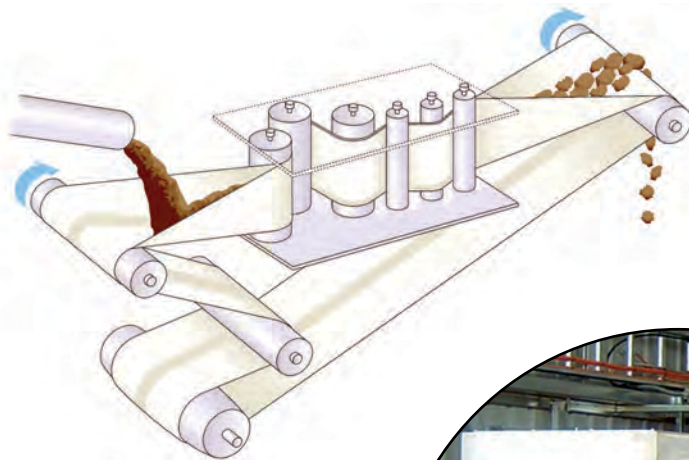
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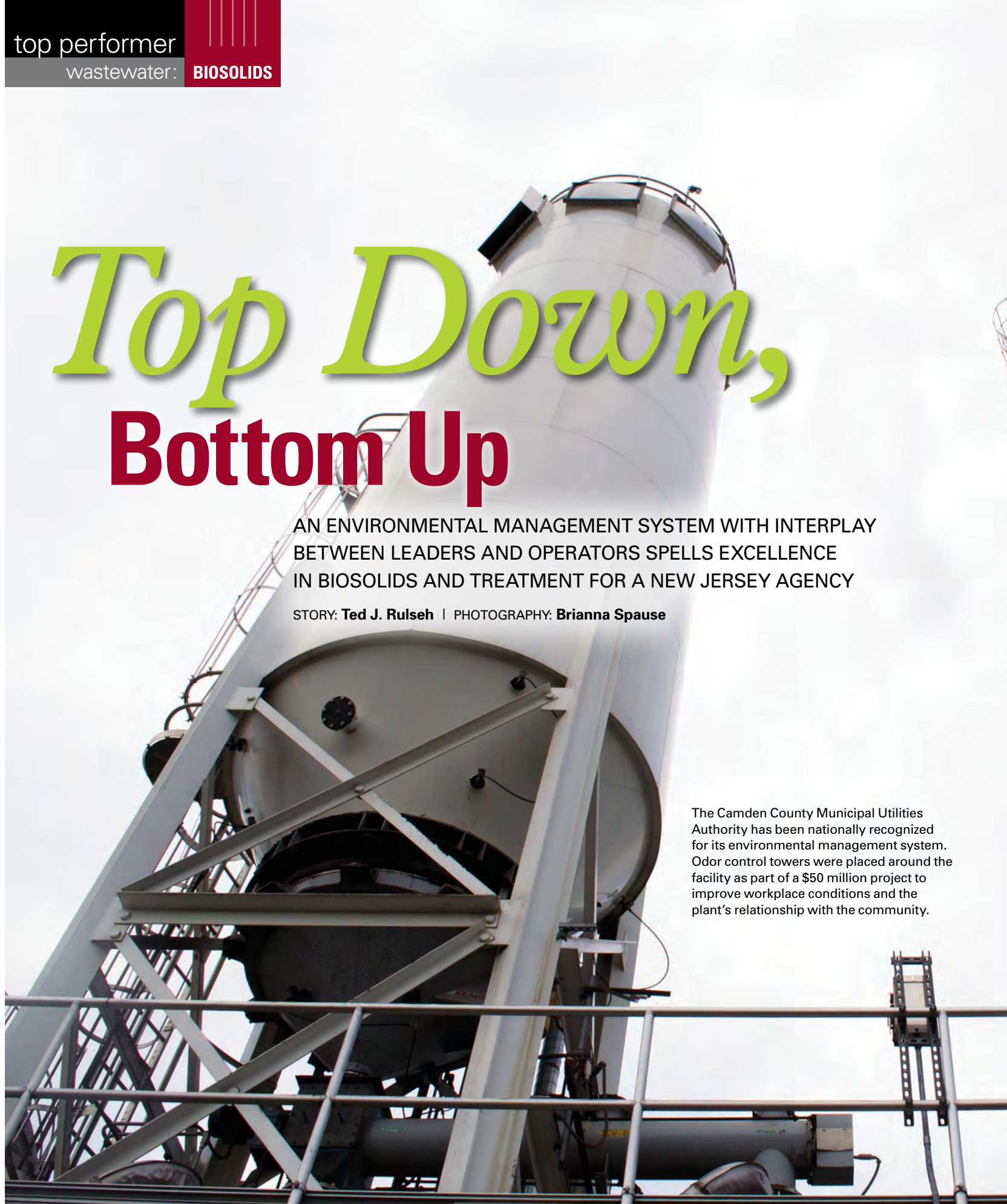
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AN ENVIRONMENTAL MANAGEMENT SYSTEM WITH INTERPLAY
BETWEEN LEADERS AND OPERATORS SPELLS EXCELLENCE
IN BIOSOLIDS AND TREATMENT FOR A NEW JERSEY AGENCY

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Brianna Spause**

The Camden County Municipal Utilities Authority has been nationally recognized for its environmental management system. Odor control towers were placed around the facility as part of a \$50 million project to improve workplace conditions and the plant's relationship with the community.





AN ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) SOUNDS LIKE A COMPLEX exercise, but to Andy Kricun and Jack Connolly, it's really quite simple.

Management establishes a mission and communicates it clearly to every employee at every level. Employees then tell management what resources they need to accomplish the mission.

It's a formula that works extremely well for the Camden County (New Jersey) Municipal Utilities Authority and its Delaware No. 1 Water Pollution Control Facility.

The EMS has helped the authority establish a clean, cost-effective biosolids program and deliver high-quality effluent to the Delaware River, while raising annual rates per household by just \$15 over the past 20 years.

There's nothing magic about it, according to Kricun, executive director and chief engineer, and Connolly, director of operations for the Wastewater Treatment Division. It's about identifying projects to boost efficiency, funding them cost-effectively and lining up the entire team behind the core mission.

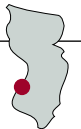
PROCESS EVOLUTION

The City of Camden built the original primary plant in 1954. The CCMUA bought it in 1978 and in 1990 upgraded it to secondary treatment. Today, it is a regional plant serving Camden and 36 other New Jersey municipalities.

Among its challenges, the plant operates cheek-by-jowl with a residential area. That makes odor control paramount, notably in the biosolids program, which went through a few iterations before arriving at the current indirect thermal drying process.

"At the time we acquired the plant from the City of Camden, they had an incinerator," Kricun recalls. "We took that out of service rather quickly because incineration in the middle of a residential community is not a good idea." The authority tried outdoor static pile composting from 1978-84 but abandoned it because of odor and other issues.

Delaware No. 1 Water Pollution Control Facility



OWNER: | **Camden County (New Jersey) Municipal Utilities Authority**

BUILT: | **1954; upgraded 1990**

SERVICE AREA: | **Camden and 36 other municipalities**

TREATMENT LEVEL: | **Secondary**

POPULATION SERVED: | **500,000**

BIOSOLIDS PROCESS: | **Dewatering, thermal drying**

BIOSOLIDS VOLUME: | **40-45 dry tons/day**

BIOSOLIDS USE: | **Fuel for cement kiln; land application by contractor**

WEBSITE: | **www.ccmua.org**

GPS COORDINATES: | **Latitude: 39°55'26.11"N;
Longitude: 75° 7'21.25"W**



Andy Kricun, executive director and chief engineer

The agency then hauled the biosolids across the Delaware River to Philadelphia for 10 years before opening a tunnel compost facility in 1994. The tunnel compost process had worked at smaller plants, but it did not scale up well to larger facilities like CCMUA, where it led to frequent breakdowns, odor issues and high operating costs.

Seeking a short-term alternative, Kricun, by then CCMUA deputy director, asked officials from neighboring Burlington, Atlantic and Gloucester

“I was looking for a permanent solution that would be cost-efficient and sustainable and minimize odors. Ultimately, we decided to go with indirect drying and issued a request for proposals.”

ANDY KRICUN

counties whether they had spare biosolids processing capacity. “If each of them could handle a third of our material, it would generate revenue for them, significantly reduce our costs and enable us to close the compost facility down and eliminate the odor problem.”

That came to pass in 1999, reducing CCMUA’s costs from as high as \$110 per ton to \$35 per ton on average. “We knew this was not a sustainable solution,” Kricun says. “I was looking for a permanent solution that would be cost-efficient and sustainable and minimize odors. Ultimately, we decided

NEXT ON THE AGENDA

Standing still is not an option for the Camden County Municipal Utilities Authority.

The next long-term goal in boosting efficiency at its treatment plant is to become self-sufficient in energy and cut down the carbon footprint.

The first move in that direction has been to limit electricity usage by making processes more efficient. “Now, we’re looking for opportunities to convert from conventional electricity to green energy,” says Andy Kricun, executive director.

In a project led by Jack Connolly, director of operations and maintenance, the authority has already installed solar panels with 1.8 MW capacity on the plant’s primary sedimentation tanks. Those panels can fulfill about 10 percent of the plant’s power demand. The project received a 2013 PV America East Projects of Distinction Award presented to installer groSolar, project concept and financing company Hellosage and CCMUA as owner.

The next step will be to add anaerobic digestion for primary and waste activated sludges and produce biogas to fuel a combined heat and power (CHP) system. “Between that, the solar panels and our energy efficiency program, we will be 60 to 70 percent off the grid,” Kricun says. “Then we’ll be looking for the last 30 to 40 percent.”

The CHP system is under design, and authority leaders are arranging for financing before soliciting bids. The system is to go online in 2017.

Connolly notes that anaerobic digestion will bring benefits beyond biogas: “We’ll probably end up with about half the biosolids we currently have, so instead of 40 dry tons per day, we’ll be down to about 20. The digested material will also dewater more easily and dry more efficiently in our indirect dryers. And the consistency of the Class A biosolids will be better because much of the fibrous material will be destroyed in digestion.”

to go with indirect drying and issued a request for proposals.” The drying system went online in 2010.

DRYER ONLINE

The drying process (Komline-Sanderson) handles undigested, dewatered material from the treatment plant’s 60 mgd average dry-weather flow (75 percent of the plant’s design capacity). The plant uses primary sedimentation followed by a pure-oxygen aeration system made necessary by limited space on site during the upgrade. Primary and secondary sludges are transferred to liquid sludge storage tanks; the secondary material is first boosted to 2 to 3 percent solids on gravity belt thickeners (Alfa Laval Ashbrook Simon-Hartley).

The blended primary and secondary sludge then goes to seven belt filter presses (also Alfa Laval Ashbrook Simon-Hartley) that yield cake at 25 percent solids. That cake is then conveyed to three dryers (each with 73 wet tons per day capacity) that produce about 40 tons per day of powdery Class A biosolids at 90 to 95 percent solids.

A conveyor repurposed from the compost facility delivers biosolids to the dryers. “Inside the dryers are two shafts with vanes on them through which a thermal fluid circulates,” says Connolly. “The process has two stages.

Solar panels on top of the primary sedimentation tank help make the treatment plant energy efficient.



The first stage operates at about 375 degrees F to flash off as much water as possible. The second stage operates at about 300 degrees.”

Contractor Synagro Technologies, which operates the dryers, hauls the finished material to a cement kiln near Baltimore for use as fuel. If for any reason that channel is not available, Synagro land-applies the biosolids.

BEING SYSTEMATIC

The CCMUA is recognized by the National Biosolids Partnership for its environmental management system, but the EMS process began long before the authority conceived of the biosolids drying system.

“The EMS has really been a big part of our success,” says Kricun. “Jack and I joined the management team at about the same time. He became the No. 2 person at the plant in 1995, and I was named deputy director in 1996. We worked together on the EMS.

“An EMS is basically a systematic way to harness your wherewithal toward meeting your goals. It’s a systematic brainstorming and a systematic implementation of your ideas. There is a two-way ladder of information. The core values of the agency are communicated from the very top down to every single employee. For example, one of our core values is odor control. So instead of a plant operator just saying, ‘I’m fixing a chemical feed pump today,’ we want that person to understand how fixing that feed pump protects the community from odor. We want people to have a sense of the value of what they’re doing.

“That’s one side of the ladder. The other side is that no one knows better about the plant than the operators. So information about the specifics of the operation go back up the chain to managers, so they can find out what the operation and maintenance department needs to accomplish the core mission.

“For us, the core mission was to optimize water quality, minimize odor and minimize cost. We went through our entire operating process and said, ‘What can we do to help meet those three goals?’ Some of it is operational — changing processes. Some of it requires capital.”

OUT WITH ODORS

The odor control part of the core mission illustrates. “For years, the plant didn’t focus on odor control,” Kricun says. “Dealing with odors changed the

way we ran the plant, but we also needed odor control systems. So we designed and installed odor controls all around the plant. It was a combination of changing operational procedures but also finding out the capital needs of the O&M Department and providing them with upgraded equipment.”

Connolly observes, “We use a chemical scrubber on the primary treatment system and the dewatering area. We use carbon filtration on our scum containment area and biosolids dryer. We have a very large biofilter for our sludge storage area, and we plan to add a chemical scrubber. Most of these were designed by CDM Smith specifically for the applications.”

IMPROVING EFFLUENT

On effluent quality, the plant team traditionally had been content to meet the permit (25 mg/L CBOD, 30 mg/L TSS). Kricun recalls, “When we agreed to make optimum effluent quality a core mission of our agency, Jack’s team came back and said, ‘If you want to do that, we need better belt filter presses

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“We determined that if we could train our people to work on our equipment, we would be significantly better off and save a lot of money.”

JACK CONNOLLY

The Synagro team at the Camden County facility includes, from left, Ana Green, plant operator; Mark Kollman, plant manager; and Jim Faltz, plant operator. At the right is Andy Kricun, executive director and chief engineer.

to capture more solids.’ So we replaced our filter presses with the high-efficiency models from Ashbrook Simon-Hartley.

“Another thing they told us was that we needed better thickening equipment. We had been using centrifuges that were unreliable. We replaced them with the gravity belt thickeners. That also made a huge difference.”

An additional change was to operate the belt presses on all three shifts instead of just two. These and other changes significantly improved effluent quality. For example, for July 2015, CBOD averaged 2.6 mg/L and TSS 5.6 mg/L. For improving water quality in its zone of the Delaware River, the authority received a Water Quality Award from the Delaware River Water Resources Association.

“Once again, there was teamwork between engineering and operations, where the operators accepted the mission but told us what we needed to do to accomplish it,” Kricun says.

CONTROLLING COSTS

“We were able to improve effluent quality significantly, capture about 15,000 tons per year more BOD and TSS than we used to, and add a significant amount of odor control,” says Kricun. “So someone might say, ‘Your rates must have gone through the roof.’ But no, because the other thing we did under the EMS was look for cost efficiencies.

“When Jack and I started this program in 1996, our rate was \$337 per household per year. We held that rate for 18 years. We raised it by \$5 in 2014 and by \$10 in 2015. So our rate today is \$352 per household. That is about 40 percent lower than our 1996 rate, when adjusted for inflation.”

It all came about through the O&M Department’s efficiency initiatives and low-cost funding of major capital projects through the state revolving loan fund, known as the New Jersey Environmental Infrastructure Trust.

“A lot of what we did involved process automation and dual titles — having people do multiple jobs,” Kricun says. “At the time we started on the EMS, we had 230 full-time employees. Now we have 130. We did not lay off

100 employees. We had one layoff of about 10, but the other 90 left through attrition and were not replaced.”

On the automation front, the team took a variety of measures, including:

- Installing electrically actuated valves in multiple locations to replace valves that had been opened and closed manually.
- Updating the process control system with a SCADA system (Emerson, with Bristol Babcock software) by which operators can monitor plant processes and all 27 pump stations from in-plant computers or remotely from laptops.
- Using variable-frequency drives on the pure-oxygen plant so that aeration can ramp up or down in response to the dissolved oxygen level in the basins.

MORE PROACTIVE

Maintenance practices got an overhaul, too. “We realized that we were doing a lot of work reactively,” says Connolly. “So we created a Reliability Preventive Maintenance Group, which currently includes four people, and we invested heavily in predictive maintenance technology: oil analysis, vibration analysis, laser alignment and infrared thermography. In 2014, we did about 92 percent predictive maintenance versus 8 percent reactive.

“We also looked at why we were spending so much money outsourcing. We determined that if we could train our people to work on our equipment, we would be significantly better off and save a lot of money.” The authority set up an apprentice program with a vocational school and put all maintenance personnel and electricians through a four-year program.

As for financing, the Environmental Infrastructure Trust helped some major projects yield positive cash flow from operational savings. For a new \$10 million pure-oxygen plant, for example, the CCMUA used funds from the trust at less than 1 percent interest, reducing debt service costs so much that annual energy savings from the upgrade exceeded the annual loan payments.

WHY CERTIFY WITH NBP?

Seeing all these benefits from the EMS, Kricun and his team decided to also certify under the EMS program of the National Biosolids Partnership,



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Operations, engineering, laboratory and maintenance disciplines all contribute to excellent performance at the Camden County Municipal Utilities Authority treatment plant.

a cooperative effort of the U.S. EPA, the Water Environment Federation and the National Association of Clean Water Agencies.

“We believed that getting our biosolids program certified would do two major things,” says Kricun. “First, the required annual third-party audit presents an opportunity. Someone is either going to tell you you’re doing everything right, which is great but not likely, or they’ll give you opportunities for improvement. Second, the certification would be something of value for our policymakers — a measure of success that they would want to perpetuate.

“For us, the key to the EMS has been the two-way system of cooperation between administration and operations. It helps optimize our processes today, but also helps create a legacy for our successors so they can continue on the same path or improve upon it.” tpo

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Nothing Fishy About This Message

MAINE ASSOCIATIONS INVITE MR. AND MRS. FISH TO TEACH ELEMENTARY SCHOOL STUDENTS THAT HEALTHY OCEAN LIFE DEPENDS ON CLEAN WATER AND GOOD HABITS IN THE HOME

By Craig Mandli

Kids can read textbooks or write papers on the importance of clean water, but it's tough to get the ideas to sink in. That is, unless they hear it straight from a fish's mouth.

The fish in this case are international marine and environmental educators Mr. and Mrs. Fish (Jeff and Deb Sandler) of South Portland, Maine. In April 2015, the Maine Water Environment Association and the New England Water Environment Association brought the couple to Fairview Elementary School in Auburn to perform a pair of one-hour-long marine education programs.

Both focused on the delicate balance between life in the ocean and the water people use daily. The performance honored the men and women in the wastewater industry who clean and recycle water. Using humor, colorful costumes and audience interaction, Mr. and Mrs. Fish taught the kids about sea life while reminding them that, thanks to clean water, the ocean remains a wonderful resource.

WHY IT MATTERS

"It was a terrific opportunity to drive home to those kids what operators do in a treatment plant, and why that's important," says Matt Timberlake, second vice president and public relations chairman for MWEA. "They tell what happens to the water once it goes

“I actually learned several new things watching their presentation. It's kind of funny hearing conservation advice from a guy wearing a clam costume, but they were good life lessons nonetheless.”

MATT TIMBERLAKE

down the drain in their homes. They follow it to the sewer system, the treatment plant, the lake and finally into the ocean. They really drive home the idea that everyone has an impact.”

Mr. and Mrs. Fish, based at Southern Maine Community College in South Portland, have performed in 20 countries and more than 30 states over the past three decades. In their Fairview Elementary presentations, they dressed in many costumes while explaining the complex food chain in the ocean and the importance of clean water to the ecosystem.

Jeff Sandler (Mr. Fish) went from playing the part of plant plankton (at the bottom of the food chain), to animal plankton (just a little higher) and eventually all the way to big fish (at the top).



PHOTOS COURTESY OF THE MAINE WATER ENVIRONMENT ASSOCIATION

The “star fish of the show,” Jeff Sandler, has Fairview Elementary School students in rapt attention.



Mr. and Mrs. Fish (Jeff and Deb Sandler) perform a marine education program about the delicate balance between life in the ocean and the water people use daily.

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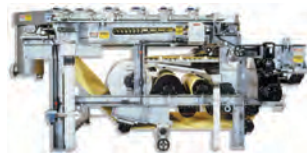
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From left, Celeste Beaudet and Katy Grondin from the Auburn School Department pose with Matt Timberlake of the Maine Water Environment Association, Jeff Sandler (Mr. Fish), Deb Sandler (Mrs. Fish), and Peter Goodwin, the New England Water Environment Association state director.

With each step up the food chain, Mr. Fish included visits from Fairview students dressed as clams, mussels, oysters and crabs. All the while, the Sandlers explained the balance between clean water and the environment. “In order to get the children to listen, they made it fun,” says Timberlake. “It’s a very effective method. It engages the kids. They were all glued to what they were learning.”

Although the skits were geared toward the elementary school audience, many of the ideas are universal. According to Timberlake, the Sandlers research and adjust each presentation to focus on a central idea the school or sponsoring group wants to convey.

“I actually learned several new things watching their presentation,”

says Timberlake. “It’s kind of funny hearing conservation advice from a guy wearing a clam costume, but they were good life lessons nonetheless.”

SPREADING THE WORD

MWEA and its more than 650 members promote professional environmental management practices, including opportunities for wastewater treatment professionals, support for a balanced view toward environmental policy, educational outreach and public awareness programs to enhance the image of wastewater professionals.

“We want everyone aware that clean-water issues are real,” says Timberlake. “Water and wastewater professionals are really the silent heroes in their communities. We want to create awareness of what they do, and also plant the seed that this industry can be a rewarding career choice. People like Mr. and Mrs. Fish certainly help that cause.”

The association sponsors an annual poster contest on the theme, “Why clean water is worth it to ME.” Last year more than 550 students entered, from grades one to 12. MWEA later distributed a 2016 calendar to members featuring the top-12 posters.

Timberlake says that the association is happy to offer advice and guidance to utilities looking to increase community outreach. “We always tell people to ask themselves, ‘If not me, who? If not now, when?’” says Timberlake. “We are all stakeholders in the clean-water business, so it’s our responsibility to continue to get information out there on what our plants do and to inform people of what’s happening. There’s no one better to share that message than us.” **tpo**

What’s Your Story?

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



The \$2 million solar array at the Hurlock Wastewater Treatment Plant will provide 1.4 million kWh a year and save the plant about \$500,000 over 20 years.

Savings From the Sun

SOLAR ENERGY HELPS AN UPDATED MARYLAND WASTEWATER TREATMENT PLANT CUT UTILITY POWER COSTS. A BLOWER UPGRADE WILL SOON FOLLOW.

By Doug Day

When the Town of Hurlock, Maryland, upgraded its wastewater treatment plant to meet new effluent limits, the project cost \$7.5 million and operating costs went up. Today, the plant is saving money through renewable energy and more efficient equipment.

A solar photovoltaic system activated last September will help, as will new high-efficiency blowers being phased in to reduce electricity demand.

Ten years ago, Hurlock replaced its 2 mgd lagoon plant with a 1.65 mgd four-stage Bardenpho activated sludge facility with enhanced nutrient removal to meet effluent standards of the multistate Chesapeake Bay Watershed Agreement. Maryland set a nitrogen limit of 4 mg/L, and the plant's annual average is 2.6 mg/L. The phosphorus limit is 0.3 mg/L, and the plant's annual average is 0.05 mg/L.

SEEKING SAVINGS

Designed by Reid Engineering, the new facility was named the 2008 Maryland Rural Water Association Wastewater Treatment Plant of the Year



Changing from a lagoon system to enhanced nutrient removal required new equipment, such as chemical pumps (left) and blowers (right), that increased power consumption at the Hurlock Wastewater Treatment Plant.

and won a 2009 U.S. EPA regional award for operations and maintenance.

"The lagoon system was cost-efficient; we just weren't getting good effluent numbers like you do with an activated sludge plant," says Eric Barnhart, wastewater plant superintendent. Each of the four lagoons covered 30 acres; one is now used for biosolids storage and another is being kept for emergency use.

"It's a lot cleaner water. It looks like drinking water when it comes out of here," says Barnhart. But the new plant uses about \$20,000 a month in electricity and \$18,000 a month in chemicals, versus \$3,000 and \$1,000 for the old plant.

“We buy electricity from VW Energy, and it saves 10 to 12 percent on our electric bill. After 20 years, we’ll save about \$500,000 and the system will belong to us.”

ERIC BARNHART

saves 10 to 12 percent on our electric bill,” says Barnhart. “After 20 years, we’ll save about \$500,000 and the system will belong to us.”

To help offset some of that added cost, the town (population 2,200) pursued a purchase power agreement for the solar system with VW Energy of Severna Park, Maryland. John Avery, town administrator, saw the company's display at a Maryland Municipal League conference. The \$2 million solar array provides about 1.4 million kWh annually. VW Energy funded the project and owns and operates it.

The town provided only the 5 acres of land for 3,420 solar panels on 114 fixed-array tables. “We buy electricity from VW Energy, and it

BETTER BLOWERS

The plant will soon switch to all LED lighting, a change already made at the water treatment plant and town office building. But next on the list of energy savings is changing out blowers.

Most of the plant's influent is from two food processing facilities with high organic loads. About 70 percent is from a poultry processing plant and 5 to 10 percent from a food processing plant that makes pickles, spices and brand name prepackaged items. Both facilities pretreat their waste to 425 mg/L BOD and 500 mg/L TSS. Those Monday-through-Friday flows add up to about



The staff of the Hurlock Wastewater Treatment Plant includes, from left, Eric Barnhart, plant superintendent; Alan Plutschak, operator; and Bob Harvey, chief operator.

1 mgd, some of it held in a 2.5-million-gallon flow equalization tank for treatment on weekends.

Even though the existing blowers are just 10 years old, more efficient blowers are now available. "We just ordered two 75 hp Atlas Copco blowers that will save 30 percent on electricity," says Barnhart. "Over the next three years, we'll phase out the other three blowers and replace them with the Atlas Copco models."

As one of the largest municipally owned solar installations in the state, the Hurlock facility is helping the plant be more sustainable both environmentally and economically for its ratepayers. **tpo**

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The Hollywood Reservation Wastewater Treatment Plant uses an extended aeration process. It is about to undergo an expansion to accommodate growth.

Primed for *Growth*

SEMINOLE TRIBE OF FLORIDA LOOKS TO CONTINUE A TRADITION OF EXCELLENCE WITH UPGRADES TO WATER AND WASTEWATER TREATMENT PLANTS ON ITS HOLLYWOOD RESERVATION

STORY: **Steve Frank**

PHOTOGRAPHY: **Ian Witlen**

ANYONE WHO HAS CRUISED ABOARD A SHIP HOMEPORTED in Port Everglades has come within about 10 miles of the Seminole Tribe of Florida's Hollywood Reservation water and wastewater treatment plants.

The 497-acre Hollywood Reservation is the headquarters of the Seminole Tribe of Florida and one of six Seminole reservations in the state. Sited side by side at Osceola Street and Florida Highway 7, southwest of the Fort Lauderdale-Hollywood Airport, the reverse osmosis (RO) drinking water plant supplies about 800 homes and offices. The wastewater treatment plant serves about 300 homes and a few businesses.

Together, the plants assure residents of a high-quality drinking water supply. The wastewater facility also has a commendable safety record that has been recognized with awards from the Florida Water Environment Association.

Today, both plants are undergoing upgrades and expansions to support residential and business growth. The tribe plans to expand the water treatment plant in the next three to five years. The tribe is also designing a new small-footprint 3 mgd sequencing batch reactor (SBR) wastewater reclamation plant, expected to come online in about five years.

Timing for these upgrades revolves around construction of a new deep-injection well to handle the drinking water plant's RO brine; it is to be completed in two years. The projects are tied together because the wastewater treatment plant now discharges effluent to a percolation pond, where it is diluted by the RO brine. The diluted water then seeps slowly through the percolation pond walls, removing salts.

RICH HERITAGE

The Seminole Tribe of Florida has about 2,000 members, with some 1,300 living on the reservations, which comprise 90,000 acres. In 1977, the tribe opened the first "smoke shop," offering discount, tax-free tobacco products and providing a stable source of revenue. In 1981, the Seminoles became the first tribe in the United States to open a high-stakes bingo hall, in effect launching the tribal gaming industry.

Today, all Seminole tribal members are afforded modern housing and health care. Well over 300 members are employed by the tribe in governmental departments. Water Resource Management and Utilities operate under



Consistent lab testing helps the Hollywood plant team keep effluent in compliance.

the Tribal Community Development Division. Derek Koger is director of Public Works, and Juan Mata is plant operations manager.

Day-to-day responsibility for the Hollywood water and wastewater treatment plants falls to Mario Isidron, chief operator. His team includes six operators, four certified in both water and wastewater. “We prefer dual-certified, C-or-above operators, because of the extra staffing flexibility they provide,” he says. The plants are not continuously staffed on holidays or weekends, but at least one operator visits each plant every day. A SCADA system enables operators to monitor operations and clear faults remotely.

Isidron holds a Georgia Class II Water Treatment Plant Operator license and a Florida Class C Wastewater license, in addition to a bachelor’s degree in civil engineering. The other dual-certified operators are:

- Arkie Caraballo, Florida Class B Drinking Water and Wastewater
- Andrew Mason II, Florida Class C Drinking Water and Class B Wastewater, plus a master’s degree in business administration
- Michael Judson, Florida Class C Drinking Water and Wastewater, associate degree in chemistry, and working on bachelor’s and master’s degrees in biomedical engineering

Operator Bassem Sanaallah holds a Florida Class B Drinking Water license, and Hilberto Pacheco, with a Florida Level 3 Distribution System license, runs the distribution and collections systems, sometimes getting help on bigger jobs from a four-member tribal underground utilities team.

HIGH STANDARDS

Mason spends most of his time at the wastewater treatment plant, a 40-year-old, 1 mgd Davco extended aeration facility (Evoqua Water Technologies). The plant is not regulated by the State of Florida, but is run as though it were. If a state regulation is more stringent than a U.S. EPA regulation, “We treat the state regulation as though it is the governing regulation,” Judson says.

“The EPA does not regulate wastewater, so any influent or effluent that does not leave the reservation is not



The team at the Hollywood Reservation Wastewater Treatment Plant includes, from left, Bassem Sanaallah, operator; Arkie Caraballo, dual-certified operator; Mario Isidron, chief plant operator; Hilberto Pacheco, operator; and Andrew Mason II and Michael Judson, dual-certified operators.

under its jurisdiction. Therefore, we do not have an NPDES permit like most municipalities. In fact, the raw water from our wells is not regulated by the EPA either. On the reservation, the EPA focuses on the finished product. That being said, the tribe has the finest drinking water treatment that money can buy to ensure the highest standards of quality for its members.”

After a bar screen for preliminary treatment, the influent enters a long, extended-aeration treatment run, after which it is chlorinated and discharged to the percolation pond. “Eventually, some of the water recharges the aquifer, but not until it has passed through several layers and feet of sand and other natural rock formations that make up this area’s geology,” Judson says.

Biosolids are dewatered using a belt filter press (VFOLD). The dewatered material is collected with solids from other Seminole Tribe treatment plants and goes to a landfill. Solids from the new wastewater plant will be managed in the same way.

When the new 3 mgd (peak flow) SBR plant comes online, “It will produce a non-potable reuse effluent,” Isidron says. Its reclaimed effluent will irrigate tribal area landscaping and will take some pressure off the drinking water plant. The plant is now at the 60 percent design stage; Hazen and Sawyer is the consulting engineering firm. Isidron notes that the Hollywood

operators attend design meetings and work with the engineers in the design process: “At some plants, only the lead operators go to those meetings. Here, we all do.”

ADVANCED PRACTICES

The reservation draws its drinking water from three 125-foot-deep wells; two more wells are under construction. The source water is filtered through a 1-micron cartridge prefilter, then conditioned with sulfuric acid and anti-scalant. The wells are flushed regularly.

“The water from these wells is high in iron that would plate out on the RO membranes without the pretreatment,” Judson says. “Treating it helps it pass through and prevent hardness fouling.” The team has developed operating practices for the 3 mgd plant that reduce membrane cleanings from three times per year to once every three years or longer.

“We prefer dual-certified, C-or-above operators, because of the extra staffing flexibility they provide.”

MARIO ISIDRON

Judson says the sulfuric acid and anti-scalant used in the pre-treatment stage lets them adjust the source water pH to 5.8 instead of the 6.5 initially recommended by the plant designers. They also flush all RO skids (Aerex Industries) with permeate water every day instead of just the skids used on that day. These actions prevent fouling and extend the time between cleanings.

The water goes from preconditioning to the low-pressure RO system (Toray Membrane USA), which removes salts and softens the water. The permeate water is filtered twice, and the RO stage also removes biologics such as bacteria and viruses. The RO system has an 85 percent recovery rate.

Follow-up treatment includes degassing to remove hydrogen sulfide and other gases. Then the water is chlorinated and treated with a custom-designed corrosion inhibitor (American Water Chemicals) and additional chemicals are added to raise the pH to 8.2 to reduce rust formation in the distribution system. Finished water is stored in a 1.5-million-gallon clearwell before distribution. "Our RO process removes 99.99 percent of undesirable materials," Judson says.

The percolation pond where RO brine is discharged functions as "nature's filter," Judson says. When the new wastewater treatment plant goes online and its effluent is reused, the RO brine will be injected into a deep well.



Andrew Mason II tests wastewater samples in the process lab.

PRIORITY ON SAFETY

The Hollywood Reservation has a lab on site for routine testing. "On a schedule, the EPA gives us a list of what to test for," says Judson. "As a small distribution system, we test every month for Bac-T and total coliforms." The tribe puts out a consumer confidence report annually and tests the source wells monthly. Judson notes that saltwater intrusion into groundwater is forcing more Florida drinking water plants to move to RO. He's happy to share with others the operating practices his team has developed.

While safe water is a top priority, so is personnel safety. The Hollywood wastewater plant won a second-place safety award in 2014 and a first-place award in 2015 from the Florida Water Environment Association. The tribe's



Operators observe the process in the plant's circular aeration tank.

REACHING OUT

The Hollywood water and wastewater plant teams put substantial effort into outreach to their community.

"The tribe is like one big family," says Michael Judson, plant operator. "We send Public Works employees out on holidays and other special occasions to set up booths to tell people what we do and educate the community. We also donate outdated Sacramento drinking water and wastewater course books to students so they can begin to prepare themselves for careers."

In addition, operators go to a nearby juvenile detention center and give career day presentations at schools, telling people how they can get into the water professions. "We outline, step by step, what they need to do to get ready," Judson says. "We make sure the kids at the juvenile detention center know they must have a

high school diploma or GED to become an operator. Getting that is step one."

The Hollywood operators work with the Florida Rural Water Association to host training events on plant operations and related subjects. "We are happy to share what we've learned with other operators, so we'll host training here," Judson says.

The Seminole Tribe of Florida is also a founding member of the United South and Eastern Tribes (USET), a nonprofit intertribal organization that collectively represents member tribes at the regional and national level. One area in which USET promotes excellence is through its licensing program for water and wastewater operators. The Hollywood plants are often the site for USET water and wastewater training programs for other tribes' operators.



Arkie Caraballo monitors the biosolids dewatering press (VFOLD).

“The water from these wells is high in iron that would plate out on the RO membranes without the pretreatment. Treating it helps it pass through and prevent hardness fouling.”

MICHAEL JUDSON

Public Works safety officer, John Holdman, helps the Hollywood team with its safety program.

The staff has regular “Safety Thursday” sit-down meetings and discussions covering topics from electrical and chemical-handling safety to proper lifting and back health. An attendance log is taken. Each operator has a “safety bag” containing personal protective equipment. “We take safety seriously — it’s a team effort,” Judson says.

Hollywood Reservation Wastewater Treatment Plant PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT
CBOD	160 mg/L	2.5 mg/L
TSS	460 mg/L	4.4 mg/L
Nitrate	—	4.3 mg/L
Ammonia	22 mg/L	0.05 mg/L



The Seminole Tribe of Florida’s Hollywood Wastewater Treatment Plant serves about 1,300 tribal members and commercial entities on the reservation.

The tribe also has an Emergency Management Division that is part of its police department. Any time a hurricane might be headed toward the reservation, the operators and the Emergency Management Division get together to discuss preparations. Public Works transfer station crews fan out through the reservation to pick up trash and objects that could become missile hazards. They also distribute information to remind residents how they should prepare: securing loose items; boarding up windows; readying flashlights, radios and batteries; and having bottled water and nonperishable food on hand.

The water and wastewater treatment plants have standby generators; the wells and lift stations have portable generators. The plants have generators and chain saws for loan to tribal members, and make ice from their ice machine available to those who need it. **tpo**

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A STUDY SHOWS THAT FEEDING FERRIC CHLORIDE AND POLYALUMINUM CHLORIDE CAN LOWER EFFLUENT TOTAL PHOSPHORUS TO A NEW MANDATED LIMIT FOR A MINNESOTA PLANT

By **Scottie Dayton**

Effluent from the Virginia (Minnesota) Wastewater Treatment Plant discharges to Manganika Lake, which is impaired by eutrophication. The Minnesota Pollution Control Agency ordered the plant to achieve 0.07 mg/L monthly average total phosphorus by March 2023.

In 2015, operators ran a 38-day study to see if adding polyaluminum chloride (PAC) would lower and maintain consistent TP levels. “It was one of multiple studies we will do to determine which solution is best for the plant,” says Jeff Frost, lead operator from PeopleService, contract operator of the facility.

Results from the study showed that injecting 70 ppm ferric chloride (FeCl) and 45 ppm PAC produced a sustainable effluent TP of 0.053 mg/L for an annual chemical cost of \$168,217.

TREATMENT TRAIN

At the study’s outset, influent TP averaged 3.3 mg/L. An FeCl injection system removed phosphorus using a 10,000-gallon storage tank, a 405-gallon day-use tank and three peristaltic pumps feeding chemicals before the primary clarifiers and at the head of each aeration basin. Effluent TP was less than 0.50 mg/L.

A 2012 plant upgrade included four fine ROTAMAT mechanical bar screens (Huber Technology), a grit vortex removal system (WesTech Engineering), two 296,000-gallon primary clarifiers, two 250,000-gallon conventional activated sludge aeration basins, two 486,000-gallon secondary clarifiers, four sand/antracite gravity filters and UV disinfection (TrojanUV).

A 267,000-gallon mesophilic anaerobic digester has dual alternating pumps that recirculate sludge at 1,000 gpm and send it through a heat exchanger maintained at 97 degrees F. From two 85,340-gallon storage tanks, material at 4 to 5 percent solids is sent to a Klampress 2-meter belt filter press (Alfa Laval Ashbrook Simon-Hartley). The resulting cake is land-applied.

PRELIMINARY WORK

A chemist with Hawkins Water Treatment Group jar-tested different PACs on the plant’s mixed liquor, identifying AquaHawk 2192 as the best fit. The city budgeted \$21,000 for it. “By the time we had gone through \$11,000 worth of PAC, we had reached our objective and there was nothing else to learn,” says Frost. “Ending the study early also enabled us to stay under our annual budget for chemicals.”

Although the plant has its own laboratory, it uses Pace Analytical Services for certified tests. Pace’s normal phosphorus effluent reporting limit was 0.10 mg/L. That wasn’t accurate enough for the study, so the city paid for a test with reporting capabilities of 0.004 mg/L.

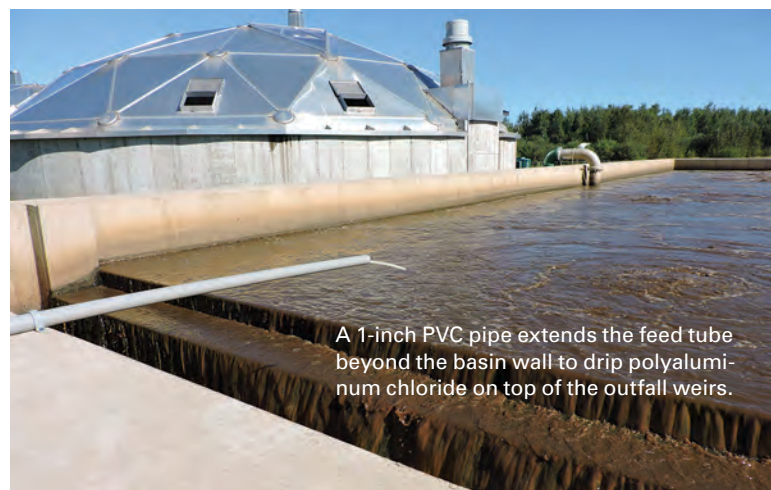
In May 2015, operators increased the aeration basin dissolved oxygen level from 1.0 mg/L to 2.0 mg/L to enhance conversion of nonreactive phosphorus to reactive phosphorus. They also relocated the FeCl influent feed

PRODUCT: | **AquaHawk 2192 polyaluminum chloride**

MANUFACTURER: | **Hawkins, Inc.**

USER: | **Virginia (Minnesota) Wastewater Treatment Plant**

APPLICATION: | Total phosphorus removal



A 1-inch PVC pipe extends the feed tube beyond the basin wall to drip polyaluminum chloride on top of the outfall weirs.

PHOTOS COURTESY OF JEFF FROST



The pilot study setup includes two bulk chemical tanks for polyaluminum chloride. Peristaltic pumps and tubing enable discharge of the chemical over the basin walls and on top of the outfall weirs.

point from before the grit vortex to the cascade point before the primary clarifier splitter box for additional mixing. The chemist recommended feeding FeCl at 70 ppm to remove as much phosphorus as possible before beginning the study. That dropped levels to between 0.15 mg/L and 0.19 mg/L.

One week before the study began, operators dewatered sludge in the holding tanks to provide 14 days of storage capacity. Hawkins Inc., the plant's chemical supplier, set and filled two chemical storage tanks at the rear of the east and west aeration basins, then calibrated the peristaltic pumps (Stenner Pump Company).

To extend the feed tubes beyond the basin walls to drip chemical on top of the outfall weirs, operators bolted a 1-inch PVC pipe to each wall, inserted the tube and zip-tied the two together. They offset the screw caps on top of the chemical tanks to position the end of the suction tube on the bottom. "The offset left a gap, which we covered with a tarp to prevent rain from diluting the PAC or falling on the pumps," says Frost.

“By the time we had gone through \$11,000 worth of PAC, we had reached our objective and there was nothing else to learn. Ending the study early also enabled us to stay under our annual budget for chemicals.”

JEFF FROST

SETTING PARAMETERS

The study began on July 9 and ended Sept. 8, 2015. Three times a week, Pace chemists analyzed influent and effluent composite samples for TP, TSS and CBOD. They analyzed effluent composite samples for low-level TP daily.

Plant operators analyzed daily effluent composite samples for orthophosphate using PhosVer3 reagent powder pillows and a Hach DR/850 colorimeter. They also recorded influent flow, backwash water return and belt press filtrate return once a day, and recorded effluent turbidities and water height above the media filters throughout the day. The filters were backwashed automatically once a day.

"Our major concern was clogging the filters by adding too much PAC," says Frost. "Our chemist suggested a beginning feed rate of 30 ppm, then increasing it and monitoring the beds." Biosolids were dewatered three times each in June, August and September. On those days, operators increased the FeCl feed to the head of the plant by 13 gallons during the eight-hour press run.

NOT A DRILL

For the first week, operators fed FeCl at 83 gpd and PAC at 30 gpd. "Two days into the study, our lab reported an orthophosphate result of 0.07 mg/L," says Frost. On July 20, the PAC feed rate increased to 40 gpd. Two days later, the temperature probe on the digester spiked to 105 degrees F. Operators found the recirculation pump running hot, making a different noise, and the pressure check valve down. Switching pumps brought an identical result.

"We opened the inspection ports and discovered the recirculation lines clogged with up to 18.5 percent total solids," says Frost. Operators stopped feeding PAC and injected 5,000 gallons of water a day into the digester to dilute the solids. They rerouted the recirculation lines onto the belt press and modified the wash troughs on the clarifier skimmers to add more water with each revolution. The pumps returned to normal. By Aug. 14, total solids had decreased to 4.4 percent, and operators resumed feeding PAC at 50 gpd.

WINDING DOWN

The feed rate increased to 60 gpd on Aug. 31. Operators also collected the final round of primary clarifier effluent, aeration basin mixed liquor, final clarifier influent and effluent, facility effluent, belt press filtrate return, filter backwash water, and secondary digester return water samples. These were tested for TP, dissolved phosphorus and orthophosphates.

(Continued on page 31)

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Saving a Village

THE CITY OF AUGUSTA PRESERVED A COLLECTION OF MINIATURE BUILDINGS AS PART OF AN EXPANSION OF THE HIGHLAND AVENUE WATER TREATMENT PLANT

By Jeff Smith

When upgrading the Highland Avenue Water Treatment Plant in 2009, the City of Augusta, Georgia, faced an obstacle.

A community of miniature buildings from the 1940s, called Mockingbird Hill Village, stood in the way of expansion. The “village” consisted of a Southern mansion, a church with a stained-glass window, a log cabin, a grist mill with a waterwheel and various other miniature buildings constructed by firefighters. As part of the \$65 million water plant upgrade, a new filter building would occupy the hillside site.

WORKING IT OUT

“Citizens were not happy,” says Allen Saxon, assistant director of facility operations. “People were more upset about losing the village than they were about the inconvenience caused by our closing a busy street near the plant during construction.”

“We have had a lot of positive community feedback about Mockingbird Hill and the artwork. People appreciate it.”

ALLEN SAXON

Many people had childhood memories of Mockingbird Hill Village, and the Augusta Utilities Department (AUD) decided to preserve it. Parsons, the project contractor, held public meetings to gain input. Today, the restored village rests in front of the plant’s new administration building.

ART ON THE WALLS

Since then, artwork has been added to the 60 mgd (design) conventional surface water treatment plant. After the upgrade, plans were to brick the walls and plant shrubs around the facility. Instead, the AUD collaborated

with The Art Factory, a nonprofit arts education group, to paint 13 murals on three walls surrounding the clearwells.

Professional artists were commissioned to paint the murals on the three walls seen by the most motorists each day. One mural tells the story of water upstream of Augusta, showing rain and rivers that become a lake formed by a dam and flows to the Savannah River, the source of Augusta’s drinking water.

A second mural is an abstract showing a distribution system of pipes and valves delivering water to homes and factories. A highlight of the third mural, which shows wildlife along the river as it flows to the ocean, is a turtle basking on a rock formed by an actual outcropping of the mural wall.

On a wall containing six 12- by 30-foot panels facing another busy road, six artists painted a water-themed mural of their own design. The artists were chosen from a pool of 45 applicants who responded to the request made by The Art Factory.

The six panels on another wall were painted by students from secondary schools and Augusta State University, members of the Boys and Girls Clubs, or by citizens as a volunteer project. Each conveys a water theme; one features historic floods in Augusta.

SAVING MONEY

The water plant provided paint and supplies for the murals. Despite its cost of more than \$700 for a 5-gallon bucket, the city chose Nova Color Art-



The Highland Avenue Water Treatment Plant staff includes, from left, Allen Elliott, assistant plant manager; Debra Beazley, water production superintendent; Robert Mobley, plant superintendent; and Roberta Tyler, administrative assistant.

ists' Acrylic Paints for their durability, brightness and resistance to flaking. Compared to re-bricking the wall, the paint was a bargain, Saxon says.

Early in the project, people complained about money being spent for artwork, but when they understood the savings, they were happy. "We have had a lot of positive community feedback about Mockingbird Hill and the artwork," says Saxon. "People appreciate it." **tpo**

Share Your Ideas

TPO welcomes news about interesting features of your facility's grounds, signage or buildings for future articles in the PlantScapes column. **Send your ideas to editor @tpomag.com or call 877/953-3301.**



(Continued from page 29)



Wastewater operator Brad Bennett of PeopleService checks an effluent composite sample for orthophosphate using PhosVer3 reagent powder pillows and a Hach DR/850 colorimeter at the Virginia (Minnesota) Wastewater Treatment Plant.

Severe thunderstorms over the Labor Day weekend contributed to high flows and multiple power failures at the plant. "The feed pumps were powered by extension cords plugged into ground-fault circuit interrupter outlets," says Frost. "We reset the outlets many times as electrical glitches tripped them."

With less than 40 gallons of chemical remaining, the failures were insignificant. Operators drained the remaining 10 gallons of PAC into the aeration basins on Sept. 8. Hawkins refilled the tanks twice during the study.

"We couldn't have done the study in winter because PAC freezes at temperatures in the mid-20s," says Frost. "If we use it in the future, the city will have to add another heated building or retrofit a chemical supply building for the tanks, then bury the feed lines below the 7-foot-deep frost layer."

CONCLUSIONS

The study proved that PAC concentrations of 69 ppm made the media filters perform better, rather than bind them. The amount didn't affect TSS removal, total low-level mercury, dissolved low-level mercury or water heights above the beds.

"Operators noticed that even effluent in the final clarifiers looked cleaner the day after we began adding PAC," says Frost. Effluent turbidity decreased from 1.50 NTU to 0.50 NTU during the study, while chloride concentrations increased by 18.1 percent. Other salty parameters (bicarbonates, calcium, hardness, magnesium, potassium, sodium, total dissolved solids, specific conductance and sulfate) were not affected.

The lowest effluent TP result was 0.018 mg/L, achieved when feeding 83 gpd of FeCl and 60 gpd of PAC. The study used 18,000 pounds (1,611 gallons) of PAC and 60,723 pounds (5,369 gallons) of FeCl. "We also learned that increasing the ferric chloride feed rate to the belt press filtrate as it returns to the head of the plant helps treat the additional phosphorus loading," says Frost.

While Frost recommends PAC to those who must meet a limit quickly, he doesn't believe it will help all plants, as Virginia's are somewhat unique: a low phosphorus load and an influent pH averaging 8.3. "The high pH and alkalinity enable us to add ferric chloride at a higher amount," says Frost. "The primary clarifiers remove 30 percent of phosphorus because they come before the aeration basins. The filters are designed for mercury and TSS, but also help with phosphorus." **tpo**

A man with a shaved head and safety glasses is looking down at a large logbook or data sheet on a desk. He is wearing a dark blue t-shirt. The background shows a control room with various equipment and a yellow wall.

Surpassing the Goal

A PENNSYLVANIA PLANT SUCCEEDS WITH OPERATOR INITIATIVE AND TEAMWORK, A MAJOR UPGRADE AND THE PARTNERSHIP FOR SAFE WATER PROGRAM

STORY: **Trude Witham**

PHOTOGRAPHY: **Brianna Spause**

THE OPERATIONS STAFF MEMBERS AT THE NORRISTOWN Water Treatment Plant have faced many challenges, from hurricanes and floods to a five-year, \$50 million plant upgrade.

They've also worked hard to meet Partnership for Safe Water goals, receiving the Phase III Directors Award in 2000 and the Phase IV Presidents Award in 2015. Owned by Pennsylvania American Water, the Norristown plant joined the Partnership in 1996. That was not an easy time.

"We phased in the construction of a brand-new plant," says Stan Szcz-

epanek, production supervisor. "The building envelope was tight and the U.S. Army Corps of Engineers had restrictions on buildings in the floodplain. Some had to be demolished before others were erected, and all this had to be done while running a 24-hour-a-day operation." In spite of these obstacles and Hurricane Floyd in 1999, the plant was completed in 2001.

The operations team is key to the plant's success. "For the Partnership program, we got all the staff together, reviewed the data, set guidelines and decided which operation and equipment improvements we needed to make,"



“New technology
always creates a
challenge. The learning
was slow, but with
experience comes
knowledge.”

STAN SZCZEPANEK

John Milakeve, plant operator, works in the laboratory, built and outfitted with new instruments as part of construction of a new water plant.

recalls Sandy Weiss, water-quality supervisor. Improvements have included Wallace & Tiernan ferric chloride pumps (Evoqua Water Technologies), raw water turbidimeters (Hach Company), SuperPulsator clarifiers (SUEZ) and media filters (Roberts Filter Group).

BRAND NEW PLANT

In 1847, Norristown Insurance and Water Company used the iron works pump house for the first treatment plant. Then, in the early 1900s, a conven-

tional plant was started at the same site. In 1962, American Water bought the plant and added a second conventional treatment plant next to the original one, and ran them both for over 30 years. In 1996, the company decided to completely upgrade all the equipment that would replace the two previous plants. That new facility went online in 2001.

The SuperPulsator units replaced traditional flocculation and sedimentation systems in one-tenth the footprint. Seven filters with 36 inches of granular activated carbon replaced 16 smaller filters. A 2.6-million-gallon clearwell replaced a 750,000-gallon well, increasing chlorine contact time.

SCADA control replaced a combination of phone lines, manual operation, mechanical timers, personal judgment and guesswork. Other improvements included:

- New pumps (Grundfos, Galigher - Weir Minerals, Moyno products by NOV, March), motors and electrical equipment
- EST chlorine scrubber (Severn Trent Services) to handle chlorine leaks
- Two plate-and-frame sludge presses (NETZSCH Pumps North America)
- Envirex automated traveling screen (Evoqua Water Technologies) to eliminate physical raking of debris
- New lab with all new instrumentation

During the past three years, the plant has added new Wallace & Tiernan ferric, caustic and polymer chemical feed pumps (Evoqua Water Technologies), a new communications network throughout the plant and distribution system, three new booster stations and new sludge thickening equipment that includes centrifuges, polymer feed equipment and instrumentation.

ZERO DISCHARGE

The 18 mgd plant serves 101,000 people in the boroughs of Norristown and Bridgeport, and all or parts of nine townships. Schuylkill River water enters a submerged crib intake built in 1907 and rehabilitated in 1998. Potassium permanganate can be used for disinfection or for zebra mussel control.

The raw water is pumped to the plant's pretreatment building, which houses hydrated lime, ferric chloride, blanket polymer, coagulant aid polymer and powdered activated carbon chemical feed areas, along with solids removal units. Chlorine may be added before or after coagulation mixing and also to the treated water. Operators normally add potassium permanga-

Norristown (Pennsylvania) Water Treatment Plant

FOUNDED: | 1847

POPULATION SERVED: | 101,000

SOURCE WATER: | Schuylkill River

TREATMENT PROCESS: | Conventional

PLANT CAPACITY: | 18 mgd

DISTRIBUTION: | 400 miles of water main

SYSTEM STORAGE: | 9.7 million gallons

KEY CHALLENGE: | Keeping up with tightening regulations/new technology

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Sandy Weiss, water-quality supervisor, and her husband Stan Szczepanek, production supervisor, credit their employees for the plant's award-winning water quality.

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**Norristown Water Treatment Plant:
Recipient of the 10-year Directors Award
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HUSBAND-AND-WIFE TEAM

At the helm of the Norristown Water Treatment Plant are Stan Szczepanek, production supervisor, and Sandy Weiss, water-quality supervisor. As husband and wife, they work closely to make sure the plant's 32,000 customers receive the best-quality water.

"We don't have to bring our work home," jokes Szczepanek, "because we can talk about it on the job." He is responsible for budgets, operations and maintenance, and capital projects. Weiss oversees the on-site certified laboratory, reviews all water-quality data and makes sure the plant meets state and federal regulations.

"We met years ago when I was working at another location," says Weiss. "Stan has been at the plant since 1979, and I was transferred there in 1997. I started as a lab analyst and was promoted to my current job in 2008."

Each appreciates what the other brings to the job. Says Szczepanek, "Sandy was an integral part of achieving the Partnership for Safe Water goals and takes an active role in the day-to-day plant operations."

Weiss comments, "Stan encourages teamwork and makes sure everyone gets credit for our successes. As a result, our operations and maintenance staff all care about each other and help each other out. They want everyone to succeed."

nate as the primary disinfectant when the water is above 50 degrees F, and chlorine only at lower temperatures.

The water is treated with lime, ferric chloride and polymer, and flows through an inline static mixer to a mechanical flocculator, where powdered

activated carbon is added for taste and odor control. A series of splitters divides the flow evenly for each of the four SuperPulsators.

Clarified water from the SuperPulsator units is sent to seven mixed-media filters, then treated with chlorine before entering the transfer clearwell. The finished water is sent to the distributive clearwell for treatment with caustic soda, ammonia and zinc orthophosphate before delivery to the distribution system.

A 336,000-gallon tower provides wash water for the filters. The wash water is collected in two 378,000-gallon wastewater clarifiers. Says Szczepanek, "We're a zero-discharge facility. Instead of sending the clarified wastewater to the Schuylkill River, we process all our sediment and solids on site and recirculate the clarified water to the beginning of the treatment process."

NEW TECHNOLOGY

Running two plants and phasing them out as the new equipment came online presented challenges. The construction was done in sections. The general contractor, PKF Mark III, tested equipment as it was installed and ran the new plant while the Norristown crew ran the old plants. The contractor also trained the operators on each process.

The biggest challenge was the SCADA system. "We had older operators who were not experienced with SCADA control, just data acquisition, so there was a learning curve," says Szczepanek. "New technology always creates a challenge. The learning was slow, but with experience comes knowledge."

Hurricane Floyd put a wrinkle in the plan. "We were deciding whether to take the No. 1 clearwell section out, since that was the oldest part of the plant and the clearwell with the most capacity," says Szczepanek. "Then the hurricane hit and made the decision for us.

"We shut down the plant. There was 2 1/2 feet of water in the lobby, and we were scared that the transformers would go, so I put on waders and went over to the breaker and disconnected the power. When we started up the plant five hours later, we had less than a day of water left."

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MAKING IMPROVEMENTS

The operations team worked toward the Partnership goals while sections of the new plant came online. “We were trying to meet the regulations, analyze the data and continue to make operational improvements,” says Weiss. “After we received the Phase III Directors Award in 2000, we began working on Phase IV.”

The team collected filter and clarifier turbidity data with help from Bill Teodecki, SCADA technician. Then they met and discussed improvements. “We say that we treat water that is too thin to plow and too thick to swim in,” says Szczepanek. Each season brings challenges. Algae blooms from April



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Process control tests in the laboratory help the plant team keep finished water at or below 0.5 NTU turbidity.

to October impart taste and odor. Raw water turbidity can spike to 600 NTU. High organics create a trihalomethane challenge.

The team began monitoring the turbidimeters and making adjustments. “We analyzed each turbidity spike on each individual filter to determine if it was due to operational or instrumentation issues,” says Szczepanek. “We performed daily verifications and quarterly calibrations on each turbidimeter to help ensure compliance.”

They piloted a new coagulant, Ferri-Plus 1025 (PVS Technologies), in April 2015. It is helping lower clarifier turbidity and reduce sludge. “The solids are getting drier, which offsets the cost of the chemical,” says Szczepanek.

The team changes out the granular activated carbon on a regular schedule to ensure filter efficiency and to handle odors during algae blooms. The team also began feeding liquid ammonium sulfate (LAS) on the pretreatment side before the static mixer to create chloramines and thus lower THMs.

These improvements have paid off. Clarified water turbidity is typically 0.5 NTU, surpassing the 1.0 NTU Partnership goal. “By forming pre-chloramines with the use of LAS, we were able to drop the running annual THM average from a high of 78 ppb to a current concentration of 47 ppb,” Szczepanek says.

CLOSE-KNIT GROUP

A team of four operators and four maintenance workers keeps the Norristown plant running 24/7. All operators perform laboratory work and equipment calibration. “The operations staff considers the plant to be theirs, and they are a close-knit group,” says Szczepanek. “Really, the best equipment and the best instrumentation in the plant are the operators. We can’t do without them.”

Weiss has been with American Water for 27 years and is certified in Class A Water and Class A Wastewater. Szczepanek (37 years) is certified Class A

Water and Class E Water Distribution. Reporting to him are:

- Beth Friel, Mike Licwinko, John Milakeve and Scott Acker, operators
- Tony Tiziana, maintenance foreman
- Tish Gallagher, Ryan Lott and Steve Tiziana, maintenance relief operators

The team's greatest strength is the ability to work unsupervised. "John Milakeve approached us to learn how to calibrate turbidimeters," says Szczepanek. "Until then, operators only certified that the readings were correct. John has also expressed interest in conducting filter inspections, also traditionally a supervisor's job. He's active his entire shift and observes everything.

"Mike Licwinko has taken responsibility for logging all equipment issues that happen during off-hours into the computerized maintenance program. He not only enters his own discoveries, but those of other operators."

Tony Tiziana stepped up to fill the maintenance foreman position. Says Szczepanek, "This job is a tough assignment that often requires expertise in various disciplines. When we're short-staffed, Tony has slept at the plant after making repairs to make sure other issues don't arise."

PREPARED FOR THE FUTURE

The new plant and the staff are well-positioned for the years ahead, and that includes being more resilient against flooding. "The river is so close, we



A photo shows the former Norristown Water Treatment Plant in 1905. The building was replaced by the current facility in 2001.



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can throw a stone from the parking lot to the water," says Szczepanek. "Out of the 22 highest floods in the area, I've been here for 18 of them."

The new plant's buildings have flood doors. Staff members have either moved, elevated or physically protected the most essential equipment. "We have a flood preparation plan to make sure we are ready and have enough chemical on hand, for example," Szczepanek says.

The team has begun upgrading the sludge-handling equipment. "We're going from a batch process to a continuous sludge centrifuge," says Szczepanek. "With a batch process, you have to guess at the consistency, add chemicals and look at the results. If it's wrong, you have to do it again. The new process will be continuous, so we can correct the chemistry as we go along, and we can run it around the clock if necessary."

Weiss anticipates increasingly strict regulations: "We are dealing with emerging contaminants like pharmaceuticals, and that creates a challenge. Once the technology improves, we can find these contaminants and remove them."

Meanwhile, the team is continuously improving the distribution system. "A lot of the issues we are having are based on 70- to 80-year-old mains, but we are making great headway installing new ones," says Szczepanek.

Szczepanek sees everyone's job evolving. "My role is becoming more administrative all the time, so the operators are taking on more of the work I used to do as supervisor. And that's a good personal growth experience for them." **tpo**

Team members at the Norristown plant include, from left, Stan Szczepanek, John Milakeve, Tony Tiziana, Tish Gallagher, Ryan Lott, and Sandy Weiss.

LEVEL & PRESSURE INSTRUMENTS

By KELLER

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Going Ultrasonic

ULTRASONIC METERS OFFER WATER UTILITIES HIGH ACCURACY AND LONG-TERM RELIABILITY IN AN EXPANDING RANGE OF APPLICATIONS

By Jan Boyer

Today's business environment demands informed decision-making. It's essential to provide superior customer service, use water and energy wisely, manage operations efficiently and sustain regulatory compliance, all while continuing to control revenue and resources.

When it comes to water, now more than ever, every drop counts. Ultrasonic flowmeters offer the newest evolution in metering technology for potable, reclaimed and residential fire service applications, truly making water visible to all utilities and end water users.

Today's technological advancements make the use of ultrasonic technology feasible for small metering applications. In particular, improved high-speed digital signal processing, advanced piezoceramic transducers and sophisticated computer technology make ultrasonic flowmeters a viable, cost-effective option.

UNDERSTANDING THE TECHNOLOGY

An ultrasonic flowmeter is an inferential meter that uses ultrasonic technology to measure the velocity of an acoustically conductive liquid or gas moving through it. There are two types of ultrasonic flowmeter technologies: Doppler and transit-time.

Doppler flowmeters

Doppler ultrasonic flowmeters measure the flow of liquids that contain suspended particles ("reflecting particles"). To ensure accurate measurement, particles of a sufficient number and size must be in the medium continuously.

Ultrasonic meters can help utilities capture more revenue by measuring flows accurately. They can also help utilities gather and analyze more granular measurement data.

Therefore, these meters are normally used with dirty liquids in industrial applications.

Typically, the meters position a pair of transducers opposite each other across the pipe, but the transducers also can be mounted on the same side of the pipe.

One transducer sends an acoustic signal or sound wave, which reflects off the particles in the flow stream. As the signal passes through the stream, its frequency shifts in proportion to the mean velocity of the fluid. The other transducer receives the reflected signal and measures its frequency. The meter then calculates flow by comparing the generated and received frequencies.

Transit-time flowmeters

Initially used only for clean liquids, transit-time meters can now accurately measure flow in a wide range of fluids, thanks to dramatic improve-



Ultrasonic meters measure flow using sound waves at frequencies above the range of human hearing. The sound waves are generated by applying a small voltage to a piezoelectric transducer in the meter.

ments in signal processing technology. Transit-time meters are now among the most universally applied flowmetering methods, and among the most accurate.

Transit-time technology takes advantage of the principle that an acoustic signal travels faster with the flow than against the flow. These meters have a pair of transducers that act as both sender and receiver. The transducer on the upstream side of the meter generates an acoustic signal that travels through the pipe. The downstream transducer receives the signal, and the meter calculates how long the signal took to travel from one transducer to the other.

Next, the downstream transducer generates a signal that travels upstream and is received by the upstream transducer. The meter then calculates how long the signal took to travel in the upstream direction.

Both Doppler and transit-time meters may be designed as insertion meters, with wetted transducers located within the flow tube, or as clamp-on meters, with the transducers mounted on the outside surface of the pipe.

ULTRASONIC SIGNALS AND TRANSDUCERS

Ultrasonic vibrations are sound waves at frequencies above the range of human hearing. In ultrasonic flowmeters, these sound waves are generated by applying a small voltage to the piezoelectric transducer in the meter. The

opposite also occurs: An ultrasonic signal received by the transducer is converted to an electrical signal. The transducer is simply a device that converts one type of energy to another.

The ultrasonic signal propagates at the speed of sound, but that speed is variable: It depends on the medium through which the sound travels and the temperature of that medium. Therefore, ultrasonic meters are calibrated for a specific liquid or gas and for a specific temperature range. Ultrasonic meters that are compatible with a variety of liquids or gases must be adjusted if the medium is changed.

Unlike mechanical water meters, ultrasonic meters use solid-state measurement technology. With no moving parts, ultrasonic meters operate quietly and improve accuracy and long-term reliability.

ULTRASONIC VS. MECHANICAL

Unlike mechanical water meters, ultrasonic meters use solid-state measurement technology. With no moving parts, ultrasonic meters operate quietly and improve accuracy and long-term reliability. Typical accuracy is within plus or minus 1.5 percent over the normal operating range of the meter and within plus or minus 3 percent at extended low flows.

In the past, water utilities have used ultrasonic meters primarily for large-volume applications including raw water, water treatment and water custody transfer. Now, however, ultrasonic meters have gained acceptance in residential metering because they have several advantages over traditional measurement technologies. These include:

- Wide measuring range or turndown
- High accuracy sustained over the meter's life
- High repeatability
- Minimal intrusion in the flow stream
- Negligible pressure drop
- Immunity to influence from particles in the stream
- Bidirectional design
- Minimal maintenance requirements

In general, these same advantages apply to small ultrasonic water meters when compared to positive displacement meters.

CASE IN POINT

The experiences of two water companies illustrate advantages that can lead utilities to choose ultrasonic metering.

Tri County Regional Water

Tri County Regional Water, based in Russellville, Arkansas, had failing meters that were not accurately capturing all of the usage data and were causing loss of revenue. After considering various replacement meters, the utility selected ultrasonic meters for their reduced height, durability and accuracy.

"The size of these meters was a key factor," says John Choate, regional water manager. "They can be mounted upside down, vertical or horizontal and still be read correctly. I also really liked the stainless steel version and the simplicity of a one-piece electronic meter with no moving parts. Stainless steel gives me peace of mind knowing that these meters will have a long life. They are also in compliance with the latest BPA guidelines."

In an area with a broad range of elevations, the ability to withstand pressure changes was another critical factor in meter selection. "We are not losing nearly as much water," says Choate. "With 100 to 125 psi on the line, our previous meters would implode. Our new meters can withstand the maximum stated operating pressure of 175 psi, and in fact we found they will withstand 300 psi and more. Similarly, our former meters only read 20 gpm accurately, whereas the ultrasonic ones will read 25 gpm and more."



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Waterworks District 3

To replace its aging metering system, Waterworks District 3 of Beauregard Parish, Louisiana, chose ultrasonic meters for durability and long-term accuracy. With no moving parts, the meters also improve reliability and have greater extended-low-flow accuracy compared to positive displacement meters. "The ultrasonic meters are catching the lowest flow amounts we've ever been able to record," says Jeremy Joffrion, distribution manager.

Along with capturing more revenue, the meters enable the district to gather and analyze more granular measurement data. "It helps me generate better reports," says Joffrion. "The numbers are much more accurate than in the past and will continue to get better as we install more meters." The ultrasonic meters will also help the district record flows at new-meter accuracies throughout the meters' life. Joffrion estimates that with labor efficiencies and added revenue from more accurate metering, the system will pay for itself quickly.

WIDE APPLICATION RANGE

While mechanical meters are predominant in small water meter applications, recent technological advancements are helping ultrasonic flowmeters make inroads. Specifically, transit-time ultrasonic meters can be an effective solution for any application requiring long-term measurement accuracy.

Historically used for clean, potable water, ultrasonic meters are also well-suited for reclaimed water applications or for less-than-optimum water-quality conditions where small particulates exist. The meters' wide-range capability and robust operating characteristics make them an attractive choice for utilities' small-metering needs.

ABOUT THE AUTHOR

Jan Boyer (jBoyer@badgermeter.com) is the marketing manager with Badger Meter, focusing on utility metering and encoder technologies. **tpo**

RIGHT FIT

DAVID McALPIN FINDS HIS IDEAL JOB AND BUILDS AN AWARD-WINNING CAREER
DIRECTING WATER-WASTEWATER OPERATIONS FOR BLOUNTSVILLE (ALA.) UTILITY BOARD

STORY: Jack Powell

PHOTOGRAPHY: Jeff and Meggan Haller

DAVID MCALPIN IS PROOF THAT THE ADAGE “LISTEN TO YOUR elders” pays off. As general manager of the Blountsville (Alabama) Utility Board, McAlpin has found a niche that has served everyone well — himself, his wife and three children, and this quiet community of 1,700 in northwest Alabama.

So well that in March 2015 McAlpin was named Wastewater Operator of the Year by the Alabama Rural Water Association (ARWA). “I sure was surprised when I won the award,” says McAlpin, 40, a 17-year water and wastewater veteran. “I told people there must have been only one person under consideration for me to have won.

“I’ve been a member of the ARWA for many years. It’s a great organization and an excellent resource for water and wastewater information. I’ve even had ARWA members come up here to do testing on our sewer system, go to our wastewater plant and tell us what we need to do to stay in compliance, and on the water side, conduct leak surveys to help us keep water levels under control.”

GREAT OPPORTUNITY

How a Blountsville native and former high school basketball star came to run the town’s water and wastewater treatment and sewer system is an example of seizing an opportunity and driving for the hoop. It also shows how hard work, commitment to learning and passion for providing clean, safe water can produce a rewarding career.

After graduating from J.B. Pennington High School, McAlpin attended Wallace State Community College in nearby Hanceville, Alabama, and



David McAlpin, general manager of the Blountsville (Alabama) Utility Board.

earned an associate degree in liberal arts. Then he enrolled in Athens State University, the state’s oldest institution of higher learning, founded in 1882, on a full basketball scholarship. Finding himself burned out on school after five years, he left the scholarship on the table — “I know it sounds crazy” — and came to the utility. He started the next day as a trainee.

“My uncle told me that I needed a good, steady job that would pay me a living and benefits, so I became a wastewater operator,” says McAlpin, who holds Grade 1 Wastewater and Grade 2 Water certifications. “I’m real glad I listened; it was the best advice I ever got. I learned the business and moved up to superintendent and eventually general manager, while providing for my wife and kids, so it’s been a big win all around.”

PERMIT ISSUES

On the water side, McAlpin and his two Grade 2 operators are responsible for two well houses that together pump about 500,000 gpd; all they do is add chlorine. The wastewater operation is a three-pond aerated lagoon system built in 1986 and staffed by a Grade 1 operator. Each pond is 700 by 300 feet. Flow averages 300,000 gpd; effluent discharges to Blue Springs Creek.

McAlpin’s major challenges include keeping up with changing permit requirements set by the Alabama Department of Environmental Management (ADEM). He’s on his fourth discharge permit. The process provides secondary treatment. McAlpin’s team checks the ponds for sludge buildup quarterly.

Five years ago, McAlpin began to shine when Blountsville encountered



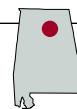
“My uncle told me that I needed a good, steady job that would pay me a living and benefits, so I became a wastewater operator. I’m real glad I listened; it was the best advice I ever got.”

DAVID McALPIN

ABOVE: David McAlpin (left) and Lynn Goble make an aerator repair. LEFT: Checking the aerated lagoons is all in a day’s work for McAlpin.



David McAlpin, Blountsville (Alabama) Utility Board



POSITION: | **General manager**

EXPERIENCE: | **17 years**

DUTIES: | **Oversee water/wastewater operations; supervise operators and office staff**

EDUCATION: | **Associate degree, Wallace State Community College**

CERTIFICATIONS: | **Grade 1 Wastewater Operator license; Grade 2 Water Operator license**

GOALS: | **Stay with the utility and continue a rewarding career**

GPS COORDINATES: | **Latitude: 34° 5'2.43"N; Longitude: 86°35'27.35"W**

“David is well-versed in all aspects of our water, wastewater and sewer operations. When things don’t go the way they should, he knows just what to do and helps us on the board understand the rules and regulations we need to enforce.”

BOBBY GRIFFIN



KEEPING IT FLOWING

David McAlpin had his mettle tested in late August 2015 when silt began showing up in Blountsville’s main waterline. It was the first time the town had encountered such a problem, and even retired water operators were puzzled.

“One of the wells pumped 800 gpm, and the other pumped 300 gpm,” says McAlpin. “With that kind of flow, being offline can really set you back, especially for a small town like ours. We really needed to get on top of the problem in a hurry.”

With the water supply threatened, McAlpin and his team swung into action. They quickly tied into the system from nearby Brooksville to keep the water flowing. Next, McAlpin and the utility board brought in well experts who pumped out the silt, which had built up in a well cavity for many years and got high enough in the hole that the suction from the pump began to pick it up. The 800 gpm well, dug in 1964, went down 105 feet and was completely offline. A big crane lifted out the pump, which was installed in 1997, and McAlpin’s crew did extensive maintenance and repair.

“Dealing with the wells was a big job for David and his team,” says Bobby Griffin, utility board vice chairman. “They worked long hours making sure that everything went right; tying these other lines in so our customers never missed a beat when it came to their water. Best of all, our customers never knew what happened. We kept providing clean, safe drinking water. When something bad happens, you have to respond right then, because people expect to have water when they turn on their faucets. That’s just what we did.”

some difficult noncompliance issues. When the town received a consent order over its sewer system, officials asked McAlpin to correct the situation and get the town back into compliance. But the fixes weren’t working as fast as ADEM thought they should. That’s when McAlpin reached out for help from other utilities in the area and hired a consultant knowledgeable about sewer systems, particularly lagoons.

“David worked with them and never let up or ever gave up until we were in compliance,” says Bobby Griffin, vice chairman of the five-member

Keeping up with changing regulations is a challenge for (from left) David McAlpin and operators Lynn Goble and Jeff Floyd.

Blountsville Utility Board, which supervises McAlpin and sets his \$1 million annual budget. “Those are just some of the things David and his crew did to get us back on track. To date, we’ve been in compliance for 26 straight months of testing with our lagoons. That’s one of the reasons he was nominated and unanimously chosen as Operator of the Year.”

Permit issues also govern chlorine use at the wastewater plant. “We were using chlorine to meet our *E. coli* parameter, but our permit allows only so much chlorine, so we had to take some of it out before we discharge the water into the receiving stream. We used that method until Dec. 8, 2015, when we put in what to our knowledge was the first and only UV equipment (WEDECO - a Xylem Brand) to be used on the back side of a lagoon system anywhere in the state. It has worked great!”

ATTACKING I&I

Like many wastewater operations, Blountsville has struggled with inflow and infiltration (I&I). Here, McAlpin’s determination and commitment produced impressive results. In 2014, McAlpin and his team found a severe offset in a sewer line and discovered groundwater pouring into an 8-inch sewer main.

Compounding the problem, many of the lines were installed in the 1940s when I&I wasn’t a priority. McAlpin and his operators used a CCTV camera to inspect the lines and deployed flowmeters in high-flow areas, ultimately finding three major infiltration points. They then patched the lines and fixed leaky manhole covers. In doing so, they reduced infiltration to the treatment plant by 11.5 million gallons per year.

“I&I is just one example of the outstanding job David does for us,” says Griffin, who has served on the board for seven years after retiring from a local water authority. “David is well-versed in all aspects of our water, wastewater and sewer operations. When things don’t go the way they should, he knows just what to do and helps us on the board understand the rules and regulations we need to enforce.”

IMPROVEMENTS ONGOING

While there have been no major facility expansions during McAlpin's tenure, Griffin points out the many modifications made to the water and wastewater system. They include adding a bar screen (I-Tech) at the headworks in 2008, installing a fourth lift station in 2010, installing 12 aerators in 2011 (Aeration Industries) to improve treatment in the lagoons and adding the UV system in 2015.

Those are all major projects for a small utility that serves 1,415 water and 815 sewer customers. It's all in a day's work for McAlpin, who starts at 7 a.m. and works until 3:30 p.m. He typically meets with the operators and discusses what needs to be done and then plans for the future, always with an eye for improving operations.

For the past 10 years, the utility has had three sewer grants of about \$400,000 each to support the collections system. In addition, McAlpin has purchased a sewer camera and a vacuum truck, which the crew uses to perform maintenance weekly. He and his crew work to find problems and note them on a geographic information system (GIS), which displays a map of the sewer and waterlines. They put all that information into a maintenance plan and determine which areas get attention first.

FAMILY FARMER

"He's out there with them and coordinates things at the same time," says Griffin. "It's not unusual for him to come by for a quick meeting



McAlpin (right) maintains close relationships with team members, including Jeff Floyd.

“I had no intention of getting into the water and wastewater business ... but then I fell in love with it, and when people retired I was able to move up. If you're up to the challenge, water and wastewater are great careers. Every day you learn something new.”

DAVID McALPIN

and take five or six phone calls; sometimes it seems as if he's run ragged keeping everything afloat.”

Fortunately, McAlpin is a high-energy type. When he's not at the utility, he works with his father, who runs a 400-acre farm 3 miles from Blountsville, named for Gov. Willie G. Blount of Tennessee, who helped settlers in Alabama during the Creek War of 1813-14. They raise cattle and maintain four poultry houses. McAlpin often puts in three or four additional hours a day there because there's always something to do on a farm that size. He doesn't mind because it's the family farm he grew up on. Not long after getting married, he bought some additional land and built a house on it.

Despite the heavy workload, McAlpin considers himself lucky to have landed his ideal job. “I had no intention of getting into the water and wastewater business,” he admits. “In fact, I thought it would be a transitional job until I found what I wanted. But then I fell in love with it, and when people retired I was able to move up. If you're up to the challenge, water and wastewater are great careers. Every day you learn something new.” **tpo**

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Just Right

AMMONIA-BASED AERATION CONTROL PROMISES ADDITIONAL ENERGY SAVINGS IN THE ACTIVATED SLUDGE PROCESS AT CHICAGO'S STICKNEY WATER RECLAMATION PLANT

By Ted J. Rulseh

About half of a typical clean-water plant's energy goes to aeration. It follows that pumping more air than necessary into the activated sludge process wastes substantial electricity.

The team at the Metropolitan Water Reclamation District of Greater Chicago's Stickney Water Reclamation Plant has embarked on a project to optimize aeration and so cut the blowers' slice of the energy consumption pie by about 25 percent.

They're doing it by installing ammonia-based aeration control, a more efficient method than the traditional control based on dissolved oxygen (DO). "Ultimately, we want to be positioned so that when the system says there is too much air going out, we can keep dialing down the output from the blowers," says Joe Cummings, assistant operations manager at the Stickney plant. "That's where the real money is saved."

The district's engineering consultant, Donohue & Associates, estimates simple payback on the project at 1.9 years, including the cost of control technology needed to achieve the desired blower turndown.

MAJOR FACILITY

The Stickney plant, in the middle of Cook County about 15 miles southwest of downtown Chicago, is the largest of seven MWRD treatment plants. Its nearly 400 employees work in 193 buildings on a 413-acre site.

The plant handles an average flow of 700 mgd and a peak flow of 1,440 mgd, discharging to the Chicago Sanitary and Ship Canal. It serves central Chicago and 46 other communities within a 260-square-mile area that is home to 2.3 million people.

The plant has four treatment batteries, each with its own aeration tanks and secondary clarifiers. Each battery has eight aeration tanks, and each tank includes four passes. Each tank has one air main to passes 1 and 2 and a second air main to passes 3 and 4.

"Roughly 50 percent of our electric bill comes from the blowers feeding the activated sludge process," Cummings says.

THE WAY THINGS WERE

Historically, the Stickney plant's aeration process has run on a combination of airflow control and DO control, by way of a distributed control system (DCS). "Passes 1 and 2 are set for airflow control," says Cummings. "We're telling the blowers to put out as much air as possible. One reason for that is we're doing biological phosphorus removal and we did not install new tanks to meet the phosphorus reduction needs — we used the existing tanks."

"Because of that we had to cut the air in the channels that feed the aeration tanks and for roughly the first half of the first pass of each tank. That produces an anoxic zone so that the polyphosphate accumulating organisms (PAOs) go through that zone. Once they get into the aerobic zone, we want to provide as much oxygen as possible, so we run passes 1 and 2 on flow control."

Passes 3 and 4 operate on DO control by way of an automated feedback

loop. "The plant NPDES permit requires a minimum 4.0 mg/L of DO in final effluent," says Cummings. "We don't have post-aeration facilities, although there is some post-aeration net gain through turbulence in our channels. For the tanks on DO control, we have a setpoint of 4.0 mg/L."

ELIMINATING EXCESS

The aeration control project calls for installation of DO and ammonia probes at additional locations in the tanks so that those two parameters are being monitored throughout the process. "Basically, by the time the water exits the tanks, we want to deliver the amount of air that's needed both to meet our minimum effluent DO and to get our ammonia down below our permit limits by the end of the tank," Cummings says. Monthly average ammonia permit limits are 2.5 mg/L from April through October and 4.0 mg/L from November through March.

Fenghua Yang, senior environmental research scientist, observes, "We want to get our ammonia down to below our permit limit near the end of the tank instead of one-half to two-thirds of the way through the tank, as commonly happens. Because when that happens, then through the rest of the tank you continue to add oxygen that isn't necessary for nitrification."

The new control strategy will also benefit the biological phosphorus removal process. "For bio-P, we have an anoxic/anaerobic zone," says Yang. "And if we have low DO at the end of the aeration tank, then there is low DO in the return activated sludge, which recycles to the head of the aeration tanks."

“We want to get our ammonia down to below our permit limit near the end of the tank instead of one-half to two-thirds of the way through the tank. ... Because when that happens, then through the rest of the tank you continue to add oxygen that isn't necessary for nitrification.”

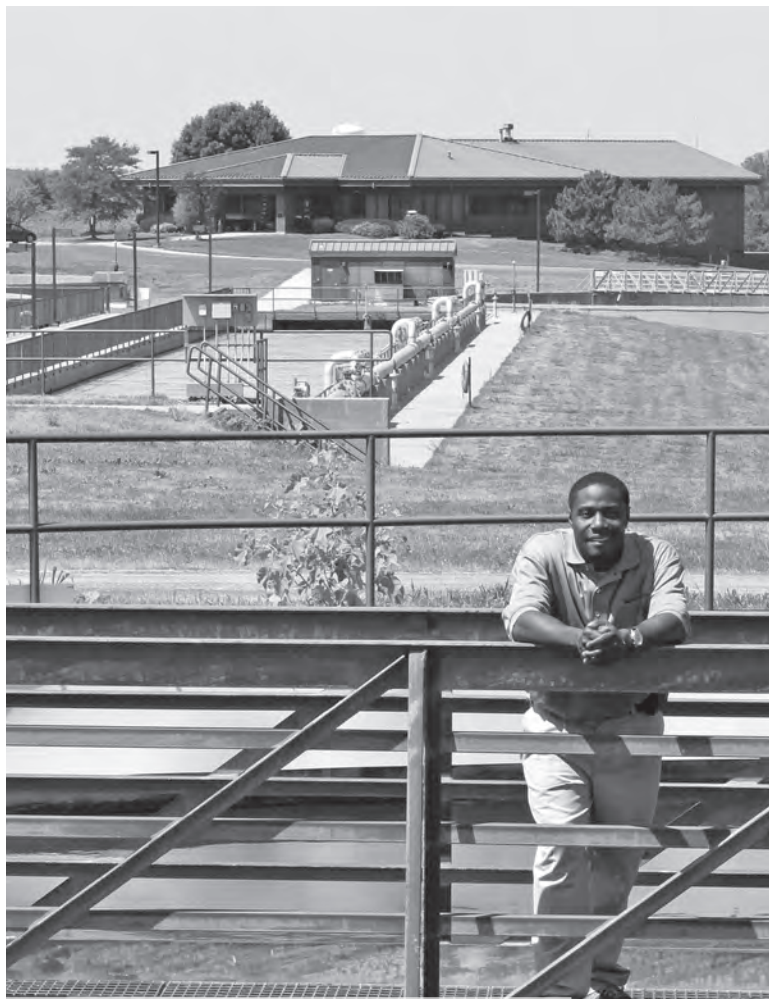
FENGHUA YANG

The control project, costing an estimated \$300,000, will replace flow control with DO control for passes 1 and 2 of each tank and provide ammonia-based aeration control for the entire aeration system. Each pair of aeration tanks will share one ammonia probe at the two-thirds mark along the tank length, a DO probe at the end of pass 2 to control the airflow to passes 1 and 2, and another DO probe at the end of pass 3 to control the airflow to passes 3 and 4.

The probes (all from YSI, a xylem brand) were to be installed starting in early 2015 in all four batteries. "In the meantime, we'll be programming our DCS so we're ready once everything is installed," says Jeff Majka, senior electrical engineer.

Yang adds, "We will need to run through a variety of control scenarios to determine the best DO and ammonia setpoints to meet our effluent permit, yet still achieve the best air savings. We would like to do a pilot study to look at the actual air savings we can obtain and the potential problems we may encounter."

The ammonia-based aeration control strategy is just one of many innovative projects underway at the Stickney plant. Says Cummings, "You could write a whole magazine about the things we're doing here." **tpo**



// The team members are the greatest resource at this plant. They know it. They've been here forever. 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."

Nate Tillis
Operations and maintenance supervisor
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The Power of Shared Values

WEF PRESIDENT PAUL BOWEN BRINGS FRESH PERSPECTIVES ON CREATING SUSTAINABLE UTILITIES AND COMMUNITIES AND ON ATTRACTING NEW TALENT TO THE WATER PROFESSIONS

By Ted J. Rulseh

Paul Bowen traces his interest in water treatment back to a crude water filter he made during grade school. From there, it has been a long and rewarding journey to becoming director of environmental sustainability with The Coca-Cola Company and 2015-16 president of the Water Environment Federation (WEF).

Bowen brings a private-sector focus on metrics and accountability to WEF. He also offers perspectives on shared values related to sustainable water and wastewater utilities, and to recruitment of new professionals into the water field.

With Coca-Cola, Bowen is responsible for delivering on company goals in water, energy, climate and packaging recovery. His team helps embed environmental sustainability in operations across the Coca-Cola system, which is composed of the company and more than 250 bottling partners worldwide. He serves as a technical expert in water reuse, water stewardship and wastewater treatment.

A WEF member since 1977, Bowen has held multiple leadership and committee roles. He has also served as a literature review author for the Residuals & Biosolids and Industrial Wastes Committee and as a board member for WEF's charity of choice, Water for People. In addition, he is active in the Georgia Association of Water Professionals, the American Water Works Association, the American Society of Civil Engineers, the International Water Association and the International Society of Beverage Technologists.

Bowen shared his thoughts on sustainability and the recruitment and retention of young professionals in an interview with *Treatment Plant Operator*.

tpo: How did you come to be interested in the water professions?

Bowen: When I was in fourth grade, I built my first water treatment device. I took a coffee can and punched holes in the bottom, filled it with rocks and sand and some crushed charcoal, and made a water filter for a science fair project. That sparked my interest in water and the environment.

That led to my current position with Coca-Cola, where I've been for 17 years.

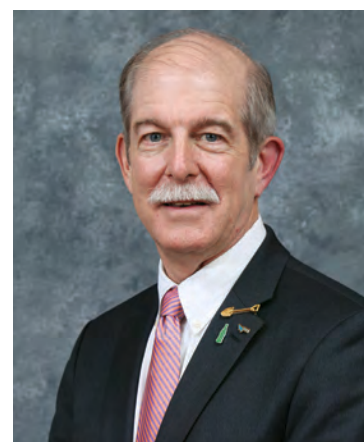
tpo: How did you become involved with WEF?

Bowen: When I was in graduate school at Clemson, the professors strongly recommended that we join what was then the Water Pollution Control Federation and make sure we received their journal, too, so we could follow what was current in the field. While at the University of Oklahoma, I took part in the local member association meetings, and I did the same while at Metcalf & Eddy.

Eventually I got on the program committee at the national level and it grew from there.

tpo: How do you see your private-sector perspectives as being valuable to WEF and to utilities?

Bowen: I tend to focus on objectives and performance metrics — making sure an organization sets the appropriate objectives and that those objectives have measureable outcomes, so that we can drive performance to a different level. So, I bring a business perspective and strong technical background in water stewardship and wastewater treatment. My for-profit perspective can benefit WEF members, many of whom represent municipalities. While they are not in business to make money, they still need to be responsible, solvent and financially sound.



Paul Bowen

“Sustainability is a journey. It's a long-term commitment to creating shared values for the business, its partners and the community.”

PAUL BOWEN

When I was on the debate team as a senior in high school, the national debate topic was on whether the United States should have regional or nationwide pollution control laws. It was a very timely topic.

As a chemistry major at Mercer University, I saw a real need for people in the environmental space. I got an EPA fellowship to do graduate work at Clemson University. Later, I was an assistant professor in the School of Civil Engineering & Environmental Science at the University of Oklahoma. After that I became a vice president and senior staff consultant for Metcalf & Eddy.

tpo: From your position in a corporate environment, what does the term “sustainable business” mean?

Bowen: Ultimately, being a sustainable business means being a business that continues to operate and grow. At Coca-Cola, we recognize our business is only as sustainable as the communities where we operate. So, we listen, assess and implement initiatives that benefit both the local communities and our business. A sustainable community and a sustainable business take the shared values they hold and learn to understand how they can work together to achieve sustainability. While WEF and utilities aren't technically businesses, they can benefit by incorporating select corporate practices with the end goal of creating a sustainable “business.” That means meeting bottom lines, find-

ing ways to be innovative, looking at new ideas and helping solve technical, financial and social problems.

tpo: What do sustainability and shared values mean as applied to the urban water cycle and to those who operate water and wastewater facilities?

Bowen: At Coca-Cola, we believe that without sustainable communities, our business cannot be sustainable. You can apply that to any industry. Sustainability is a journey. It's a long-term commitment to creating shared values for the business, its partners and the community.

What values do a water utility and its community share? They share the values of clean water, of clean energy, of recycling and reuse, and of proper control of stormwater. If we can create a long-term commitment to those shared values, that's our best bet at achieving environmental sustainability. On the other hand, citizens have to appreciate that they have a commitment to the utility, and that these services don't come without a cost.

tpo: As experienced operators retire, there is a critical need for new talent in the water professions. How can utilities forge more connections with young professionals?

Bowen: WEF is an excellent resource for young professionals and students considering water careers. WEF has long been regarded as a go-to resource in the water sector and it remains so today, particularly for those just starting out. We have excellent programs and resources like the Water Leaders Institute, quality publications, the Work for Water website and job board, as well as valuable training and networking opportunities at WEFTEC and other events.

WEF is a great support system for all stages of a career but it's not the main attractor for future water leaders. What will attract new people to the field is giving them attractive opportunities to be problem-solvers. Most of us want to be problem-solvers. We want to find solutions and achieve results. What's more important than water? Protecting public health? Our environment? We're on the cutting edge of instituting a fundamental, sectorwide change in how we manage water and make the most of every resource that can and could be derived from that process.

Utilities need to have a vision for where they're going and what they want to accomplish. If we set clear goals and clear visions that people understand, then we're going to attract those who want to be part of something bigger and better.

tpo: What can be done to make more young people, at earlier ages, aspire to careers in the water professions?

Bowen: For the most part, young people in the U.S. don't remember what it was like to have polluted water. They didn't experience the river in Cleveland catching fire, garbage floating down the Mississippi or water supplies so contaminated people couldn't drink from them. They don't have that background. So we have to talk about going from just treating waste to recovering resources — water recovery, nutrient and minerals recovery, and energy recovery. That's how we excite young people. We talk about the opportunity to make their community sustainable and the threats that exist if we don't monitor and care for current infrastructure. The troubles in Flint since August 2015 are likely sparking new interest in the topic.

I also think it's about helping young people understand the education and technology behind advanced wastewater treatment. When we talk about what it takes to have water resource recovery and green facilities, some of those are highly technical and challenging jobs. We need young people to understand that it's not just about turning valves; it's about making a positive difference in the world. This is a generation that cares about that.

tpo: In a time when public agencies are budget constrained, how can people entering the field be shown a promising career path?

“We need young people to understand that it's not just about turning valves; it's about making a positive difference in the world. This is a generation that cares about that.”

PAUL BOWEN

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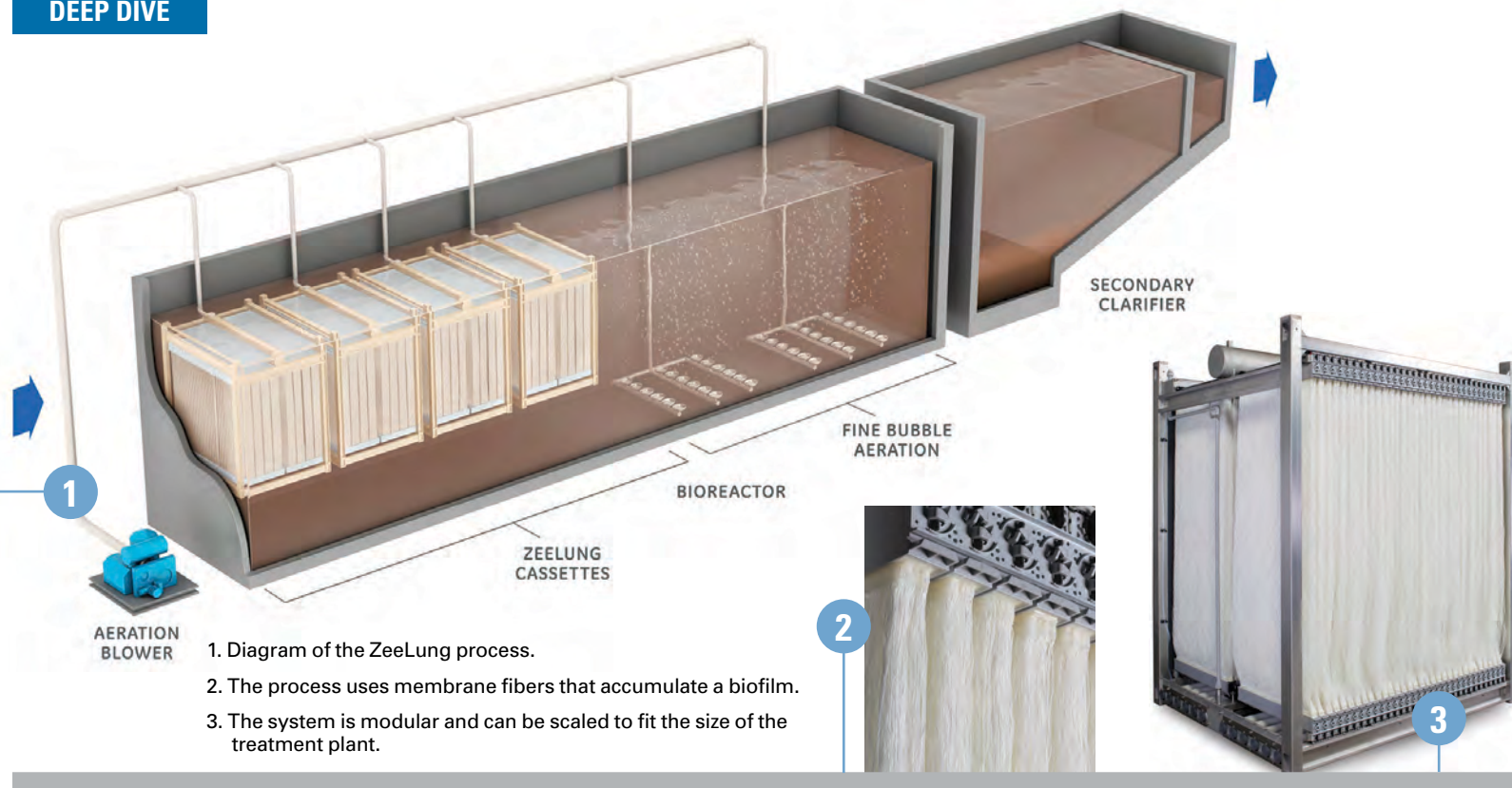


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Bowen: We have to highlight shared values. What values do communities always talk about? They talk about education, the welfare of their kids, jobs. Aren't those things that a utility or water resource recovery facility is also concerned with? We also need to show that there are opportunities for people to work their way up and advance, and we've got to be willing to support their advancement from one stage to the next. I know there is supposed to be a huge brain drain coming, but it's not going to happen overnight. Now, while it's starting to happen, is the time to give people the opportunity to advance and move forward.

tpo: You work for a company that owns one of the most powerful brands in the world. What lessons can you offer about effective branding for wastewater agencies?

Bowen: We've made a good start by talking less about wastewater treatment and more about water resource recovery. Beyond that, I'm not a marketing expert, but I think we have to find what resonates with people. One former Coca-Cola tagline was, "Open Happiness." In speaking to groups, I would tell people to close their eyes and think about the first time they had a Coke. As I looked out over the audience, I'd see smiles on everybody's faces. That's what the brand delivered. We need to think of how we can touch a nerve in a similar way. Maybe it's "clean water factory." Maybe it's "resource recovery." We have to find what resonates and let that be the mantra that we embrace. **tpo**



Beating the Bubbles

ZEELUNG MEMBRANE AERATED BIOFILM REACTOR TECHNOLOGY OFFERS HIGHLY EFFICIENT OXYGEN TRANSFER AND SUBSTANTIAL ENERGY SAVINGS IN CLEAN-WATER PLANTS

By Ted J. Rulseh

As clean-water plants strive to become resource recovery facilities, energy neutrality is a key goal. There are two components to get there: using less energy (through efficiency) and producing more energy (by using biogas).

An example of the first component is ZeeLung membrane aerated biofilm reactor (MABR) technology from GE Power & Water. The system is designed to use oxygen much more efficiently than conventional fine-bubble aeration in the activated sludge process.

The technology transfers oxygen by diffusion through a membrane to a biofilm that grows on the outside membrane surface. The microorganisms in the biofilm then metabolize the nutrients and organic compounds in the wastewater. The manufacturer says the process uses one-fourth the energy required for fine-bubble aeration, which typically accounts for about 60 percent of a treatment facility's electricity usage.

The ZeeLung system can be installed in new plants or retrofitted to existing aeration basins, increasing treatment capacity or performance without increasing the plant's footprint. Jeff Peeters, senior product manager for water and process technologies with GE Power & Water, talked about the process in an interview with *Treatment Plant Operator*.

tpo: What market need drove the development of this technology?

Peeters: Energy is increasingly important in water treatment. There's a need for energy-saving technologies and energy recovery processes. We

are developing a suite of products to fill that need. ZeeLung addresses the largest energy consumer in wastewater treatment plants, which is the aeration process.

tpo: How have you documented the potential energy savings?

Peeters: We've been testing the technology for about three years at different scales. We started with proof of concept testing in our lab. We scaled that up to small-scale versions of the product in the lab and then went to pilot testing at a customer site. Most recently, we've been testing a commercial scale module at the Metropolitan Water Reclamation District of Greater Chicago's Terrence J. O'Brien Water Reclamation Plant.

tpo: What makes this process more efficient than conventional aeration?

Peeters: Until now, the game in aeration has been how to make smaller and smaller bubbles, because that increases the surface area of air in contact with the liquid. That has limitations in transfer efficiency, as typically 60 to 70 percent of the oxygen that goes into the basin comes out at the surface and isn't used. With the ZeeLung MABR, we use a membrane to diffuse oxygen directly into a biofilm.

tpo: What does the membrane system consist of?

Peeters: It consists of bundles of membrane fibers deployed into cassettes and installed in the aeration basin. It looks exactly like our ZeeWeed

membrane filtration system, except that the membrane is different. The membrane does not filter water. We chose a membrane material that has an affinity for diffusing oxygen.

tpo: How exactly does the aeration process work?

Peeters: We push air into the membrane fibers. This creates an oxygen concentration gradient so that molecular oxygen diffuses from the inside of the membrane through to the outside. On the outside of the membrane a

“Most opportunities we’ve looked at have been retrofits into conventional activated sludge systems that have bioreactor tanks and secondary clarifiers, but need to upgrade to meet new regulatory requirements or to expand capacity.”

JEFF PEETERS

biofilm grows. The bacteria in the biofilm are in direct contact with the medium that provides the oxygen they need.

tpo: Besides the membrane, what are the other key components of the technology?

Peeters: You still need a blower, but that blower can be significantly smaller. You also need mixing in the tank. Some mixing is integral to the cassette. If the tank is large or wide or deep, it may need some supplemental mixing to get good contact between the substrate in the wastewater and the biofilm on the membrane.

tpo: What are the most promising applications for the technology?

Peeters: Most opportunities we’ve looked at have been retrofits into conventional activated sludge systems that have bioreactor tanks and secondary clarifiers, but need to upgrade to meet new regulatory requirements or to expand capacity.

tpo: How does this process perform in applications that require nutrient removal?

Peeters: The biofilm includes bugs that remove BOD as well as bugs

“We designed the product to simplify installation to existing tanks. After installing the cassettes in the aeration basin, you simply plumb the air supply to them.”

JEFF PEETERS

that remove ammonia — the nitrifiers. So we get very good nitrification performance. Then if the customer needs total nitrogen removal — denitrification — that can happen in the bulk solution around the membrane.

tpo: Can the process provide biological phosphorus removal as well?

Peeters: Some applications we’ve looked at are existing plants that want to do biological phosphorus removal but are at capacity and don’t have enough tankage to introduce an anaerobic zone. We could add ZeeLung cassettes to concentrate the aerobic portion of the system, and in that way free up space for an anaerobic zone for bio-P.

tpo: What is involved in retrofitting the technology to existing tankage?

Peeters: We designed the product to simplify installation to existing tanks. After installing the cassettes in the aeration basin, you simply plumb the air supply to them. Of course, you need to look at the plant hydraulics

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and, if you’re adding capacity, make sure the secondary clarifiers can handle the increased flow.

tpo: How has this technology proven out at commercial scale?

Peeters: Chicago is our first commercial demonstration. We’re testing a full cassette of commercial modules operating in a sidestream configuration with a nominal capacity of 0.5 mgd. We pump a mixture of primary effluent and return activated sludge to a separate tank that houses the ZeeLung cassette and monitor its performance. The effluent from that tank goes back into the main plant. The focus there is on ammonia removal. We are seeing consistently greater than 30 percent ammonia removal by the membranes, which is the target for this particular plant.

tpo: What other GE technologies can help plants achieve energy neutrality?

Peeters: ZeeLung is one of four products in our Energy Neutral portfolio. Another is LEAPprimary, an enhanced primary treatment process designed to remove as much of the organics as possible and minimize the load to secondary treatment. The MONSAL advanced anaerobic digestion process improves digester gas yield. And the Jenbacher gas engine converts that gas to electricity and heat. **tpo**

watch how it works

Short animated videos illustrate how the ZeeLung process works.

On YouTube, search for:

- ZeeLung — How It Works
- Energy Neutral Wastewater Treatment—Biological Treatment

Monitoring and Instrumentation

By Craig Mandli

Analytical Instrumentation

ASA ANALYTICS CHEMSCAN MINI

ChemScan mini Fe (iron) and mini Mn (manganese) single parameter analyzers from ASA Analytics are used in potable water monitoring. They assist in the monitoring of these parameters for process control. For monitoring the chloramination process, the mini FreeAm (free ammonia) and the mini MonoChlor (monochloramine) can be used individually or together to create a suite of chloramination parameters for process, distribution and booster station control. The mini Sulfite and mini LowChlor (chlorine) analyzers are designed for chlorination and dechlorination monitoring in the wastewater disinfection process. **262/717-9500; www.asaanalytics.com.**



ChemScan mini Fe and mini Mn single parameter analyzers from ASA Analytics



V-3000 Multi-Analyte Photometer from CHEMetrics

CHEMETRICS V-3000 MULTI-ANALYTE PHOTOMETER

The hand-held V-3000 Multi-Analyte Photometer from CHEMetrics can be used as a portable or bench-top water analyzer pre-programmed to test for over 50 analytes using Vacu-vials self-filling reagent ampoules. V-3000, V-3000P (pH and ORP)

and V-3000T (pH, ORP and Turbidity) photometers offer simple menu-driven operation that guides the user through all measuring tasks with a large, easy-to-read LCD display. Its flexible design accepts 13, 16, and 28 mm cell sizes. Operator safety is ensured because there's no sample preparation, mixing or chemical contact. It can store up to 100 data points (1,000 data points for the V-3000P and V-3000T) with date/time tags for later download to a lab computer or direct printing. Web-based updates are available, and the unit is European CE mark certified. It's waterproof (IP67), lightweight and battery operated, with rechargeable battery available. **800/356-3072; www.chemetrics.com.**

CIRCUIT INSIGHTS LOOP SLOOTH EXCITER/DETECTOR

The Loop Slooth Exciter/Detector ground loop diagnostic device from Circuit Insights enables rapid, easy ground loop troubleshooting by revealing ground loop paths without disconnecting cables. Ground loops cause lots of headache and expense by preventing proper functioning of measurement and control equipment. The Exciter induces a test signal into the ground loop just like a real noise or interference signal would inductively couple to the ground loop. The Detector then tracks the magnetic field produced by the test signal and traces out the



Loop Slooth Exciter/Detector ground loop diagnostic device from Circuit Insights

ground loop physical path. The unit can also detect ground loop branching, a problem essentially undetectable by the traditional method of disconnecting and reconnecting cables. **626/201-0488; www.loopslooth.com.**

ELECTRO CHEMICAL DEVICES DO90 TRACE DO2 ANALYZER

The plug-n-play rack-mount DO90 Trace DO2 Analyzer from Electro Chemical Devices provides continuous precision measurement and alarming of trace dissolved oxygen levels in boiler feed water, supporting electric power generation steam turbine systems. It has a lead silver, galvanic, dissolved oxygen sensor with a durable PFA Teflon membrane. The sensor is combined with an intelligent universal transmitter designed for continuous service. The sensor is housed in a rugged, 316L flanged stainless steel body for use in rugged industrial process environments. It is a smart, digital device with a noise-free digital signal for easy communication. All data processing is internal to the sensor, and the calibration information is stored in the sensor's memory. It provides integral temperature measurement, and has an easily replaceable electrode cartridge. It offers users a measurement range of 0.001 to 20.00 mg/L or ppm/ppb auto-ranging. **800/729-1333; www.ecdi.com.**



DO90 Trace DO2 Analyzer from Electro Chemical Devices



T56 Clarity II Turbidimeter from Emerson Process Management, Rosemount

EMERSON PROCESS MANAGEMENT, ROSEMOUNT T56

The T56 Clarity II Turbidimeter from Emerson Process Management, Rosemount determines turbidity in water and can monitor filtered water discharges, condensate returns and clarifiers. It consists of an analyzer, with either one or two signal input boards, sensor(s), and a debubbler/measuring chamber and cable for each sensor. Sensors can be located as far as 50 feet from the analyzer. The large LCD display makes menu screens and prompts easily viewable. Its 4-20mA analog outputs

are fully scalable. It has four alarm relays with interval timer functions. Alarms are fully programmable for high/low logic and dead band. It can automatically recognize installed turbidity signal boards and detect whether an EPA 180.1 or ISO 7027 sensor is being used. It is available with the analyzer, sensor(s) and debubbling flow cell(s) mounted on a single back plate. The sensor cables are pre-wired to the analyzer, making setup simple. **800/854-8257; www.rainhome.com.**

HEYL USA TESTOMAT EVO TH

The Testomat EVO TH from Heyl USA is an inline field-measuring instrument that automatically analyzes water hardness concentrations in a quantity- or time-controlled basis. If water quality is checked manually, water hardness may go undetected. This leads to lime scale buildup, which increases energy and maintenance costs. Once implemented, the unit helps reduce operating costs and increase energy efficiency. With an integrated Wi-Fi SD card, monitored data is delivered in real time to mobile devices for flexible data collection and management. Error reports and alarms are sent wirelessly to notify when immediate action is needed. **312/377-6123; www.heyld.com.**



Testomat EVO TH from Heyl USA

LOVIBOND MD 100

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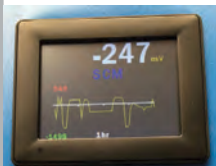
total chlorine. It has a large backlit display, a real-time clock, automatic data logging and the ability to electronically export data for use in other software applications. It uses DPD Tablets or VARIO Powder Pack reagents and is ideal for laboratory or field use. **800/922-5242; www.lovibond.com.**

MD 100 chlorine analyzer from Lovibond



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The Streaming Current Analyzer (Model SCA) from Micrometrix monitors and optimizes the coagulation process. The device responds to changes in raw water quality and prevents plant upsets. The analyzer has a color touch-screen display with graphical data trending and alarm functions. The heavy-duty instrument has a fast response time of less than one second and high accuracy for 24/7 monitoring. The sensor has a user-serviceable probe that extends sensor life. **770/271-1330; www.micrometrix.com.**



Streaming Current Analyzer (Model SCA) from Micrometrix

SWAN ANALYTICAL AMI SAC 254 ANALYZER

The AMI SAC 254 Analyzer from SWAN Analytical provides photometric measurement of organic material load in drinking water based on DIN EN 38404-4. Spectral Absorbance Coefficient UV254 measurement with turbidity compensation enables process adjustments to cost-effectively adjust clarification chemical feed to reduce final effluent natural organic material loading. This reduces disinfectant demand and disinfection byproduct formation, improving water quality. The dissolved organic carbon formed from natural organic material such as humic acid, lignins and other organic material can also be directly correlated. When UV disinfection is employed, the UVT value can be used to optimize the disinfection process. It comes mounted on a back plate for easy and time-saving installation and operation. **847/229-1290; www.swan-analytical-usa.com.**



AMI SAC 254 Analyzer from SWAN Analytical

Controllers

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InGenius control panels from AdEdge Water Technologies

BURKERT FLUID CONTROL SYSTEMS TYPE 8619

The Type 8619 multifunction transmitter/controller from Burkert Fluid Control Systems is a microprocessor transmitter/controller for

connection of sensors that deliver raw signals for pH, ORP and conductivity and flow via pulses. It can be used for measurement and control as well as dosing processes in water treatment plants like boiler, cooling tower or reverse osmosis systems. Modularity in hardware and software offer high flexibility for adjusting it to the applications. Sophisticated electronics and control algorithms ensure that optimum process control is maintained at all times with minimal operator intervention for achieving highest quality. It has a simple, intuitive user interface supported by a large, adjustable backlit display with four user-defined views. **949/223-3100; www.burkert-usa.com.**



Type 8619 transmitter/controller from Burkert Fluid Control Systems

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PowerCommand remote monitoring equipment from Cummins Power Generation provides a convenient and efficient means of remotely monitoring and controlling generator sets, transfer switches, sensors and output controls. Users can have visibility of multiple locations such as pumping stations on one screen, anywhere in the world, whether in the facility or offsite, through a Web-browser or mobile device. They minimize the possibility of downtime,



PowerCommand remote monitoring equipment from Cummins Power Generation

increasing the reliability of the water plant power systems due to the real-time access and notifications. Customers can be aware of potential issues even before they happen, thus preventing downtime and costly ramifications. The monitoring system is flexible and connection can be either through LAN or cellular connection. **248/573-1600; power.cummins.com.**

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Power Xpert C445 intelligent motor management and protection relay from Eaton

and protection; advanced control and diagnostics algorithms; and extensive onboard industrial communication protocols to help customers reduce the integration cost of using an intelligent motor management device for achieving greater predictability in operations. It can

help automate maintenance through remote monitoring and troubleshooting that can help reduce the need for scheduled maintenance, helping gain greater stability, control and endurance with motor equipment life cycles. **877/386-2273; www.eaton.com.**

INDUSTRIAL CONTROL DIRECT IMO iVIEW HMI

The IMO iView HMI, distributed by Industrial Control Direct, comes with full-color 64K touch screens, ranging from 4.3 to 15 inches. Connectivity features include serial, Ethernet and USB interfaces capable of device communication with more than 380 industry protocols such as Modbus RTU, Modbus TCP, Eth-



IMO iView HMI, distributed by Industrial Control Direct

ernet/IP and Profibus. It offers IP66 protection, removable storage for data logging, integral Ethernet port supporting FTP remote transfer and VNC Server. It can be remotely monitored using an iConnect M2M controller which communicates via 3G, 4G or Ethernet, enabling running of scripts, setting up alerts and accessing data for remote process monitoring using a subscription service. **678/782-2090; www.iview-hmi.com.**



MURPHY BY ENOVATION CONTROLS POWERCORE MPC-20 CONTROLLER

The PowerCore MPC-20 Controller from Murphy by Enovation Controls is an out-of-the-box fully sealed industrial controller. With an array of inputs and outputs, it is capable of handling sophisticated engine diagnostics whether installed on a mechanical

PowerCore MPC-20 Controller from Murphy by Enovation Controls

or electronic engine. The CSA-approved unit has a 3.8-inch QVGA monochrome LCD. Designed with pumping applications in mind, the controller can be used in other applications requiring an auto- or manual-start controller. The rugged controller withstands harsh environments and supports J1939 CAN protocols for electronically governed engines for fault and safety shutdowns. The versatile menu structure offers the ability to change many parameters without the need of a PC. Settings can be customized and saved for specific applications with the user-friendly configuration tool. **918/317-4100; www.fwmurphy.com.**

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The ECO Smart Station control system from PRIMEX provides energy-efficient pump control in municipal lift station applications using VFD technology. The EnergyView Controller with kW Logix Software uses an efficiency auto-tune algorithm that searches for the pump speed that will consume the least amount of energy per gallons of liquid pumped. The pump motor power is monitored by the VFDs and transmitted to the controller.



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SIEMENS INDUSTRY HYDRORANGER 200

The HydroRanger 200 ultrasonic controller from Siemens Industry offers fast commissioning, an improved human machine interface and graphical Quick Start Wizard, as well as a redesigned enclosure with removable terminal blocks. It offers a wide range of communication options including Profibus

DPV1 industrial protocol, and can be used for water/wastewater monitoring

HydroRanger 200 ultrasonic controller from Siemens Industry

via pumping stations or open channels, to inventory management of chemicals or liquids and truck load-outs. It provides high-performance measurement of level, flow, differential level and volume conversion, with additional alarm and pump control functions. Its Sonic Intelligence signal processing technology differentiates between true and false echoes, which can be caused by electrical noise. **800/365-8766; www.usa.siemens.com/level.**

Data Loggers

CAS DATALOGGERS MX2001

The MX2001 Bluetooth low-energy-enabled water level data logger from CAS DataLoggers and Onset



MX2001 Bluetooth data logger from CAS DataLoggers

is designed for wireless communication with users' mobile devices. The HOBOMX water level logger is used for monitoring changing water levels in a wide range of applications, including streams, lakes, wetlands, tidal areas and groundwater. Using Onset's free HOBOMobile application — available on iOS devices — users can configure the logger and view/share data from its deployed location from their smartphone or tablet. **800/956-4437; www.dataloggerinc.com.**



PermaNet+ from Fluid Conservation Systems

FLUID CONSERVATION SYSTEMS PERMANET+

PermaNet+ from Fluid Conservation Systems combines the PermaLog+ leak noise sensor and a versatile telemetry data logger to create a fixed network to remotely monitor and correlate leaks. Once a leak has been identified, operators have three

secondary options to check for false positives prior to team deployment: remote correlation, remote retrieval of a detailed Aqualog noise graphic or listening to an audio file transferred to the host PC. The leak noise sensor attaches magnetically to water pipelines and proactively listens for leak noise to occur within the distribution network. Acoustic data is transmitted directly to the cloud using the existing cellular network for utility personnel to listen to leaks and eliminate false positives from the office. As part of the FCS OmniColl remote asset-monitoring platform, it displays the reported leak data on a geographical overlay and exports the data for immediate remote correlation with one click. **513/831-9335; www.fluidconservation.com.**

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The BW DIGI-METER Micro-Flo with Analog Output from Blue-White Industries displays flow rate and accumulated total flow, with 4-20 mA / 0-10 VDC circuitry for low-flow applications. Units include an NPN open collector output for communication with SCADA systems. Flow ranges



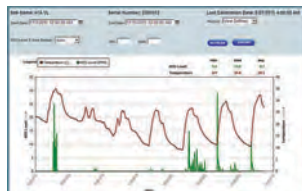
BW DIGI-METER Micro-Flo with Analog Output from Blue-White Industries

include 30 to 7,000 mL per minute. Connection options include 1/8-, 1/4-, and 1/2-inch threaded and 1/4- and 3/8-inch OD tubing connections. A clear PVC viewing lens allows for visual confirmation of flow. A PVDF chemical-resistant lens is also available. The LCD display indicates operating mode and battery status. The memory is nonvolatile. The unit is field programmable via a front panel touch pad, or can be factory programmed. The front panel has a lockout option, and the Total Reset function can be disabled to prevent tampering. Electronics are AC powered. The display is remote mounted, and is weather resistant NEMA 4X wash-down compliant. **714/893-8529; www.blue-white.com.**

EVOQUA WATER TECHNOLOGIES LINK2SITE WEB MONITORING

Link2Site Web Monitoring from Evoqua Water Technologies pro-

vides operators with remote access to hydrogen sulfide data for real-time monitoring and responsiveness to changing site conditions. The Web platform interfaces with the Vapor-Link hydrogen sulfide monitor and VersaDose dosing controller for comprehensive performance monitoring and dosing control.



Link2Site Web Monitoring from Evoqua Water Technologies

Operators can view and download trending graphs and charts to analyze system performance in order to ensure consistent, effective odor and corrosion treatment. The result is a more efficient use of chemicals, reduced labor requirements, and better odor and corrosion control. **800/345-3982; www.evoqua.com.**

GREYLINE INSTRUMENTS OCF 5.0

The OCF 5.0 open-channel flow monitor from Greyline Instruments uses a non-contacting ultrasonic sensor to measure wastewater flow through flumes or weirs. It has a built-in data logger with on-screen flow reports and output to USB flash drives, plus Windows software to display and graph flow reports in fully customizable formats. It works with a non-contacting ultrasonic sensor mounted above the flume or weir. It includes isolated 4-20 mA and USB outputs; two programmable relays; and a large, backlit LCD flow-rate display and totalizer. Calibration and selection of flume or weir



OCF 5.0 open-channel flow monitor from Greyline Instruments

are made through a built-in, five-button keypad and user-friendly menu system. The calibration

setup is password protected, and flow data and totals are safely stored through power interruptions. Temperature compensation is automatic and accuracy is plus or minus 0.25 percent. **888/473-9546; www.greyline.com.**

KROHNE OPTISONIC 7300

The OPTISONIC 7300 ultrasonic flowmeter from KROHNE targets the high requirements of biogas applications. The measuring instrument, which functions according to the time transit differential method, guarantees flow measurement with a high degree of long-term stability regardless of the gas composition. It is maintenance-free and immune to deposits. Thanks to its special signal converter design, it has considerably higher signal strength. The NACE-approved Grade 29 Titanium transducers provide corrosion resistance against hydrogen sulfide. An enhanced digital signal processor allows for better detection of small acoustic signals strongly dampened by high carbon dioxide content. To make various measurements comparable, the standard volume can be measured based on temperature and pressure inputs to the converter. **800/356-9464; www.us.krohne.com.**



OPTISONIC 7300 ultrasonic flowmeter from KROHNE

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Centrifuges for biomass measurement

Carroll plant teams up with wildlife agency

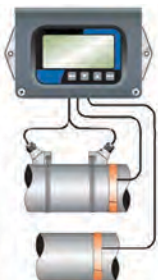
Winning biosolids program in Ocean County, N.J.

Go to **tpomag.com** to view the e-zine.

and the cost of these events. They can add equipment documents and images, record service and warranty information, and track equipment location and responsible party. The program allows the user to schedule and track training, quickly record who attended the training and if they passed a specific training event. It comes with a full complement of detail and summary reports. **888/954-5483; www.lablitecmt.com.**



CMT (Calibration, Maintenance and Training) program from LabLite



NCM Series flow and energy meter from Noncontact Meters

NONCONTACT METERS NCM SERIES

The NCM Series clamp-on ultrasonic transit time flow and energy meter from Noncontact Meters installs in seconds on most pipe materials, and measures full pipe clean and dirty liquid applications. Typical applications include water, well water, chilled water, hot water, city water, cooling tower water, glycol, deionized water, seawater, sewage and acids. It is available in a NCMB standalone flowmeter and a NCME energy flowmeter monitoring

flow and dual clamp-on RTDs. The energy flowmeter measures energy usage in Btu or tons, and is ideal for

retrofit, chilled water and other HVAC applications. Communication options include 4/20mA, Modbus RTU, BACnet/MSTP, BACnet/IP, TCP/IP, and Ethernet/IP. **770/516-3999; www.noncontactmeters.com.**

SMITH & LOVELESS QUICKSMART

QUICKSMART system controls from Smith & Loveless provide monitoring and adjustment for headworks functions, including grit pumping, removal and washing in one easy-to-use control system. The touch-screen layout simplifies control modification, screen navigation and viewing of system status. Screen function buttons and a status bar are accessible from each screen. A maintenance log displays periodic recommended operation and maintenance instructions, and makes lubrication suggestions based on actual system runtimes. An I/O status screen displays controller digital and analog I/O status. The 7-inch 65,000-color TFT LCD touch-screen HMI controller is UL-listed, NEMA 4 rated when installed in an enclosure, and surge-protected. **913/888-5201; www.smithandloveless.com.**



QUICKSMART system controls from Smith & Loveless

SPIRE METERING TECHNOLOGY RH40

The RH40 portable flowmeter from Spire Metering Technology measures flow rate as well as temperature and thermal energy. It is a clamp-on product, which means no cutting of pipes, and is very easy and quick to install. It can measure pipe sizes ranging from 3/4 to 120 inches. It uses ultrasonic technology, which means that there are no moving parts to break, and it retains its accuracy over the lifetime of the meter.

It can be used for water and waste treatment applications, pipeline leak detection, inspection, tracking and collection. It can also be used for water distribution network monitoring. It is capable of measuring bidirectional flow/energy. The ergonomic design allows the main unit to be

held and operated with one hand. It has a large built-in data logger. **978/263-7100; www.spiremt.com.**

UNIVERSAL FLOW MONITORS COOLPOINT

CoolPoint vortex shedding flowmeters from Universal Flow Monitors provide flow consistency, accuracy and high repeatability in measuring and monitoring water, water with chemicals added, permeate and chemical feeds. They measure water flows in pipes sized from 1/4 to 4 inches, providing 4-20 mA transmitter flow rates ranging from 4 to 600 gpm. They have high repeatability and accuracy to ensure flow consistency. All models are available with plus-or-minus 2 percent full-scale accuracy. They have user-selectable output that can display rate or total in gpm or lpm. A flow repeatability of plus-or-minus .25 percent of indicated flow is standard. They are available in brass, 316 stainless steel or PVC in limited sizes. The local display is LED digital. They can measure water that may contain particles, and have no moving parts to stick or coat. **248/542-9635; www.flowmeters.com.**



CoolPoint flowmeters from Universal Flow Monitors

Gas/Odor/Leak Detection Equipment

ACME ENGINEERING PRODUCTS PM AWARE

PM Aware from Acme Engineering Products provides the equipment and cloud-based software to monitor pollution, PM 1.0, PM 2.5, PM 10 and up to four gases in a unit as a monthly service. Operators can access the data on any Internet-connected device, as well as receive alerts via text and email when the data reaches personalized thresholds. The monitoring unit is small and connects to the cloud via Wi-Fi or GPS. It has a data logger, is A/C or solar powered with battery backup and easy self-install. Move it from one area to another or add multiple units to one system. Real-time, reliable data can improve operations compliance. **514/816-6417; www.pmaware.com.**



PM Aware from Acme Engineering Products

AMETEK DREXELBROOK CLEAR LINE FLUID DETECTOR

The Clear Line Fluid Detector from AMETEK Drexelbrook is designed for pipe and tank applications to monitor the presence or absence of fluid in a pipe and provide complete assurance that the tank is empty. The detector mounts directly into existing pipelines between two standard 150-pound, flat-faced flanges. Without interfering with product flow, it uses RF admittance technology to detect when material is present or absent from a pipe. This is especially important for users of expensive pumps who want to prevent damage or burnout from a pump running empty. Each



Clear Line Fluid Detector from AMETEK Drexelbrook

detector is factory-calibrated to provide reliable, repeatable performance regardless of changes in process fluids and coatings or variations in temperature, conductivity and density. Cote-Shield circuitry ensures dependable detection regardless of conductive coatings or product buildup on the sensor. It can be used for interface detection to accurately determine when a material changes from one phase to another. This is especially useful in processes involving material separation. **215/674-1234; www.drexelbrook.com.**



RH40 portable flowmeter from Spire Metering Technology

tion, inspection, tracking and collection. It can also be used for water distribution network monitoring. It is capable of measuring bidirectional flow/energy. The ergonomic design allows the main unit to be

ANALYTICAL TECHNOLOGY Q46N FREE AMMONIA MONITOR

The Q46N Free Ammonia Monitor from Analytical Technology is designed for the continuous measurement of free ammonia, total ammonia and monochloramine in potable water. It is intended for monitoring chloraminated water to minimize the amount of excess ammonia in the system. It has a fast



Q46N Free Ammonia Monitor from Analytical Technology

response time for real-time ammonia measurement, providing continuous, real-time updates for better process control. It uses a simple chemical system with three separate, inexpensive reagents required for operation. These reagents can be purchased directly or can be easily mixed on site using readily available chemicals. Each system is supplied complete with monitor, chemistry module, sensor membranes and electrolytes, reagent bottle brackets, reagent pickup tubing assemblies, a spare parts kit and a manual. **800/959-0299; www.analyticaltechnology.com.**



Jerome J605 hydrogen sulfide analyzer from Arizona Instrument

ARIZONA INSTRUMENT JEROME J605

The Jerome J605 gold film hydrogen sulfide analyzer from Arizona Instrument detects hydrogen sulfide gas at concentrations as low as 3 parts per billion, with a resolution of 20 parts per trillion.

It has onboard data logging that can store up to 20,000 measurements for detailed recordkeeping

and analysis, as well as a USB interface for data transfer and SCADA interface capabilities. It has a solid-state design, durable metal casing and 24-hour battery life. **800/528-4711; www.azic.com.**

MOCON-BASELINE SERIES 9000

The Series 9000 total hydrocarbon analyzer from MOCON-Baseline Series monitors hydrocarbons in air or pure liquid-oxygen ozone generation feed gas streams. Feed gas delivered to the ozone generator must be clean and free of hydrocarbons and must be closely monitored during the process. Its range is factory set at 1 to 200 ppm (methane), MDQ 0.01 ppm. Analog, digital or logic output capability, as well as components for single or multipoint analysis, may be selected at time of order. Built-in software, navigated by a large graphical display with an easy-to-use menu, allows operation with or without an external computer. Electronic control of fuel, air and sample delivery to the flame ionization detector — with auto-ignition — improves safety, performance and sensitivity. Programmable alarm levels and automatic calibration allow operation with minimal experience and enhance long-term analytical stability. **303/823-6661; www.baseline-mocon.com.**



Series 9000 total hydrocarbon analyzer from MOCON-Baseline Series

EAGLE MICROSYSTEMS GD-1000 PREMIER SERIES

The Model GD-1000 Premier Series gas detector from Eagle Microsystems can detect a range of gases, including chlorine, ammonia, sulfur dioxide, ozone and methane. It is capable of responding to levels of gas in air over a multitude of ranges. The unit consists of an electrochemical gas sensor and a microprocessor-based alarm

indicator unit. The sensor can be mounted in the area of potential leakage while the monitor remains in a safe area, protecting the operator from exposure to the gas leak. The operator is alerted to a leak by an audible alarm and flashing display on the indicator. The alarm-indicating unit can interface with up to two sensors, each of which can monitor the same or a different gas. **610/323-2250; www.eaglemicrosystems.com.**



Model GD-1000 Premier Series gas detector from Eagle Microsystems



GA-180 gas alarm from Global Treat

GLOBAL TREAT GA-180

The GA-180 gas alarm from Global Treat has a modular design that can integrate up to 16 gas sensor types. The sensors are individually adjustable, weatherproof and can be located up to 1,000 feet from the alarm module. Sensor configuration mode is entered using a password and then adjusted using push buttons. The digital alarm module is housed in a NEMA-4X enclosure and includes both audio and visual alarms. There is a front panel push-button function used to acknowledge/deactivate latching alarms. The front panel display and LEDs provide continuous and clear operation status. The digital alarm module is controlled through a user-friendly interface consisting of push buttons and an alphanumeric, backlit LCD. Calibration can be performed through the push-button menu, and sensors are easily changed and replaceable. **281/370-3425; www.globaltreat.com.**

INDUSTRIAL SCIENTIFIC VENTIS MX4

The Ventis MX4 multi-gas monitor from Industrial Scientific detects from one to four gases with a wide range of sensor options. Draw samples from up to 100 feet with an optional, integrated sampling pump for confined spaces, or take advantage of the extended-range battery for up to 20 hours without the pump. A safety orange overmold increases visibility and safety in the field. If the gas detection needs are temporary, rental options are ideal for shutdown or turnaround applications. It is docking station compatible and iNet ready. **800/338-3287; www.indsci.com.**



Ventis MX4 multi-gas monitor from Industrial Scientific

MIL-RAM TECHNOLOGY TA-2100

The TA-2100 smarter gas detector with large graphics display from Mil-Ram Technology provides user-friendly data, bar graphs, instructions, advanced diagnostics, continuous onboard systems monitoring and eliminates shorthand, coded messages. It has a programmable calibration reminder, and detects toxic gases, LEL, VOC and oxygen, among hundreds of different gases and vapors using several sensor technologies, including electrochemical, catalytic LEL, infrared, photoionization (PID) and solid-state. Its continuous advanced diagnostics meet SIL 2 compliance. **888/464-5726; www.mil-ram.com.**



TA-2100 gas detector from Mil-Ram Technology

NEXTTEQ GASTEC DETECTOR TUBE SYSTEM

Gastec pumps and detector tubes from Nextteq precisely measure gases and vapors in over 600 applications, making it valuable for gas detection and measurement as well as detecting leaks and fugitive emissions. The pump is easy to use, lightweight and rugged. Its one-stroke

piston action provides reliable operation with no partial samples. The Thermal Ring provides on-the-spot measurement of ambient temperature for tests that require temperature correction. The direct-read length-of-stain tubes offer distinct lines of demarcation for easier viewing. Detector Tubes are intrinsically safe and always ready to use anytime, anywhere. They can measure many substances that can't be measured with electronic gas detection devices. **877/312-2333; www.nextteq.com.**



Gastec pumps and detector tubes from Nextteq



Gas detectors from Sensor Electronics

SENSOR ELECTRONICS GAS DETECTOR

Gas detectors from Sensor Electronics react immediately to dangerous levels of hydrogen sulfide, methane, sulfur dioxide or chlorine. Each stand-alone detector links to its own compact transmitter fitted with LEDs that glow green so long as gas levels are safe. If levels increase, LEDs change to amber, then red. Gas levels — in ppm or percentages — are shown on digital readouts. The transmitter can be mounted with the detector or up to 1,000 feet away, and checks for trouble anywhere in the system, indicating what's wrong where on a read-out panel. They can be operated in corrosive atmospheres, ignore temperature/humidity extremes, and aren't affected by dust, dirt, moisture or oily aerosols. Each is factory-calibrated for its specific gas, with operating life measured in years. Plug-in sensor modules mean change-over in minutes, eliminating on-site calibration and checkout. **800/285-3651; www.sensorelectronics.com.**

Meters

CHALLENGE TECHNOLOGY ODM-100

The ODM-100 oxygen demand monitor from Challenge Technology can provide early upset detection, up-to-the-minute loading information, trend and history analysis in industrial pre-treatment and municipal applications. It provides real-time data of oxygen demand at any point in a plant process. The rugged, rail-mounted unit can quickly and easily be installed for a full analysis of the effects that influent is having on biomass. It operates in continuous or sequential batch mode for optimum oxygen demand data. It is SCADA ready, and can be used to screen trucked-in waste. **479/419-0708; www.challenge-sys.com.**



ODM-100 oxygen demand monitor from Challenge Technology

IN-SITU AQUA TROLL 600 MULTIPARAMETER SONDE

Whether establishing baseline conditions in reservoirs or monitoring sentinel parameters for source water quality impacts from algal blooms, pollution or storm events, the Aqua TROLL 600 Multiparameter Sonde from In-Situ offers water quality and quantity measurements in a single probe. Customizable sensor options combined with long-lasting internal power and a corrosion-resistant design make it ideal for spot-checking, sampling and long-term groundwater or surface water deployments. Fast response makes it ideal for vertical profiling in dynamic water conditions. Estab-



Aqua TROLL 600 Multiparameter Sonde from In-Situ

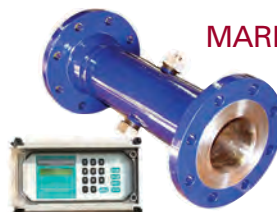
lish an early warning system to detect and address potentially harmful water quality issues with real-time telemetry and data services options. **800/446-7488; www.in-situ.com.**

KRUGER USA SUPERIOR TUNING AND CONTROL (STAC)

Superior Tuning And Control (STAC), a real-time biological nutrient removal control for phased isolation ditch (PID) technologies from Kruger USA uses online monitoring of nitrate and ammonia to control the phase length in response to incoming loading. It monitors orthophosphate, aiding in the control of chemical dosing for phosphorus removal. Switching from fixed to variable-phase length control allows for continuous and automatic optimization of the alternating anoxic-aerobic pattern of BIO-DENITRO and BIO-DENIPHO plants. It has been proven at full-scale plants that effluent nitrogen concentrations can be significantly reduced by controlling phase durations based on real-time measurements of ammonia and nitrate. It allows for an overall plant improvement, resulting in lower average effluent total nitrogen, less energy consumption and the ability to increase treatment capacity. **919/677-8310; www.krugersusa.com.**



Superior Tuning And Control (STAC) from Kruger USA



MARKLAND SPECIALTY ENGINEERING SUSPENDED SOLIDS DENSITY METER

Suspended Solids Density Meter from Markland Specialty Engineering

The Suspended Solids Density Meter from Markland Specialty Engineering provides real-time knowledge of sludge/silt/RAS concentrations in pipes, tanks and clarifiers. It allows users to program under-flow pumps to shut off before bio-solids density becomes too thin and optimize dosing for preferred feed density and enhanced dewatering. The ultrasonic sensor on the inline pipe spool-piece is non-intrusive. A throw-in style is also available, and can be used as a single point interface level detector, allowing operators to program de-sludge pumps to turn on when the rising sludge blanket contacts it. The percentage of suspended solids readings are unaffected by color. **855/873-7791; www.sludgecontrols.com.**

MATCHPOINT HYDREKA DOPPLER VELOCITY PROBE

The Hydreka Doppler Velocity Probe (DVP), distributed by Matchpoint, measures uni- or bi-directional flows in open channel applications, even in very shallow water. The unit is IP68 as well as ATEX and NEMA6 certified. With RS232 or RS485 Modbus communication and low power consumption, it can be connected to most logging devices or directly into a SCADA system. It measures both temperature and speed and has integrated sound correction for increased accuracy. It is compatible with MainFlo units when a complete system is required. **910/509-7225; www.matchpointinc.us.**



Hydreka Doppler Velocity Probe (DVP), distributed by Matchpoint

McCROMETER V-CONE FLOW METER

The V-Cone Flow Meter from McCrometer conditions flow in the pipe to ensure accurate, reliable dP flow measurement in any environment. It reduces the upstream/downstream straight pipe run required by orifice plates and venturi tubes by up to 70 percent, creating a cost savings in materials and installation labor that reduce FPSO vessel tonnage and the footprint of subsea modules. Using less pipe and reducing

total weight also simplifies vessel balancing, making it easier to find the optimal location for flowmeter installation. It provides a stable flow profile for reliable measurement, featuring accuracy of plus-or-minus 0.5 percent of actual flow and repeatability of plus-or-minus 0.1 percent over the entire range. It is ideal for the measurement of liquid, steam or gas, and is available for line sizes from 1/2 inch to 150 inches. Its no-moving-parts design provides a rugged instrument.



**V-Cone Flow Meter
from McCrometer**

800/220-2279; www.mccrometer.com.



**SmartPD meter from
Niagara Meters**

NIAGARA METERS SMARTPD

The SmartPD meter from Niagara Meters is a digital, volumetric meter available in nutating disc (SND) and oscillating piston (SOP) models. It is two-wire loop powered and measures volume and flow rate. It has 4-20mA output with HART communication to allow for flexibility in applications. Various line sizes and base materials are available. Remote options are available up to 50 feet for high-tem-

perature applications or when access to the meter for readings is not convenient. 800/778-9251; www.niagarameters.com.

OTEK CORPORATION NTM-9

The NTM-9 digital bar graph meter from Otek Corporation is a form, fit and function replacement for analog or digital bar graph meters. The combination of modern, low-power LED technology along with a signal-loop-powered design offers low power consumption, consuming 1 percent of the power of a digital panel meter. There is no need for an external power supply, as the unit can be powered from the 4-20mA signal loop or AC/DC signal as long as the signal can supply more than 10 MW. It is hot plug installable, with isolated serial I/O and alarms. The unit is customizable for specific input, output or mathematical functions, and relays and analog output are available on powered models. 520/748-7900; www.otekcorp.com.



**NTM-9 digital bar graph
meter from Otek Corporation**



**InnovaMass 240i flowmeters
from Sierra Instruments**

SIERRA INSTRUMENTS INNOVAMASS 240I

InnovaMass 240i inline vortex mass flowmeters from Sierra Instruments are designed for precise flow energy management in gas, liquid and steam applications. They can measure up to five variables — volumetric flow, mass flow, density, pressure and temperature. The Raptor II operating system enables precise flow measurement, while FloPro software improves point-velocity accuracy and the onboard Smart Interface Portal creates

easy-to-use field diagnostics, validation and adjustment. 800/866-0200; www.sierrainstruments.com.

Meter Reading Equipment

SMARTPHONE METER READING

The SmartPhone Meter Reading System leverages the wide-

spread use and power of smartphones, allowing utilities of all sizes and utility types to read their meters faster, easier and less expensively. It allows users to get routes downloaded from anywhere, and upload readings, photos, GPS and other data in real time. Improve customer service by providing 100 percent validated reading reports. 972/234-5000; www.smartphonemeterreading.com.



**SmartPhone Meter
Reading System**

Process Control Equipment



**Model R82 radar transmitter
from Magnetrol**

MAGNETROL MODEL R82

The Model R82 loop-powered radar transmitter from Magnetrol brings 26 GHz radar performance to everyday applications. Applications that have been typically considered for ultrasonic level control can use its radar technology. The electronics are housed in a compact, single-compartment cast-aluminum or Lexan housing. It measures effectively even when atmospheres above the liquid are saturated with

vapor. Pulse burst technology and advanced signal processing manage common distur-

bances such as false echoes caused by obstructions, multi-path reflections from tank sidewalls or turbulence caused by agitators, aggressive chemicals or aerators. 630/969-4000; www.magnetrol.com.

SCADA Systems

LOGIC BEACH INTELLILOGGER

The cellular-network-connected IntelliLogger system from Logic Beach enables performance profiling and operational monitoring of remote equipment, processes and systems. Integral analog and digital inputs, along with flexible connectivity to Modbus RTU Slave devices provide versatility for applications including pump station monitoring, flow and pressure studies, and audits for energy reduction. Sampled data can be stored locally for later download as well as reported via FTP to a remote server for further processing. Emails with embedded current values can be sent to a phone or desk, triggered by alarm conditions or for periodic update. Included HyperWare-II software provides versatility with quick and intuitive graphic icon-based programming. 619/698-3300; www.logicbeach.com.



**IntelliLogger system
from Logic Beach**



**TC mGuard from
Phoenix Contact**

PHOENIX CONTACT TC mGUARD

The TC mGuard from Phoenix Contact leverages cellular networks, such as Verizon and AT&T, to provide secure remote communications wherever a wired connection is not possible. For remote maintenance and support, it connects through the mGuard Secure Cloud service, providing OEMs, machine builders and system integrators access to service their equipment easily and avoid heavy travel expenses. The combination of cellular networks and a virtual private network

ensures a secure solution for remote maintenance and support. For secure SCADA, it offers a solution to customers that have a higher concern for security and availability of their sites. Features such as an active

firewall, VPN technology, network redundancy and support for multiple carriers under one part number ensure high availability and secure applications. **800/888-7388; www.phoenixcontact.com.**

SENSAPHONE SAT4D

The SAT4D satellite-based monitoring system from Sensaphone delivers immediate alerts of changes in conditions at pumps, wells and storage facilities located in areas without a phone line, Ethernet connection or cellular service. It can monitor virtually any critical condition 24/7, including security and power status. When an alarm occurs, the system sends notification to up to eight telephone numbers and six email or text messages. It is self-powered and can operate for over three years on its replaceable battery. GPS technology pinpoints the location and status of equipment being monitored. Each unit is sealed in an enclosure to protect it from harsh conditions. **888/369-4781; www.sensaphone.com.**



SAT4D monitoring system from Sensaphone

Sensors

ABB INC. - INSTRUMENTATION DO SYSTEM

Comprised of the ADS430 optical dissolved oxygen sensor and the AWT440 multichannel transmitter, the DO System from ABB



DO System from ABB Inc. - Instrumentation

Inc. - Instrumentation provides stability and accuracy for dissolved oxygen measurement in demanding process environments. The ADS430 has EZLink technology and users benefit from plug-and-play connectivity, automatic sensor recognition/set-up, predictive diagnostics and enhanced measurement accuracy. The design allows it to withstand the problems that can affect conventional membrane-

based sensors, such as abrasion, fouling or poisoning. The AWT440 universal transmitter enables connections of up to four Aztec 400 digital sensors, enabling monitoring at multiple points without the cost associated with purchasing and installing separate transmitters. **800/435-7365; www.abb.com/measurement.**

KAMAN INDUSTRIAL TECHNOLOGIES TELEMECANIQUE ULTRASONIC SENSORS

Telemecanique Ultrasonic Sensors, distributed by Kaman Industrial Technologies, are ideal for starting and stopping a pump or opening and closing a valve for exact tank level control. Ultrasonic technology allows for discrete or analog level control in vessels, tanks, hoppers, bins and reservoirs of liquid or dry bulk products. The sensing range is not affected by color changes in material. They measure the top height of the material in the tank and automatically compensate for tank level errors caused by material temperature variations. The OsiSense XX Series of smart dual-level sensors offers sensing ranges of up to 26 feet. The tank level range is field adjustable. The output type, response time and other functions can be adjusted to satisfy unique requirements. **800/526-2626; www.kamandirect.com.**



Telemecanique Ultrasonic Sensors, distributed by Kaman Industrial Technologies

KELLER AMERICA VALUELINE

The Valueline pressure transmitter from Keller America uses microprocessor technology to provide Total Error Band (TEB) accuracy, with fully conditioned analog output over a wide, compensated temperature range. Available with a choice of electrical connections, custom pressure ranges and voltage or current outputs, it integrates into new and existing systems, including PLC, VFD, SCADA and most commercially available displays and controllers. When equipped with a 4-20 mA analog output, it includes guaranteed lightning protection. Internal circuitry protects it from fast-rising transients. **877/253-5537; www.kelleramerica.com.**



Valueline pressure transmitter from Keller America

SENSOREX S270 SERIES

S270 Series pH sensors from Sensorex provide accurate pH measurement in plant water/wastewater treatment, chemical, food production and other process environments. Economical and easy to clean, the pH



S270 Series pH sensors from Sensorex

sensors are compatible with virtually all commercially available transmitters and controllers, including the Sensorex TX100, 2000 or 3000 pH/ORP Transmitter family. They are available in a range of configurations to meet the needs of both industrial and municipal end users. Either spherical (S271CD) or flat (S272CD) pH measurement surfaces are available, providing accurate measurement over a

range of 0 to 14 pH. They are constructed with chemical-resistant Ryton sensor bodies and use a polymer sensor reference gel. With integral 3/4-inch NPT threads, the sensors can be installed inline in any standard 3/4-inch flow-through pipe tee, or submerged directly in a process tank. **714/895-4344; www.sensorex.com.**

UNITED ELECTRIC CONTROLS ONE SERIES 1XTXSW

The One Series 1XTXSW transmitter line from United Electric Controls integrates HART 7 compatible 4-20 mA output and two HART programmable solid-state relays for monitoring temperature or pressure in safety, alarm and emergency shutdown applications. It allows operators to manage instrumentation assets using a centralized asset management solution. The smart transmitters include "I am Working" (IAW) discrete diagnostic output for remote monitoring from a PLC or DCS. A



One Series 1XTXSW transmitter line from United Electric Controls

large backlit display provides process values, setpoint programming and health and switch status notifications. The hybrid transmitter switch effectively replaces a gauge, a switch and a transmitter, requiring only one connection to the process. It has no moving parts, which provides a repeatable and adjustable deadband switch suited for applications with high cycle rates. **617/926-1000; www.ueonline.com.**

VIATRAN DETACHABLE LEVEL TRANSMITTER

Viatran Detachable Level Transmitters allow for a quick sensor head swap without the removal of the entire installed cable run. No special tools are needed. These submersible level transmitters are available in six models to meet a wide range of applications. They have detachable sensor heads, submersible ranges from 0 to 8 inches



Viatran Detachable Level Transmitters

W.C. to 0 to 835 feet W.C., 316L stainless steel or PVC housings for aggressive media, an IP68 rating, and accuracy to 0.1 percent (combined Non-Linearity, Hysteresis and Repeatability) available. Applications include SCADA systems, water and wastewater, lift stations, ponds, wet wells, reservoirs, dams, irrigation, inground and above-ground tanks. **800/688-0030; www.viatran.com.**

Security Equipment/Systems

INDUSTRIAL VIDEO & CONTROL LONGWATCH

Longwatch from Industrial Video & Control is a video monitoring solution that helps municipalities improve security, reduce vandalism and protect assets at remote sites. It integrates seamlessly with SCADA/HMI systems, allowing personnel to view visual information alongside critical process data for efficiency and fast response to events. The software automatically links event and historical process data to recorded video so personnel can track video of operations based on lot number, batch ID or process step. Process data is overlaid directly on the video image in real time to provide a broad, overall picture of what's occurring. It can capture HMI,



Longwatch from Industrial Video & Control

SCADA and DCS displays and provide live and recorded video of what was on the operator's monitor at any point in time. It can be bundled with industrial video cameras to offer a complete customizable video solution. **781/255-7400; www.ivcco.com.**

OSPREY INFORMATICS OSPREY EDGE

The Osprey Edge portable, low-power camera from Osprey Informatics connects seamlessly to the Osprey Reach cloud-based visual monitoring platform for industrial operations. It is designed for rapid deployment, without the need for professional installation services. To activate, the customer simply powers the camera on and it connects automatically over the cellular network, providing authorized personnel with immediate online access to photos from the camera, along with activity-based alerts and reports. Its small form factor and ability to run on standard AA batteries means it can be easily moved to any location as a customer's needs change. It allows operators to reduce the frequency of site visits and prioritize work activity, leading to significant productivity gains. It can also be deployed to detect and capture vehicle activity, using the camera's passive infrared motion detection combined with visual alerts. **403/460-4779; www.ospreyinformatics.com. tpo**



Osprey Edge camera from Osprey Informatics

FREE INFO ON THESE PRODUCTS — RETURN FOLLOWING FORM

For FREE information on these products, check the box(es) below:

Analytical Instrumentation

- ☐ ASA Analytics ChemScan mini Fe and mini Mn single parameter analyzers
- ☐ CHEMetrics V-3000 Multi-Analyte Photometer
- ☐ Circuit Insights Loop Slooth Exciter/Detector
- ☐ Electro Chemical Devices D090 Trace D02 Analyzer
- ☐ Emerson Process Management, Rosemount T56 Clarity II Turbidimeter
- ☐ Heyl USA Testomat EVO TH field-measuring instrument
- ☐ Lovibond MD 100 chlorine analyzer
- ☐ Micrometrix Streaming Current Analyzer (Model SCA)
- ☐ SWAN Analytical AMI SAC 254 Analyzer

Controllers

- ☐ AdEdge Water Technologies InGenius control panels
- ☐ Burkert Fluid Control Systems Type 8619 multifunction transmitter/controller
- ☐ Cummins Power Generation PowerCommand remote monitoring equipment
- ☐ Eaton Power Xpert C445 intelligent motor management and protection relay
- ☐ Industrial Control Direct IMO iView HMI
- ☐ Murphy by Enovation Controls PowerCore MPC-20 Controller
- ☐ PRIMEX ECO Smart Station control system
- ☐ Siemens Industry HydroRanger 200 ultrasonic controller

Data Loggers

- ☐ CAS DataLoggers MX2001 Bluetooth data logger
- ☐ Fluid Conservation Systems PermaNet+

Flow Control and Software

- ☐ Blue-White Industries BW DIGI-METER Micro-Flo
- ☐ Evoqua Water Technologies Link2Site Web Monitoring
- ☐ Greyline Instruments OCF 5.0
- ☐ KROHNE OPTISONIC 7300 flowmeter
- ☐ LabLite CMT (Calibration, Maintenance and Training) program
- ☐ Noncontact Meters NCM Series time flow and energy meter
- ☐ Smith & Loveless QUICKSMART system controls
- ☐ Spire Metering Technology RH40 portable flowmeter
- ☐ Universal Flow Monitors CoolPoint flowmeters

Gas/Odor/Leak Detection Equipment

- ☐ Acme Engineering Products PM Aware
- ☐ AMETEK Drexelbrook Clear Line Fluid Detector
- ☐ Analytical Technology Q46N Free Ammonia Monitor
- ☐ Arizona Instrument Jerome J605 hydrogen sulfide analyzer
- ☐ Baseline a MOCN company Series 9000 total hydrocarbon analyzer
- ☐ Eagle Microsystems Model GD-1000 Premier Series gas detector
- ☐ Global Treat GA-180 gas alarm
- ☐ Industrial Scientific Ventis MX4
- ☐ Mil-Ram Technology TA-2100 smarter gas detector
- ☐ Nextteq Gastec pumps and detector tubes
- ☐ Sensor Electronics gas detectors

Meters

- ☐ Challenge Technology ODM-100 oxygen demand monitor
- ☐ In-Situ Aqua TROLL 600 Multiparameter Sonde
- ☐ Kruger USA Superior Tuning And Control (STAC) biological nutrient removal control
- ☐ Markland Specialty Engineering Suspended Solids Density Meter
- ☐ Matchpoint Hydreka Doppler Velocity Probe (DVP)
- ☐ McCrometer V-Cone Flow Meter
- ☐ Niagara Meters SmartPD meter
- ☐ Otek Corporation NTM-9 digital bar graph meter
- ☐ Sierra Instruments InnovaMass 240i flowmeters

Meter Reading Equipment

- ☐ SmartPhone Meter Reading System

Process Control Equipment

- ☐ Magnetrol Model R82 radar transmitter

SCADA Systems

- ☐ Logic Beach IntelliLogger system
- ☐ Phoenix Contact TC mGuard
- ☐ Sensaphone SAT4D monitoring system

Sensors

- ☐ ABB Inc. - Instrumentation DO System
- ☐ Kaman Industrial Technologies Telemechanique Ultrasonic Sensors
- ☐ Keller America Valueline pressure transmitter
- ☐ Sensorex S270 Series pH sensors
- ☐ United Electric Controls One Series 1XTXSW transmitter line
- ☐ Viatran Detachable Level Transmitter

Security Equipment/Systems

- ☐ Industrial Video & Control Longwatch video monitoring solution
- ☐ Osprey Informatics Osprey Edge camera

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00416

Valve positioner provides boost to effluent quality

Problem

An Illinois wastewater treatment plant needed to improve the valve position on each of its three drainage doors and then send the information to its Emerson Process Delta V plant control system for monitoring. Because each drainage door had different opening characteristics, plant personnel needed to modify the analog output signal for each unit. To complicate matters, the valve actuator housings were extremely small and located in extremely challenging environments.

Solution

The plant purchased field-programmable **Kinax 2W2 Angular Position Transmitters** from **Absolute Process Instruments**. Each transmitter is 1.95 inches in diameter and 1.10 inches deep, small enough to be installed in the actuator housings. They use relative capacitive sensing technology and create no drag on the valve gearing.



RESULT

The transmitters give an accurate and repeatable linear 4-20mA signal for the valve position that easily interfaces with the control system. This allows the operators to achieve more accurate flow control and improve effluent quality. 800/942-0315; www.api-usa.com.

Electrical signature analysis helps detect faults

Problem

A five-stage vertical turbine pump overheated at a pump station that supplies drinking water to Henderson, Nevada.

Solution

The in-house predictive maintenance team investigated five pump motors, using hand-held **ALL-TEST Pro 31** and **ALL-TEST IV Pro de-energized motor-testing instruments** to reveal potential winding faults and indicate rotor problems. "The extensive rotor testing indicated there were issues with Motors 1 and 5," says Alex Panattoni, control systems technician. "We asked ALL-TEST Pro to perform on-site electrical signature analysis with their energized testing instrument, and at the same time we had a third party perform vibration analysis. The vibration analysis did not show any rotor problems, but the ESA data taken with the On-Line II indicated several rotor bars could have been broken."

RESULT

Motor 5 was pulled, and the repair shop confirmed that 30 percent of the aluminum rotor bars were broken. Motors 1 and 5 were rebuilt with copper rotor bars, and another round of testing was performed after re-installation. The ATPOL II, which is both a motor analyzer and a power quality analyzer, provided the maintenance team with ESA data, which helped them to proactively avoid motor failure. 800/952-8776; www.alltestpro.com.

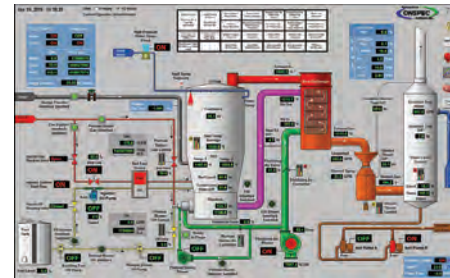
Single direction communication software helps city save time

Problem

Veolia Water Ireland saw substantial value in allowing experienced and knowledgeable select personnel viewing access to a water facility while not on site. Security was paramount.

Solution

The system administrators installed **Secure Plant Explorer** from **Automation ONSPEC Software**. A separate computer allows remote viewing of plant floor data. It uses a single direction communication protocol to receive updates in real time from the plant floor SCADA computer. This isolates the plant floor from outside attack.



RESULT

Key employees were given protected remote access to the PC for receiving plant floor updates, allowing them to more effectively supervise the facility. 888/362-5867; www.automationonspec.com.

Network upgrade offers self-healing capabilities

Problem

In 2008, the City of Monroe, North Carolina, needed to add fast, automatic self-healing capabilities to its SCADA fiber network. "Our distribution network spans a 40-mile area, including electric and gas transmission plus water control and monitoring," says Teresa McBrayer, representative with Energy Services at the city.

Solution

The city upgraded its existing **H&L Instruments** 561-based Fiber-Loop II network to the **570-based FiberLoop III network**. The 570 system is configured in a loop using two redundant masters 15 miles apart, with four 22-mile spans between masters. There were also 2-mile and 15-mile radials out to water towers/lift stations. The Model 570 offers 126 communication channels, remote master/slave configuration over the network via FiberPanel software, and point-to-point communication support.



RESULT

"After upgrading the network, we experienced two simultaneous fiber cable dig-ins," says McBrayer. "The 570s instantaneously switched from single-loop mode to two radial networks. The Fiber-Panel alarms sounded, and we saw immediately where to dispatch crews to begin repairs. However, due to the fast self-healing, we never lost a beat in monitoring and control of our SCADA network." 603/964-1818; www.hlinstruments.com.

Total suspended solids monitoring helps stabilize process

Problem

Inconsistent secondary clarifier performance limited effluent quality at an advanced wastewater treatment facility in Kansas. The operations engineer sought to achieve the lowest TSS and most consistent effluent quality by controlling the solids retention time. To implement the solution, the plant needed a new monitoring system for continuous online measurement of mixed liquor suspended solids (MLSS) and return activated sludge (RAS).

Solution

After a two-month comparative demonstration of three monitoring systems in an aeration basin, the plant team chose the **IQ SensorNet system** from **YSI, a xylem brand**, for having the highest accuracy and the least maintenance due to a self-cleaning system. TSS sensors were installed at the oxic end of each of the four treatment trains to monitor MLSS. Insertion-mounted ViSolid sensors were installed into RAS pipelines.



RESULT

The monitoring system has been operating reliably with minimal maintenance. Two facilities owned by the utility have earned Platinum Awards from the National Association of Clean Water Agencies. **800/765-4974; www.ysi.com.**

Tool helps department build mobile operation interface

Problem

The Water and Sewer Department in Union Township, Michigan, used remote desktop software to monitor flow rates, tank levels, pump status and other data from wells, pumping stations and water treatment plants. The program eliminated traveling to collect data manually, but it required a PC running HMI software 24/7 at each monitored location. Michael Dearing, superintendent, and Shaun McBride, chief water operator, wanted a reliable and less complicated monitoring solution using mobile devices like smartphones and tablets.

Solution

They selected **groov** from **Opto 22** to help in building mobile operator interfaces and apps for control systems. Running at department headquarters, it securely connects to and exchanges data with control systems and equipment at remote sites, enabling operators to use a Web browser or an app on smartphones, tablets, PCs and smart TVs to connect to control systems and devices without having to write or debug code.

RESULT

Staff members use groov on their smartphones and tablets from any location to monitor site equipment status, process measurements, tank levels and other information. For wastewater, they monitor flows, power consumption, tank levels and key metrics like dissolved oxygen, pH and turbidity. "Considering the limited time we had between other projects, we were surprised that we were up and running so quickly with a new product," McBride says. **800/321-6786; www.groov.com.**

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FREE INFO - SEE ADVERTISER INDEX

Instrumentation helps city reduce disinfection chemical costs

Problem

With rising disinfection chemical costs, the City of Corvallis, Oregon, sought a solution to monitor various parameters, including *E. coli*.

Solution

The city chose **LiquidD Stations** from **ZAPS Technologies**. Using real-time monitoring, plant operators can close the treatment process control loop around the instantaneous *E. coli* levels to pace chlorine addition on time scales measured in minutes instead of days and stop over-chlorinating. The system uses hybrid multispectral analysis, an optical approach specifically for online monitoring. It uses no chemicals or membranes, requires no calibration, has low maintenance and produces no waste.



RESULT

Real-time *E. coli* data allowed the staff to optimize treatment to actual conditions with confidence, while improving oversight. In 2013, the annual chemical savings from the changes totaled \$75,000 per year, or 62 percent of the previous annual chemical budget. **866/390-9387; www.zapstechnologies.com.**

(continued)

Aquaculture monitoring solution offers Web control

Problem

Cooke Aquaculture is a processor of Atlantic salmon with more than 100 farm sites off the Northeast coast. At the Oak Bay Hatchery in New Brunswick, Cooke hatches eggs and raises brood stock for shipment to other freshwater facilities. The pH and flow of the hatchery water must be tightly controlled to maintain the health of the fry. The hatchery has always used sensors and controllers connected to PLCs, but there was no way to monitor outside the building. The facility needed a controller with a Web interface.

Solution

Mitchell Dickie, project manager, chose the **AquaMetrix 2300** from **Water Analytics** with total Web control, inputs for four analog and three flow sensors, four relays, data logging and email notifications. He set up two in the hatchery. For pH control, he used an AquaMetrix P65C8 probe, and for flow, he used a paddle wheel. He found that configuring the unit was fast. "I'm not a PLC programmer, and being able to configure it by following the wizard made setup easy," he says.



RESULT

The hatchery has cut down on chemical use and maintained the pH within the optimal range. "Anytime, I can just go to my phone and check on the tanks. I'm in a comfort zone I've never had before," says Dickie. Data logging allows the staff to troubleshoot problems. Recently they noted pH fluctuations that only became obvious when they looked at data logs. They determined that the pH fluctuated during feed times, and from then on were able to control pH more effectively. **978/749-9949; www.wateranalytics.net.**

Web platform helps simplify monitoring data

Problem

The City of Richmond, California, was having trouble organizing its environmental monitoring data into a single Web platform. The monitoring network consisted of meters from Isco, Telog and ADS. Inability to house all data in one platform made reporting and graphing tedious.

Solution

The city installed the **FlowWorks** platform, working with George Elaro and Infrastructure Engineering Corporation (IEC).

RESULT

FlowWorks helped the city to bring its data into one platform and easily run reports and generate graphs. The engineering and management teams now have access to all the flow monitors in the system along with SCADA data from the wastewater treatment plant. As a result, combined sewer overflows and potential spills are being identified by a system with alarm capabilities. **206/859-6999; www.flowworks.com.**

Plant relies on thermal flowmeter for gas blending process

Problem

The Rahway Valley (New Jersey) Sewerage Authority embarked on a cogeneration project using large 1.5 MW engines fueled by digester and natural gas to generate power for the facility. The engine control system required independent measurement of both gases.

Solution

RVSA engineers installed **Model ST98 thermal mass flowmeters** from **FCI - Fluid Component International** on the digester gas and natural gas lines. The meters can be placed on 4- and 6-inch lines and measure flows up to 500 scfm. Temperature conditions ranged from 50 to 100 degrees F at a pressure of 60 psig.



RESULT

The meter flow elements have no moving parts and provide direct mass flow measurement with a single process penetration. They are not susceptible to the engines' vibration and operate with no issues. **800/854-1993; www.fluidcomponents.com. tpo**



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1. LARSON ELECTRONICS LED LIGHT STRING

The temporary construction LED light string set (WAL-SL-5-PAR38-LED-12.3-TLP) from Larson Electronics features five 25-watt lamps with 10 feet of 12/3 SJTW cable between each lamp. The light string provides 12,500 lumens of light over 500,000 hours and is configured to operate with 120 volts AC to 277 volts AC or 12-24 volts DC without modification. The lamps are suitable for wet areas and are impact-resistant. **800/369-6671; www.magnalight.com.**

2. NETZSCH PROGRESSING CAVITY PUMP

The NEMO BF progressing cavity pump from NETZSCH Pumps North America is designed for highly viscous to compacted media. The add-on asynchronous bridge preventing module (aBP-Module) prevents the formation of lumps that can cause bridge building in a sewage sludge conveyance system, reducing or eliminating operational shutdowns in wastewater treatment plants. **610/363-8010; www.netzschusa.com.**

3. SHERWIN-WILLIAMS CORROSION-PROTECTION EPOXY

Dura-Plate 6100 semi-structural epoxy from Sherwin-Williams Protective & Marine Coatings is a 100 percent solids high build, high physical performance, amine-cured epoxy designed for corrosion protection of concrete and steel in municipal and industrial wastewater treatment facilities. At 77 degrees F, the coating is dry to the touch in 30 minutes, cures for immersion in 12 hours and can be applied in temperatures down to 50 degrees F. Available in off-white, the ultra-low-VOC, spray-applied resinous coating can provide film builds of 125-plus mils in a single coat. **800/524-5979; www.sherwin.com/protective.**

4. WANNER ENGINEERING SEAL-LESS PUMP

The T80100 Hydra-Cell seal-less pump from Wanner Engineering delivers flow rates up to 96 gpm at pressures up to 1,500 psi. Applications include reverse osmosis in water and wastewater treatment plants. The packing-free design eliminates the need for external lubrication and maintenance, as well as plunger wear problems. The pumps can run dry and

will operate with a closed or blocked suction line. Hydraulically balanced diaphragms enable the pump to handle abrasive fluids. **800/369-4172; www.hydra-cell.com.**

5. FRANKLIN ELECTRIC GP SERIES GRINDER PUMP

The Little Giant GP Series of grinder pump models from Franklin Electric operate across voltages ranging from 208 to 230 volts. The GP-A (automatic) and GP-M (manual) are designed to handle low-pressure sewage applications, utilizing 414,000 cuts per minute. The pumps have a non-clogging impeller to handle sewage slurries and a shut-off head of 130 feet. Both models have a 2 hp single-phase, 3,450 rpm with capacitor start/run motor and built-in overload protection. **260/824-2900; www.franklinwater.com.**

6. STAFFORD RIGID SHAFT COUPLINGS AND ADAPTERS

Rigid shaft couplings and shaft adapters from Stafford Manufacturing Corp. are designed to join shafts of different sizes and configurations, extend shafts and provide mating options. Made from steel, stainless steel, aluminum and brass, the couplings and adapters are available in a variety of configurations. Suitable for use with pumps, mixers, conveyors and related equipment, the shaft couplings are available in one-, two- and three-piece designs, with or without keyways. The shaft adapters are available in step-up and step-down configurations, with or without keyways. **800/695-5551; www.staffordmfg.com.**

7. KUNTZE INSTRUMENTS DISINFECTANT MEASURING SYSTEM

The Krypton Multi disinfection and pH system from Kuntze Instruments includes instrument, sensors, assembly and wiring. Designed for measuring and control in industrial applications, the Argon Stabiflow integrated modular assembly ensures a constant flow of approximately 30 L/h. Measuring input can be configured to measure free chlorine, chlorine dioxide, ozone or hydrogen peroxide. **724/339-8510; www.kuntzeinstruments.com. tpo**

water: product spotlight

Industrial Test Systems photometer tests over 40 water-quality parameters

By Ed Wodalski



The **eXact iDip Smart Photometer System** from **Industrial Test Systems** is designed for quick and accurate water-quality testing in the field or in the lab. The hand-held meter pairs with a smartphone or tablet, enabling the user to test over 40 water-quality parameters, including iron and manganese, through a four-step process.

“Let’s say your typical testing procedure calls for free and total chlorine, calcium hardness and pH,” says Andrew Roberts, assistant sales manager, Industrial Test Systems. “However, something new has been introduced where you now need to test for hydrogen peroxide, iron, copper and phosphate. Instead of having to source a new test kit and learn different testing methods, all you need to do is unlock the test with the app and purchase the reagent. The testing procedure for the most part is going to be the same. No training is required.”

The app-driven system operates on an iOS or Android platform and offers an array of capabilities, including GPS location, date/time tagging as well as the ability to email results or export a spreadsheet and map.

Two-way wireless communication with Bluetooth Smart (4.0) allows for instantaneous software updates, upgrades and customization. Using the eXact iDip app, data can be stored or shared in real time.

“Data management is a big part in the product,” Roberts says. “The application is a free download. It comes with four free tests: free and total chlorine, pH and alkalinity. Any of the other 40 tests have a one-time purchase of \$4.99 plus reagent. Reagent costs typically are between 8 1/2 and 16 cents a test.”

Designed to improve efficiency and reduce cost, the meter features Industrial Test System’s reagent strip technology. “Instead of using the meter with powders, tablets or liquid reagents, we dried the same chemistries onto a strip,” Roberts says. “This allows the dispersion of reagents to be less of a mess and less technical. You don’t need to count drops to ensure all the particulars have dissolved into the water sample.”

The photometer also meets the IP-67 waterproof standard.

“The unit is very rugged and can be used in wet environments,” he says. “It floats. There’s no glass or moving pieces, allowing it to be very useful on site.” **800/861-9712; www.sensafe.com.**

wastewater: product spotlight



Therma-Flite biosolids drying system offers affordable option to landfill disposal

By Ed Wodalski

The **SludgeBox modular, biosolids drying system** from **Therma-Flite** offers a lower cost option to landfill disposal. Designed to produce Class A biosolids, the pre-piped, pre-wired and factory-tested containerized system can be assembled and operational in three to four weeks.

“It takes our core technology and packages it in a way that makes it more modular, quick deploying and re-locatable,” says Peter Commerford, vice president of Thermo-Flite. “We can take the SludgeBox and put it anywhere at the treatment plant. It doesn’t require a building. It doesn’t require a contractor to come in and bid on the installation.”

Commerford says the drying system, which covers about 40 by 60 feet, enables treatment plants to completely process biosolids for less than \$40 a ton, reducing transportation and landfill disposal costs. A single SludgeBox can handle about 2 wet tons an hour. Multiple units can be combined to handle larger amounts. Leasing options are available.

“We can take in cake anywhere from 15 to 30 percent solids and discharge at 92 to 94 percent solids,” he says.

The system typically uses natural gas or diesel fuel to dry the sludge. Some facilities use electricity, methane from a landfill or digester gas, as well as various mixtures. Dried biosolids can be sold, used on municipal parks and playgrounds, offered to farmers or hauled to a landfill for less cost.

“Where we’re seeing the highest interest is in areas that have higher hauling costs; areas with higher rainfall,” Commerford says. “When you have more rainfall the soil typically can’t absorb the water as quickly. The concern with applying biosolids in those areas is the pathogens can get into the groundwater. Consequently, you have to haul it farther during certain times of the year. Urban areas are another area of interest where biosolids have to be hauled great distances. And the small footprint is a better fit than solar or composting.” **707/747-5949; www.therma-flite.com.**

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00416

people/awards

Steve Graceffa retired as the executive director of the Rock River (Illinois) Water Reclamation District. Graceffa joined the district in January 1970.

Lamont Larkins of St. Augustine, Illinois, was hired as wastewater treatment operator in Redgranite, Wisconsin. He replaces **Tom Markowski**, who retired after more than 20 years of employment with the village.

Clayton Putnam retired as superintendent of the Wilton (Maine) Water and Wastewater Departments.

Dean Nelson, superintendent of the Owatonna (Minnesota) Wastewater Treatment Plant, received the Dick Hagemeyer Award from the National Weather Service to mark 45 years as an NWS Cooperative Weather Observer.

The **Ellensburg Wastewater Treatment Facility** received an Outstanding Performance Award from the Washington State Department of Ecology.

The **Village of Bosque Farms Wastewater Treatment Plant** received the New Mexico Rural Wastewater Association Wastewater Treatment System of the Year award for consistent quality control and monitoring of effluent released to the Rio Grande.

Megan O'Brien was hired as community services manager for the wastewater division of the office of Macomb County (Michigan) Public Works Commission. She replaces **Mark Steenbergh**, who was promoted to operations manager of the wastewater division.

The **City of Tulsa (Oklahoma) Lower Bird Creek Wastewater Treatment Plant** received a Platinum Peak Performance Award from the National Association of Clean Water Agencies.

Edward Tadlock completed the Texas A&M Engineering Extension Service Certified Water Professional program.

Three Cape Fear Public Utility Authority staff members received 2015 awards from the North Carolina section AWWA and Water Environment Association. **Robert Daughtry**, collections system manager, received the Wastewater Collections Operator of the Year award. **Jim Tayson**, water distribution and construction manager, was named Water Distribution Operator of the Year. **Michael Richardson**, water resource manager, was the first individual recipient of the Disaster Preparedness Award.

John Montgomery, a businessman and native of Spartanburg, South Carolina, was elected chair of the city's Commission of Public Works. **Horace Littlejohn** was elected vice chair.

The Clarksburg Water Board named meter technician **John D'Anselmi** Employee of the Year. D'Anselmi has been instrumental in changing the utility's meters to remote read.

Graham Rich, chief executive officer of Central Arkansas Water in Little Rock, resigned to take a job in his home state of South Carolina.

Kathleen Yurchak was hired as director of operations and water utilities for the City of Pleasanton, California.

Michelle Klose was named director of utilities in the Public Works Department

events

April 3-6

Water Environment Federation Residuals and Biosolids Conference, Wisconsin Center, Milwaukee, Wisconsin. Visit www.wef.org or call 800/462-9420.

April 4-6

AWWA Financial Management: Cost of Service Rate-Making Seminar, Four Points By Sheraton Phoenix North, Arizona. Visit www.awwa.org.

April 10-12

Water Environment Association of Ontario Annual Conference, Scotiabank Convention Centre, Niagara Falls. Visit www.weao.org.

April 10-13

Alabama Water Environment Association Annual Technical Conference, Perdido Beach Resort, Orange Beach. Visit www.awea-al.com or call 205/330-0098.

April 18-20

Illinois Association of Water Pollution Control Operators Annual Conference, Crown Plaza, Springfield. Visit www.iawpco.org or call 815/303-3745.

April 18-21

Alaska Water Wastewater Management Association Annual Statewide Conference, Hotel Captain Cook, Anchorage. Visit www.awwma.org or call 907/561-9777.

April 19-22

Water Environment Association of Texas, Texas Water 2016, Fort Worth Convention Center. Visit www.weat.org.

April 20-21

Nebraska Water Environment Association Annual Great Plains Waste Management Conference, Embassy Suites, La Vista. Visit www.ne-wea.org.

April 20-22

Design-Build for Water/Wastewater Conference, sponsored by the Water Environment Federation and the Design-Build Institute of America, Charlotte (North Carolina) Convention Center. Visit www.wef.org or www.dbia.org.

April 24-27

Florida Water Environment Association, Florida Water Resources Conference, Gaylord Palms Resort, Kissimmee. Visit www.fwea.org.

April 26-29

California Water Environment Association Annual Conference, Santa Clara Convention Center and Hyatt Hotel. Visit www.cwea.org or call 510/382-7800, ext. 107.

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ment of Bismarck, North Dakota. She replaces **Keith Demke**, who retired.

Rob Schab, general manager of the Coos Bay-North Bend (Oregon) Water Board for 22 years, retired at the end of 2015. New general manager **Ivan Thomas** came from Asheville, North Carolina.

The **City of Cayce** received the South Carolina Area-Wide Optimization Program Award for the Cayce Water Treatment Plant.

industry news

Hayward CPVC product lines receive ABS approval

Hayward Flow Control received American Bureau of Shipping (ABS) product approvals for most of its CPVC thermoplastic flow control product lines. They include BFA Series bulkhead fittings, BFAS Series bulkhead fittings, BY Series butterfly valves, BYV Series butterfly valves, FLV Series (GFPP) filter vessels, SB Series basket strainers, SW Series swing check valves, TB Series True Union ball valves, TC Series True Union ball check valves, TW Series three-way ball valves, WCV Series wafer check valves and YS Series Y-strainers. **tpo**

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“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

An Original Environmentalist
WASTEWATER TREATMENT OPERATOR
Franklin County (Mo.) Water & Sewer District



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The **Advanced Oxidation Process (AOP) Water Treatment Facility at Tucson (Arizona) Water** won the 2015 Grand Prize in Design Award from the American Academy of Environmental Engineers and Scientists (AAEES). The city installed a new advanced oxidation process water treatment facility using six TrojanUVPhox units.

Jake Hahn, district technician at the Clermont Soil & Water Conservation District, was named Technician of the Year by the Water Management Association of Ohio.

The **Hillsdale Water Treatment Facility** in Gardner received a Quality Achievement Award from Oral Health Kansas and the Kansas Department of Health and Environment Bureau of Oral Health for its high-quality fluoridation practice.

The New England Water Environment Association presented **BettyAnne Rogers** with the 2015 Water Environment Federation Laboratory Analyst Excellence Award and named **Patrick Doyle** Operator of the Year. Both are longtime employees of the Warwick (Rhode Island) Sewer Authority.

The **City of Maryville Regional Wastewater Treatment Plant** received the inaugural M.L. Brickey Award for water/wastewater facilities from the Lower East Tennessee Section of the Tennessee Water and Wastewater Association. **Joe Head**, utility construction inspector supervisor, received the 2015 M.L. Brickey Distribution Operator Award.

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. **tpo**

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RoyCEU.com: We provide continuing education courses for water, wastewater and water distribution system operators. Log onto www.royceu.com and see our approved states and courses. Call 386-574-4307 for details. (oBM)

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EPOXIES: Apply underwater epoxies. Epoxy paints, putties, potable water resins. BBB member. Progressive Epoxy Polymers Inc 603-435-7199 epoxyproducts.com 24/7 support. (o05)

POSITIONS AVAILABLE

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Looking for a job in the water-wastewater industry? WATER DISTRICT JOBS, an online career resource, lists dozens of great career opportunities on its website. Job listings are updated daily. You can also post your resume so employers can find you. Visit www.WaterDistrictJobs.com for more information. (o05)



Matt Green
Operator
City of Loganville WWTP
Loganville, Ga.

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Matt Green, WWTP Operator for the City of Loganville, Georgia, trusts USABlueBook to get him what he needs. "I've been here at Loganville for seven years, and everything's always run real smoothly with you guys. You're good. Real good!"

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**"I think USABlueBook is great,
and everyone I talk to seems to
feel the same way I do."**

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