TREATMENT PLANT OPERATOR
tpo™
DEDICATED TO WASTEWATER & WATER TREATMENT PROFESSIONALS
tpomag.com
APRIL 2023

IN MY WORDS:
Comparing treatment costs | 38

Jeffrey Dorsey
Maintenance Manager, Water Operations
Detroit, Michigan

All According to Plan

JEFFREY DORSEY'S STRESS ON EQUIPMENT RELIABILITY PAYS BIG DIVIDENDS
16

HOW WE DO IT:
Controlling algae in Marysville, Ohio | 20

TECH TALK:
Three approaches to maintenance | 30

KELLER

WE MEASURE PRESSURE

- EXCELLENT TOTAL ERROR BAND ACCURACY
- CUSTOM RANGES AND CABLE LENGTHS
- DURABLE NON-STICK DIAPHRAGM
- GUARANTEED LIGHTNING PROTECTION
- ANALOG AND DIGITAL OUTPUT OPTIONS
- 2-YEAR WARRANTY
- 3 DAY LEAD TIME

LevelRat - Non-fouling wastewater level transmitter

877-2-KELLER
KELLERAMERICA.COM
SALES@KELLERAMERICA.COM

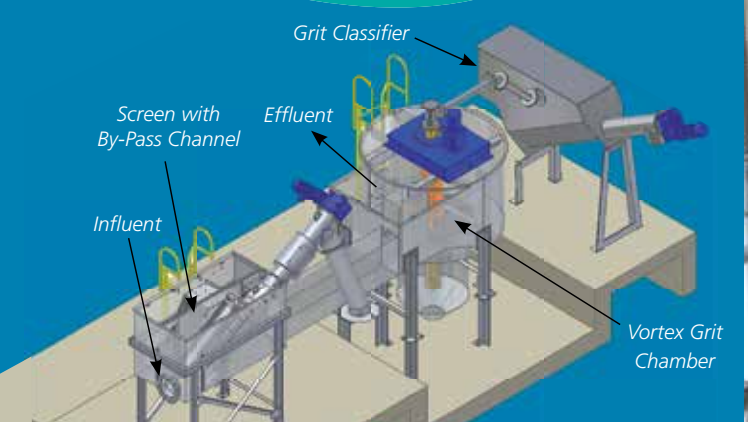
A BETTER SOLUTION WITH FLEXIBLE OPTIONS.

Our Headworks Packaged System – H-PAC® – combines our *Raptor*® or Hydronic T Screening product line with our SpiraGrit® Vortex Grit Chamber in an elevated pre-engineered headworks system. Capable of handling flows as high as 12 mgd, the H-PAC can be installed above or below ground and its compact design uses less space and costs less than other packaged systems. For more than 90 years, Lakeside has provided solutions for treatment plant designers and engineers. Lakeside's H-PAC offers the highest quality screens and grit removal systems, with the dependability and reliability expected of a trusted and proven leader in the industry. Contact us for a better solution!

For more information on how you can achieve Lakeside quality and performance, contact one of our experts at **630.837.5640**, email us at **sales@lakeside-equipment.com** or visit our website **www.lakeside-equipment.com**

LAKESIDE EQUIPMENT CORPORATION
Water Purification Since 1928

Cleaner Water for a Brighter Future®



Package Headworks Systems

Raptor® Complete Plant
H-PAC®

contents

April 2023

top performers

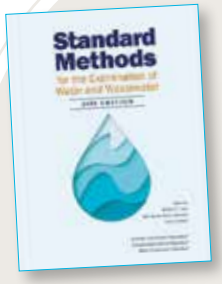
coming next month: May 2023 FOCUS: ACE Pre-Show Issue / Annual Company Directory

» Let's Be Clear: Doing What It Takes » TOP PERFORMERS – Wastewater Plant: Operator: Northeast Water Reclamation Facility, Clayton County, Georgia | Water Operator: Bob Lieble, Aurora (Illinois) Water Treatment Plant | Water Plant: Corkscrew Water Treatment Plant, Lee County, Florida » How We Do It: Blower upgrade in Paducah, Kentucky | In My Words: A new biosolids association for the Midwest | Sustainable Operations: Green stormwater infrastructure in Kansas City | Hearts and Minds: Water essay contest in Metro Atlanta | Technology Deep Dive: Ecosim unit with rotating drum containing fixed-film media

CORE&MAIN®

Count on Us for Your **Lab Supply** Needs

NATIONAL REACH. LOCAL EXPERTISE.



HACH® Be Right™

cytiva

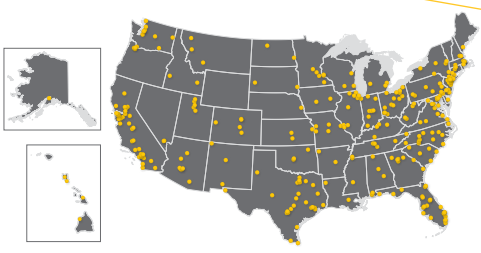
MICROFLEX®

...and more!

We are a leading specialized distributor of water, wastewater, storm drainage and fire protection products, and related services. With 300+ branches nationwide, and 24/7 access to the **lab**, **plant** and **field products**, we have what you need to keep your municipal operations running smoothly.

Contact us to place an order, to request a catalog or to ask a question.

1-888-885-2673
support.supply@coreandmain.com
supply.coreandmain.com



Local Knowledge
Local Experience
Local Service, Nationwide®

advertiser index April 2023

share
discover
connect

facebook.com/TPOmag **instagram.com**/TPOmag
twitter.com/TPOmag **youtube.com**/TPOmagazine
linkedin.com/company/treatment-plant-operator-magazine

tpo TREATMENT PLANT OPERATOR

DEDICATED TO WASTEWATER & WATER TREATMENT PROFESSIONALS

Published monthly by COLE Publishing, Inc.
P.O. Box 220, Three Lakes, WI 54562

In U.S. or Canada call toll free 800-257-7222
Mon.-Fri., 7:30 a.m.-5 p.m. CST

Website: www.tpomag.com / Email: info@tpomag.com / Fax: 715-350-8456

SUBSCRIPTION INFORMATION: A one year (12 issues) subscription to TPO™ in the United States and Canada is FREE to qualified subscribers. A qualified subscriber is any individual or company in the United States or Canada that partakes in the consulting, design, installation, manufacture, management or operation of wastewater and water treatment facilities. To subscribe, visit tpomag.com or call 800-257-7222.

Nonqualified subscriptions are available at a cost of $60 per year in the United States and Canada/Mexico and $150 per year to all other foreign countries. To subscribe, visit tpomag.com or send company name, mailing address, phone number and check or money order (U.S. funds payable to COLE Publishing Inc.) to the address above. MasterCard, VISA and Discover are also accepted. Include credit card information with your order.

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

Our subscriber list is occasionally made available to carefully selected companies whose products or services may be of interest to you. Your privacy is important to us. If you prefer not to be a part of these lists, please contact Holly at holly.gensler@colepublishing.com.

ADVERTISING RATES: Call Kim Bruss at 715-891-0404 or email kim.bruss@colepublishing.com, or call Phil Hahn at 715-493-9913 or email phil.hahn@colepublishing.com. Publisher reserves the right to reject advertising which in its opinion is misleading, unfair or incompatible with the character of the publication.

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

DIGITAL REPRINTS AND BACK ISSUES: Visit www.tpomag.com for digital reprint options and pricing. To order back issues, call Holly at 800-257-7222 or email holly.gensler@colepublishing.com.

CONTROLLED CIRCULATION: 60,500 per month

let's be clear

Completing the Circle

HERE'S A QUIZ: WHAT SHARE OF WATER, NUTRIENTS AND ENERGY DO THE NATION'S CLEAN-WATER PLANTS RECOVER? HOW CLOSE ARE WE TO A CIRCULAR WATER ECONOMY?

By Ted J. Rulseh

We have come a long way since 1970. As I was entering college, an ad running frequently on TV touted a frozen pizza that came with a "toss-away pizza pan."

Think of it. The most memorable feature of this product was not its ingredients, not its taste, but a disposable aluminum pan. Heaven forbid people should have to wash a dish. A product and an ad like that would be unthinkable today, when reuse and recycling hold such stature that "circular economy" has become a buzzword.

The Water Environment Federation is embracing the circular economy with its ReNEW Water Project (the letters N-E-W stand for nutrients, energy and water). Several years ago, WEF adopted Water Resource Recovery Facility as the generic name for what we've known for years as wastewater treatment plants.

Now WEF is upping the ante with the ReNEW project, which promotes resource recovery to fuel and grow a circular economy. The idea is to reduce waste by creating valuable products from what have been thought of as waste streams.

TRY YOUR HAND

So, what amounts of resources are being recovered in WRRFs? The most recent data we have is from a WEF analysis completed in 2018, using information from national and state databases, publications and a utility survey, which taken together represented about 25% of U.S. municipal wastewater flow and 20% of biosolids.

See if you can guess how well the United States was doing with resource recycling. No fair peeking at the answers below until you've completed the quiz.

1. What percent of wastewater was being used for purposes such as irrigation and groundwater replenishment?
A. 18%
B. 3%
C. 7%
D. 21%

2. What percent of biosolids was used as fertilizer, compost or other beneficial purposes?
A. 16%
B. 51%
C. 73%
D. 34%

3. What percent of phosphorus was captured by way of land-applied biosolids, fertilizer and recycled water for irrigation?
A. 9%
B. 31%
C. 21%
D. 46%

4. What percent of nitrogen was captured by way of land-applied biosolids and recycled water for irrigation?

A. 11%
B. 22%
C. 38%
D. 6%

5. What percent of biogas was captured for heating and electricity generation?

A. 60%
B. 41%
C. 28%
D. 73%

WEF is upping the ante with the ReNEW Water Project, which promotes resource recovery to fuel and grow a circular economy.

ELEMENTS OF RENEW

With the ReNEW project, WEF aims to create a bold, aspirational initiative to accelerate resource recovery, and so help power a circular economy. The project has two components:

Call to action. This means encouraging utilities to pursue resource recovery as a way to improve operations, manage risk, and enhance sustainability. The aim is to catalyze the capture of high-value products by helping utilities develop business cases for resource recovery.

Progress and impact reports. These will be developed periodically to track progress and spotlight the impact of utilities creating value from former waste streams.

HOW DO YOU MEASURE UP?

If you want to check on how your clean-water agency is doing with resource recovery, WEF offers an Accelerating Resource Recovery Tool. It can help you gauge how you compare with other utilities of similar size. You can locate and download the tool at www.wef.org. Search on ReNEW Water Project.

Walt Marlowe, WEF executive director, observes, "With precious water resources increasingly stressed by the climate crisis, population growth and pollution, we need to urgently manage water in a way that reflects the limited supply and ensures a sustainable future."

Making a difference starts with knowing where we are today. Maybe now is a good time to assess your resource recovery performance and discuss how to continuously do better. **tpo**

QUIZ ANSWERS: **1.** C | **2.** B | **3.** C | **4.** A | **5.** B.

@tpomag.com

Visit the site daily for new, exclusive content. Read our blogs, find resources and get the most out of *TPO* magazine.

MARSHAL FIRE

Heroic Operators Kept Water Flowing

The Marshal Fire of December 2021 was the most destructive in the history of Colorado. The calamity might have been worse if not for the bravery of team members at the two water treatment plants in Louisville. This article explores how operators put themselves in danger to keep water flowing during the devastating blaze.
tpomag.com/featured

OVERHEARD ONLINE

"Not many people have studied the methane emissions associated with wastewater infrastructure, even though we know that it's a hotspot for methane production."

Princeton Researchers Claim WWTPs Emit Nearly Twice as Much Methane as Previously Thought
tpomag.com/featured

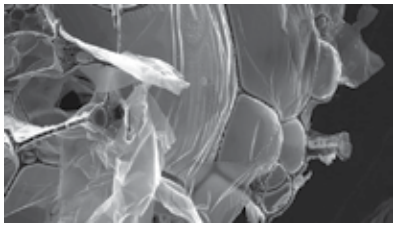
PUBLIC OUTREACH

Meet 'Bruce the Water Guy'

Bruce Royce, wastewater treatment plant manager for Midland, Michigan, has a series of YouTube videos that educate the public about the critical work treatment plant operators do every day. Learn more about his efforts and watch the videos in this online exclusive article.
tpomag.com/featured

MICROPLASTICS REMOVAL

Researchers Use Egg Whites



Researchers at Princeton Engineering have found a way to turn your breakfast food into a new material that can cheaply remove salt and microplastics from seawater. The researchers used egg whites to create an aerogel for water filtration.
tpomag.com/featured

Emails & Alerts
Visit **tpomag.com** and sign up for newsletters and alerts. You'll get exclusive content delivered right to your inbox, and you'll stay in the loop on topics important to you.

Join the Discussion
Facebook.com/tpomag
Instagram.com/tpomag
Twitter.com/tpomag

Hayward Gordon
EBARA CORPORATION

MADE IN NORTH AMERICA

We have the right pumps and mixers for your application

Torus Recessed Impeller Pumps

XCS Screw Centrifugal Pumps

SmartFlex Hose Pumps

ChopX Chopper Pumps

HydroMix Hydraulic Mixing System

Top Entry Mixers

Use our 70 years of knowledge and experience to make your water management simple.

www.haywardgordon.com

Jeff LeMay, left, water pollution control facility supervisor, with Wilfredo Garcia, operator, perform maintenance on a 100 hp turbo blower (APG-Neuros).

Collaboration Counts

JEFF LEMAY BUILDS A WINNING CULTURE AND SUSTAINS HIGH PERFORMANCE BY WORKING CLOSELY WITH STAFF, REGULATORS AND HIS INDUSTRY ASSOCIATION

STORY: **Suzan Chin-Taylor** | PHOTOGRAPHY: **Scott Eisen**

When Jeff LeMay got the call that he'd been named 2021 Regional Wastewater Operator of the Year by the U.S. EPA, "I kind of thought it was a joke," he recalls.

"I get a call in my office and I pick up, and it's somebody telling me they're from the EPA. I'm like, okay. Your heart goes in your throat a little bit. Did something happen that I wasn't aware of? Did something go wrong, or is this somebody messing with me?

"It was a gentleman telling me I won the award," says LeMay, plant supervisor and Grade 4 operator at the South Windsor (Connecticut) Water Pollution Control Facility. He was nominated by the state Department of Energy & Environmental Protection , although he's not sure by whom exactly. LeMay felt honored and humbled by the nomination: "I think how that happened is, I have very good rapport with a number of people down there."

He believes that rapport comes from, among other things, working with the department on getting his operators certified at higher levels, and asking questions about the proper way to fill out bypass reports.

"If something goes wrong, it's not enough to just fill out the Discharge Monitoring Report and attach something saying, 'Hey, I'm sorry. We got a bad number this month.' I call them and say, 'This is what happened. We've done an internal review. We think this is why. How do you want me to handle that?' Because the reality is, mistakes are made. Nobody is perfect, and you want to just be transparent."

LeMay feels that rapport, along with excellent treatment numbers, probably led to the nomination. South Windsor consistently removes 98-99% of TSS and BOD and has nitrogen numbers that also fall well under permit.

LeMay collaborates with DEEP through the Connecticut Water Environment Association, for whom he serves as vice president and chair of the Legislative Committee: "We're all trying to do the same thing; we all want to reach the same goal." DEEP officials reached out to the organization after it was formed, looking to have regular meetings to determine how treatment plants across the state might best be helped in meeting their goals.

PLANT AND PROCEDURES

The South Windsor treatment plant's headworks includes a bar screen and Muffin Monster grinder (JWC Environmental). A JWC bar rack removes rags, followed by a JWC wash press. The wastewater then moves into two aerated grit chambers.

After grit removal the stream flows to an influent wet well, powered by three 40 hp Flowserve pumps, each rated at 5.5 million gpd. Under normal conditions, any one pump can easily handle the flow. When brief flows over that 5.5 mgd occur, the other pumps rotate duty. The pumps convey the wastewater to three circular primary clarifiers (AMWELL).

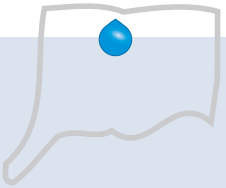
When flows are very low, the plant can run on just two primaries, allowing more BOD to get through and giving the tank bacteria "a little extra food." Hayward Gordon pumps move the primary sludge to two covered gravity thickeners, where it settles out to about 5% solids. It is then pumped to three holding tanks.

The primary effluent goes to a collection box and then into the anoxic zones in the two aeration basins. After aeration, mixed liquor not returned to the front of the anoxic zone goes to the secondary clarifiers. Nearly 100% of return activated sludge is also pumped back into the anoxic zone collection box.

"That's where the bacteria and its food are all meeting each other," LeMay says. "We are an MLE activated sludge process, but that process starts in our anoxic zones. It goes from there into the aeration basins, each of which have 1,300 fine-bubble diffusers.

> "You need people to feel they have a voice; that if they give an opinion, they're going to be heard."
> **JEFF LEMAY**

Jeff LeMay, supervisor, Joseph J. Carino Water Pollution Control Facility



Jeff LeMay
South Windsor, Connecticut

POSITION:
Water Pollution Control Facility Supervisor

DUTIES:
Manage plant operations, oversee maintenance and staff training

CERTIFICATIONS:
Grade 4 Wastewater Operator

EDUCATION:
Course work at Mississippi State University and University of Connecticut

GOALS:
Motivate colleagues to learn and advance, improve processes to optimize treatment

"The internal recycle pumps at the end of aeration return at a four-to-one flow, back to our anoxic zones. Altogether, we're running at about a five-to-one ratio of return between what we're doing in internal recycle and with our RAS pumps. Whatever they're not returning is getting wasted to a gravity belt thickener.'

Crews run a low three-day solids retention time, especially during summer. "Sometimes we'll go down to a 2.7 and that seems really light," LeMay says. "But especially in the summer, we don't really need to carry a lot more inventory than that to get good treatment. Our anoxic tanks handle about 700,000 gallons, and our aeration basins are 600,000 gallons each. For about half the year, we only need to run one aeration basin." Three 100 hp APG-Neuros turbo blowers satisfy one basin's aeration demand.

Sludge wasted from secondary clarifiers goes to a gravity belt thickener where it is mixed with polymer and dewatered to 5-6% solids. That material is pumped to storage tanks separate from the primary sludge. During permit-required disinfection, May through September, flows run through a TrojanUV system. Effluent is discharged to the Connecticut River.

One issue is how to reduce biosolids volume, both in process and as a byproduct. "Down the line, it's going to be a major challenge," says LeMay. "Will we have to deal with PFAS in a permit somewhere? I'm sure at the very least we'll need to be cognizant of what we have and how we're going to manage it." South Windsor's biosolids hauling costs have gone up 35-40%.

LeMay says part of addressing this and other issues is looking at different solutions: "It's a collaborative process, and some of that is working with regulators." The South Windsor facility is also working with Eversource and Enel X on a demand response program. During periods of high electrical demand, plant runs on generator power for up to 25 hours per year, easing demand on the electrical grid. In return the utility provides up to $20,000 per year in incentives.

Jeff LeMay, shown with Daniel Kruger (left) and Mike Romejko (right), believes in a collaborative management style.

PEOPLE MATTER

LeMay's collaborative approach to plant operation extends to his management style. He's a proud and unapologetic cheerleader for the industry, and that enthusiasm drives his every move as a manager: "For anybody thinking about entering the field, it just feels limitless. There's so much to it."

South Windsor has had great success hiring people skilled in other disciplines, people he describes as "just really sharp, good personality, problem solvers." His appreciation of such colleagues began with Tom Bjorkland, who functions as lead operator in maintenance.

Having served in the Coast Guard as a chief machinery technician for 20 years, Bjorkland took every new team member under his wing. "He really wanted to make sure people understood the machinery, but also why it was important," recalls LeMay. "Where is this material going? Where is it coming from? Why is it going there? What looks normal? What doesn't?"

The team at the Joseph J. Carino Water Pollution Control Facility includes, from left, Wilfredo Garcia and Mike Wood, operators; Robert Butler, lead operator, process control; Tim Cronin, operator; Jeff LeMay, water pollution control facility supervisor; Tom Bjorkland, lead operator, maintenance; Mike Romejko, operator; Jared DeNardis, Daniel Kruger and Jim Kavanaugh, operators; and Jacob Plona, lead operator, collection system.

A TEAM APPROACH

One of Jeff LeMay's duties as plant supervisor is to oversee operators' cooperation with third-party research in the facility. In one such endeavor, Advance H2O is identifying and cataloging bacteria populations in the waste streams.

"Our crews are going through the process with AdvanceH2O collectively, because we don't know exactly what we're looking for," he says. "We're assisting with the sampling and giving them all kinds of information, all kinds of data to correlate with what they're getting from their weekly samples, and trying to help them tie everything together."

"It's a monumental task. What I can say with certainty is that, by the time this process is complete, we will know so much more about our plant than we ever imagined we would. We all know that we're going to learn a ton.

"We may find somewhere down the line, that, if we do have bacteria in here that are more efficient and use less oxygen, maybe we don't need to run a 2.5 mg/L dissolved oxygen in our aeration basins. Then maybe we can somehow select for those bacteria.

"It feels like in working with AdvanceH2O, maybe we are on the cusp. Not that South Windsor is making the discovery, but because we're amenable to doing these kinds of things, maybe we're a part of that ultimate solution, or a group that can help facilitate a spring forward into the future. That's just very exciting."

Another team member with a construction background, Robert Butler, came to South Windsor with no wastewater experience. Plant staff taught him wastewater operations specific to the facility, while leveraging the strengths he brought to the job. Eight years after being hired, he is now lead process control operator.

The team also includes Jacob Plona, lead collection system operator; Kathryn Foley, lab analyst; operators Tim Cronin, Jared DeNardis, Rico Garcia, Jim Kavanaugh, Mike Romejko and Mike Wood; and Tony Manfre, operator and pollution control superintendent.

"They've become phenomenal operators," LeMay says. "It can be very fast-paced and dynamic," LeMay says. "There are always new challenges. No two days are the same, and if you come in with a skill set that could benefit a facility, it's just worth so much. Whether it's electrical experience, whatever it might be, you can find a place for yourself in wastewater."

THE PLACE TO BE

On top of that, "It's just so rewarding. It's so easy to go home and hang your hat every night on what you're ultimately doing for the environment. There's just so much job satisfaction. The jobs pay well, they're very secure, and it's a very exciting field. That's what I would tell people who think they might want to get into the industry."

Much of LeMay's enthusiasm comes from working with the people in his new management class: "When we ask these folks about the best and worst leaders they've ever had, the worst ones are people who just stick you in one spot, leave you there and there's no training. There's no value to your opinion. There's no real engagement."

From left, Tom Bjorkland, Mike Wood and LeMay remove hydraulic wipers from UV light bulbs as the disinfection system (TrojanUV) is taken offline for the season.

> "It's so easy to go home and hang your hat every night on what you're ultimately doing for the environment. There's just so much job satisfaction."
>
> **JEFF LEMAY**

What the class stresses is the importance of people, and that's what he tries to incorporate into his management style: "If you have people interested in different components of what you're doing, encourage that. If they want to learn something new, teach them. If they want to get training in something new, give them the training.

"If there's an opportunity to create slots where their license and performance, tied together, can lead into a higher position and ultimately more money, give them the opportunity to do that because that keeps people engaged."

The first rule he goes by is the importance of truly listening. "Don't make a crew meeting something where you're just telling your folks what's going on, and then you get up and leave," he says. "You need people to feel they have a voice; that if they give an opinion, they're going to be heard."

It doesn't mean he will implement all suggestions, "but nine times out of 10, I do end up going with an idea that one of them has, because they're out there in the field. They're the ones doing the work. If you hire the right people and the right personalities, and you keep them upbeat and positive and feeling like they're making a difference, they're going to perform for you."

ENCOURAGING INITIATIVE

LeMay's management approach also includes a balance of accountability and indulgence. He recalls a piece of equipment in South Windsor's grit elevators that wasn't working properly. An operator brought it to his attention. LeMay asked whether the work could be handled in-house. The operator replied, "Let me get a couple other guys on it. We'll go through the manual. I think we can do it."

The crew buttoned everything up and told LeMay everything was working well, but a little while later an off-shift alarm came in. Something had gone wrong. The crew came back in and found and corrected a couple of small things they had overlooked.

The next day the operator who had expressed confidence in the in-house fix apologized to LeMay, visibly contrite. "There shouldn't have been a call-out," he said. "I told you it was all set." LeMay realized it would serve no purpose to pile on blame and guilt.

"I'm not going to hammer you over that," he replied. "It would have cost an arm and a leg to hire a contractor to fix that problem. Instead, our guys figured it out. Did it go exactly how you planned? No. Did it take a little bit more time than you thought it would? Yeah. But ultimately, you fixed it. Now we know we can do that ourselves."

He knows that some managers might look at that situation and come down on the operator: Look what you did. You cost us extra money! There was more overtime involved. What were you doing? LeMay plays the long game.

"How many times do you do that to somebody, before they never go above and beyond again?" he asks. "At some point they just say, 'This is all I'm going to do. I'm not going to hang myself out there.' You need to foster an environment where people are willing to try new things, and you need to not destroy them over their mistakes."

LeMay's approach weaves a teacher's patient temperament with a hands-on style that makes every member of the team feel appreciated and motivated. They know it all matters, and they're not invisible in the process. tpo

Pumpkins, Succulents and Family Fun

A CALIFORNIA DISTRICT HOSTS AN OCTOBER WATERWISE GARDEN AND PUMPKIN FEST TO STRESS WATER CONSERVATION AND KICK OFF THE FALL PLANTING SEASON

By Sandra Buettner

The Chino Basin Water Conservation District's fall festival is back after a two-year hiatus due to COVID.

Based in Montclair, California, the district created the festival to educate residents on water-saving plantings and responsible gardening practices. Amid frequent droughts, the residents appreciate learning how they can do their share to conserve water.

"We have festival attendees who know a lot about water wise gardening and some who know nothing. It runs the gamut," says Maia Dean, community programs manager. The Waterwise Garden and Pumpkin Fest takes place on the district's grounds, about 30 minutes east of Los Angeles.

The district was formed in 1949 to help protect and preserve the Chino Groundwater Basin for the San Bernardino communities that rely on it for water. Its service area includes some or all of the cities of Chino, Chino Hills, Montclair, Ontario, Rancho Cucamonga and Upland.

The Chino Basin Water Conservation District's Waterwise Garden and Pumpkin Fest offers a variety of fun activities for all ages.

FESTIVAL FUN

"Our planting and growing season starts in fall, and so we host our event in October to teach water-wise planting and gardening practices just as residents are planting their own gardens," Dean says.

The festival was started in 2006 as a family-friendly event. Many residents attend year after year. The half-day event runs from 10 a.m. to 2 p.m. and offers water-related activities festival for all ages. Inland Empire Utilities Agency helps sponsor the event. There are workshops sponsored by the district's partner water agencies. Every year there are up to 20 booths.

The district promotes the festival in a monthly newsletter sent to 8,000 subscribers. Information is also posted on the district website and social media platforms, including a Facebook page devoted solely to the event.

Partner agencies advertise the event through their social media and bill inserts. Some cities hang promotional banners above their streets. "When the district hosts school field trips, we promote the festival to the students and educators throughout the year," Dean says.

VARIED ACTIVITIES

Festival booths can include a master gardener tent and a representative from the San Bernardino stormwater program who explains what not to put down storm drains. An irrigation vendor instructs residents on how to use a water-saving slow-drip system to water plants.

Students from the horticultural department at the local community college sell succulents and water-saving plants as a fundraiser. They teach attendees which plants are best for their areas and describe the plants' water-conserving qualities.

Throughout the day, raffles are conducted for water-related items donated by partner agencies.

Speakers throughout the day tell how to create and maintain water-conserving gardens. Dance groups and singing groups volunteer to entertain the attendees. There are special events for children; one festival featured a live exhibit with marine animals.

Water drop characters are among the attractions at the Waterwise Garden and Pumpkin Fest.

PUMPKIN PATCH

The festival draws about 900 people, including roughly 600 adults and 300 children. By far the most popular event is the Pumpkin Patch. Kids and adults buy pumpkins that the children paint for prizes. Adults and older children create pumpkin centerpieces, which the families take them home to use as fall decorations in their yards.

The festival also includes water-related arts and crafts activities for kids. Booths offer prizes, popcorn, candy and ice pops. There is also a petting zoo.

A festival of this magnitude takes a lot of helping hands. Area middle and high schools require students to contribute volunteer hours every year; many students donate some of those hours to the festival year after year.

The district staff members also pitch in, as do staffers from partner water agencies and master gardeners. Says Dean, "Our volunteers make this festival the success that it is, and we couldn't do it without them." tpo

Accuracy You Can Trust

Ultrameter II™

Model 6PFC^{E}

Conductivity
Resistivity
TDS
ORP/Free Chlorine Equivalent (FC^{E} ™)
pH
Temperature

TM

MYRON L COMPANY
Water Quality Instrumentation
...Since 1957

www.myronl.com
760-438-2021

DESIGNED, ENGINEERED AND ASSEMBLED IN THE USA

All According to Plan

JEFFREY DORSEY MAKES EQUIPMENT RELIABILITY A TOP OBJECTIVE. HIS APPROACH HAS PAID BIG DIVIDENDS FOR GREAT LAKES WATER AUTHORITY TREATMENT PLANTS.

STORY: **David Steinkraus** | PHOTOGRAPHY: **Eric Seals**

> "They gambled on me. I rolled the dice, and we came out successful."
>
> **JEFFREY DORSEY**

Jeffrey Dorsey had the same level of knowledge as most people when he applied for a job in the water industry.

"I knew only that when I went to get some water, it was present," he says. "I didn't know anything about how water was provided. I just wanted a job."

Today Dorsey is maintenance manager of water operations for the Great Lakes Water Authority, which operates the water and wastewater systems in and around Detroit, serving about 40% of Michigan's population. Its five water plants have a combined capacity of 1.7 billion gallons per day.

In his role, Dorsey has led a strategic shift from reactive to planned and predictive maintenance. As a result, equipment reliability has improved dramatically, and operators draw more satisfaction from their jobs.

In 2021, Dorsey received the Operators' Meritorious Service Award from the AWWA Michigan Section for exceptional performance in compliance with public health standards, outstanding plant maintenance, treatment improvements, operator training and dedication to the public.

BORN AND BRED

Dorsey's water industry journey began when he took his first job at the Detroit Water & Sewerage Department. He grew up in Detroit and attended Renaissance High School, known for its rigorous academics and college preparatory studies. In 1997 he was looking for anything when he attended a career fair and applied for that first position.

As an electrical helper, he was a low-level assistant, not even an apprentice. If a journeyman electrician needed someone to fetch a tool or hold a light, Dorsey was that guy. "I didn't know anything about motors," he says. "I didn't know anything about electrical circuits."

Being around the work helped him begin to understand electricity, and the water industry. It piqued his curiosity. After a few years as a helper, he advanced to electrical repair, learning about basic troubleshooting and installations.

In 2003 he applied for a journeyman's position, but he ran up against a requirement of Local 58 of the International Brotherhood of Electrical Workers that said prospective journeymen had to go through the union's apprenticeship program.

Jeffrey Dorsey (right) and Bill Ewell, water management professional, select the proper cable for equipment. Dorsey believes in a proactive plan to make sure equipment is reliable and to head off failures.

Jeffrey Dorsey, Great Lakes Water Authority

Detroit, Michigan

POSITION:
Maintenance Manager, Water Operations

EXPERIENCE:
25 years in the industry

DUTIES:
Oversee maintenance strategies for five water treatment plants

EDUCATION:
Bachelor's degree, electrical engineering, Wayne State University

CERTIFICATIONS:
F3 Water Filtration, S4 Water Distribution, journeyman electrician

GOALS:
Optimize water operations, modernize, build a team of skilled people

Eventually under an agreement between the union and the city, Dorsey was able to qualify by way of a written test for the union, a written test for the city, and a hands-on performance test at Henry Ford College. He received his journeyman's card in 2003, and the electrical worker position in 2007.

Four years later, Dorsey moved up to be a professional administrative analyst and assistant to the director of water operations, a new position. His job included looking at turbidity data and other information, providing performance indicators, and producing graphs easy to understand in presentations. His boss, Terry Daniel, gave him wide latitude to define the job, so he came to understand what was happening in the operations and maintenance divisions.

MOVING AHEAD

At the same time, Dorsey built on his practical knowledge of electrical equipment and finished a bachelor's degree in electrical engineering at Wayne State University. In 2014 he left the city for a better-paying job with a packaging company in Cleveland.

"I was very comfortable with the water department," he recalls. "I didn't know anything about the packaging industry." But he had learned not to fear challenges: "I said, 'This may be uncomfortable, but I'm going to do it.'"

One of the key concepts he learned in the private sector was the importance of time. When equipment broke down, his maintenance team had to react quickly to put it back in service. In turn, he was challenged to think about how to do maintenance so as to minimize downtime. In 2016, the new Great Lakes Water Authority offered him the job of maintenance manager. The money was good, he had grown up in Detroit, his family was there and so he moved back.

TIME MANAGEMENT

He started the job and looked around. "The main thing I saw was a lot of responsive or reactive maintenance," workers rushing from one breakdown to the next.

"One thing I'm a big proponent of is to make plans so things are reliable," Dorsey says. Operators need to know they can rely on a piece of equipment

> "One thing I'm a big proponent of is to make plans so things are reliable."
> **JEFFREY DORSEY**

Jeffrey Dorsey received the 2021 Operator Meritorious Service Award from the AWWA Michigan Section.

whenever they want to use it. He embarked on a condition assessment of all of the remote automation, pumps and motors in the system, asking what he and his team could do in-house to increase the life of those assets.

The pumps (primarily Fairbanks) provide one example. During a year, Dorsey and his group analyzed the mean time between failures, measuring that parameter using sensors on the machines that reported actual runtime. "We began to see that if we kept equipment under 1,000 hours of runtime, we really did not see the unexpected failures," he recalls. So the SCADA system was adjusted to flag components as they reached 1,000 hours of operation.

His team also analyzed work orders to determine what kinds of failures were happening. Small problems, such as carbon buildup on motor brushes, were handled by taking machines out of service more often for cleaning. Technicians had previously done only quarterly maintenance.

The team also used an infrared camera (Fluke) to image motors, control panels and breakers to detect abnormal heating. The information was then

Dorsey's close associates include management professionals Ed Merriweather (left) and William Ewell (right).

The high-lift building at the Great Lakes Water Authority in Detroit.

UP FROM THE DEPTHS

In 2013, Detroit became the largest U.S. city ever to file in federal bankruptcy court. The city owed as much as $20 billion to unions, retirees and lenders. It was carrying about $143 million in delinquent water and sewer accounts, and its water and sewer system bonds were rated near junk status.

During the process, the federal bankruptcy judge on the case ordered the city and its suburbs to negotiate the future of water and sewer service. The city had proposed a water authority to span much of the metropolitan area, but suburban leaders were hesitant.

In 2014, the city reached a deal with the three main metropolitan counties it serves, and the result was the Great Lakes Water Authority. Under a 40-year agreement, the authority pays Detroit $50 million a year to lease its assets: $22.5 million for drinking water, $27.5 million for wastewater. The city uses the money for capital improvements or debt obligations.

A six-member board gives the suburbs a voice in governing the system. The city has two representatives, the state of Michigan has one, and the other seats are filled by representatives from the three counties where most of the people in the six-county metropolitan area live.

logged in a database so that an analyst could follow trends over time. "A lot of times you'll see hot points around contacts, or a stator, or a motor," Dorsey says. Based on the scans, workers know what components to watch carefully.

Changing oil in pumps and motors is also important. Workers use a small cart (Lubrication Engineers) that extracts oil, cleans it, and puts it back. The authority also hired Johnson Controls to conduct vibration analysis on equipment to monitor for premature bearing failure or pump misalignment.

UP WITH RELIABILITY

Each GLWA plant has both a maintenance crew leader and a planner. Planners look at all this equipment data and adjust the maintenance strategy for each site. The data also becomes part of the capital plan, so that funding requests can be justified. "Most of our plants are 30 to 60 years old, and we have a lot of old equipment," Dorsey says.

When he took the job in 2016, the authority's reliability percentage was about 52%. The industry standard is 80%, meaning that share of work or maintenance is planned and no more than 20% is a reaction to an unexpected failure. By 2021, the reliability percentage had increased to 94.5%.

> "None of this has been due to just me. I've been blessed to have a really great team to work with."
>
> **JEFFREY DORSEY**

Among the top sources of information, Dorsey says, are the people doing the work: "We have a veteran team of mechanics, electricians and first-line supervisors, and they've seen a lot of stuff. One thing people neglect is to listen to them. They understand some of the things we can't understand from a higher level." From a foundation of knowledge, work can be planned out for a week or two. Operators are more satisfied with their jobs and not frequently writing repair orders for failed equipment.

IT'S TEAMWORK

"None of this has been due to just me," Dorsey says. "I've been blessed to have a really great team to work with." That means the people who report to him: Edwin Merriweather and William Ewell, water management professionals; and Jason Hammond and Joseph Haffey, team leaders. There is also Terry Daniel, water operations director, who serves as a sounding board for ideas and sets an example by the way he handles various situations.

Since the COVID-19 pandemic began, Dorsey and his subordinates have moved to meeting online via Microsoft Teams. "It's been a lot more effective in making sure we're staying connected," he says. "It's a lot better than having to drive someplace." At the same time, he notes, something is lost in remote meetings.

His farthest drive is to the plant in Port Huron, about an hour north of Detroit. Even with the advantages of online meetings, he makes a point of getting out to the plants, talking, listening, asking questions and reinforcing what the managers under him say.

History repeated itself with Dorsey's current job. Just as he was the first data analyst for the Detroit Water & Sewerage Department, he was the first maintenance manager for GLWA, a position that hadn't existed in the city department. "So it was mine to create," he says. "They gambled on me. I rolled the dice, and we came out successful." tpo

featured products from:

Fluke Corporation
425-347-6100
www.fluke.com

Lubrication Engineers, Inc.
800-537-7683
www.lelubricants.com
(See ad on page 21)

Pentair Fairbanks Nijhuis
888-416-9510
www.pentair.com/fairbanks-nijhuis

EarthTec algaecide (Earth Science Labs) is placed in a tank mounted in a boat and delivered by an electric pump to two simple pipe manifolds towed at boatside.

Since the proactive treatments began in spring 2018, the city has not detected microcystin in more than 100 samples collected in more than four years of monitoring.

Staying Ahead of Algae

A LIQUID FORMULATION OF IONIC COPPER ENABLES AN OHIO CITY TO ELIMINATE HARMFUL ALGAE BLOOMS AND MICROCYSTIN IN ITS DRINKING WATER RESERVOIR

By Louis LeBrun

In late of 2017 the City of Marysville in north-central Ohio experienced its first harmful algae bloom in its surface water reservoir.

After evaluating various alternatives with its engineer, the city selected a treatment with a liquid formulation of ionic copper to control microcystin issues resulting from algae growth. Since the proactive treatment program began in 2018, the city has not experienced another HAB.

The city continued the chemical treatment to combat algae while preparing for a new water treatment plant commissioned in 2022.

ISSUES WITH MICROCYSTIN

In 2017, Marysville was operating a nearly 100-year-old conventional lime-softening water treatment plant with an average daily flow of 20 mgd.

Whenever possible, the city prefers to use surface water from its reservoir as the drinking water source.

With the ability to select either groundwater or surface water, the city has significant flexibility to address water quality and treatment issues. Whenever possible, the city prefers surface water from its reservoir due to the simpler operation and lower cost of collecting and treating the water.

After completing improvements to the reservoir in mid- to late 2017, the city for the first time experienced an algae bloom, with microcystin concentrations above 1.6 ug/L. The event triggered enhanced monitoring requirements and a review of treatment alternatives under Ohio EPA rules.

Raw water microcystin concentration continued to climb, eventually reaching 2.69 ug/L in October. Problems persisted into winter, as December testing found detectable concentrations of microcystin in the finished water, requiring a complete switch to groundwater.

CHOOSING A REMEDY

In February 2018 the city completed a treatment optimization plan and a cyanotoxin general plan to address the HAB issues. As part of the plan, the city evaluated the full spectrum of chemical and mechanical treatment options for controlling algae in its reservoir.

The city had used traditional copper sulfate in 2011-12 to control filamentous algae growth in the reservoir. However, its limited solubility caused undissolved copper sulfate to accumulate with dead algae on the bottom of the lake. When this occurs, the algae releases phosphorus, nitrogen and other nutrients which tend to fuel additional algae growth.

Beyond the copper accumulation, the city found traditional copper sulfate somewhat cumbersome to handle and apply. City personnel also investigated various ultrasonic technologies, but found those options cost-prohibitive.

After further review, the water plant team investigated EarthTec algaecide (Earth Science Labs), containing only 5% copper in purely ionic form. As a liquid, the product is manufactured with a formulation that enables easy application and extremely rapid dispersion.

The purely ionic copper reacts quickly to kill algae without causing cell lysis or other issues. Further, the lower concentration of copper, already in a fully dissolved state, reduces concerns about copper exposure and eliminates accumulation within the reservoir.

SIMPLE TREATMENT

After reviewing the product with the Arcadis engineering firm, the city began treatment in spring 2018. The treatment is easily applied by boat. The product is transferred to a 60-gallon tank mounted in the boat and delivered by a 12-volt electric pump to two simple pipe manifolds towed at boatside.

The submerged manifolds deliver the product, which disperses in the water. Treatment of the 110-acre reservoir can be completed within one to two hours by a two-person crew. The treatment is applied every two to three weeks, starting as soon as the water temperature climbs above 50 degrees F and continuing as needed through the summer and into early fall.

Since the proactive treatments began in spring 2018, the city has not detected microcystin in more than 100 samples collected in more than four years of monitoring. The treatment is affordable, with an annual cost of less than $15,000.

Based on the good results, the city continued its treatment program to protect its investment in the new water treatment plant, commissioned in late 2022.

ABOUT THE AUTHOR

Louis LeBrun, P.E., (llebrun@earthScienceLabs.com) is a civil and environmental engineer with more than 20 years' experience in the application and commercialization of water and wastewater technology. tpo

Operations Out Front

OPERATORS PLAYED A KEY ROLE IN EVERY PHASE OF THE HUGE REGIONAL SAN FACILITY UPGRADE LABELED ECHOWATER

STORY: **Jim Force** | PHOTOGRAPHY: **Fred Greaves**

Jason Haddix, left, operations supervisor, and Ken Abraham, commissioning manager, at the Sacramento Regional County Sanitation District wastewater treatment facility's biological nutrient removal basins.

The EchoWater Project in Sacramento took seven years to construct, costing nearly $1.8 billion. It is touted as the biggest public works endeavor in the city's history.

Yet the human factor — communications and a commitment to excellence — is what made this massive undertaking successful.

"Our operators were encouraged to provide input to the project right from the beginning," says Michael Melady, chief plant operator and treatment plant operations and maintenance manager for the Sacramento (California) Regional County Sanitation District, known as (Regional San). "Operators working hand-in-hand with design engineers, regulatory staff and construction management was key.

"We made a commitment to the success of the project and assigned two of our best shift supervisors, Jason Haddix and Brent Ramsey, to it from the outset. They served as relentless advocates for our operations and for the wastewater process. This project was built with operator input on a daily basis for over seven years. If something wasn't right, the philosophy was to fix it right away, and for the most part we did."

SPRAWLING TERRITORY

Regional San owns and operates an expansive conveyance system, along with the Sacramento Regional Wastewater Treatment Plant near Elk Grove. The facility serves about 1.6 million people as well as industrial and commercial customers. The plant has a permitted capacity of 181 mgd and an average flow of 141 mgd.

In 2010, stringent new treatment requirements and permit compliance deadlines were issued, calling for Regional San to reduce ammonia discharges to the Sacramento River. The new permit also required Regional San's effluent to comply with California's Title 22 reuse standards.

The two major objectives of the EchoWater project were met through the replacement of an older high-purity oxygen activated sludge process with a 330 mgd biological nutrient removal system and the construction of a 260 mgd granular media filtration facility.

The name EchoWater is a reference to the concept of returning the water to the environment in a positive, useful way, in this case as nearly ammonia-free, tertiary-filtered effluent.

MULTIPLE PROJECTS

The EchoWater Project involved more than the construction BNR and filtration facilities. "There were at least 14 different projects, many occurring at the same time and many needing to be constructed in a deliberate order with one project dependent on the completion of another," Melady says.

These projects included a nitrifying sidestream treatment system; a new biological odor-control facility; replacement of the return activated sludge pumps; rehabilitation of the 40-year-old effluent valves; and expansion of the emergency storage basins to equalize diurnal flows, smooth out the treatment process and save chemicals.

In addition, an older gaseous chemical handling system was replaced with new safer liquid-based chemical handling facilities. The plant's electrical substation was expanded and the old pure-oxygen activated sludge system was decommissioned and removed.

The RAS pump project was typical of the level of attention and effort from the Sacramento team. "The hydraulic requirements of our RAS system changed, and we had to replace all of our RAS pumps," says Melady. "For the new BNR process, our return rates increased from about 30% to 70%. In addition, the new system needed to move our RAS flows about 15 feet higher and much farther than the old system."

Sacramento (California) Regional Wastewater Treatment Plant

(EchoWater project)

BUILT:
1982, expanded and upgraded 2015-2021 present

POPULATION SERVED:
1.6 million people, plus industrial and commercial customers

FLOWS:
181 mgd design, 141 mgd average

TREATMENT PROCESS:
Biological nutrient removal, media filtration

TREATMENT LEVEL:
Tertiary

RECEIVING WATER:
Sacramento River

AWARDS:
2021 Grand Design Award, American Academy of Environmental Scientists and Engineers

WEBSITE:
www.regionalsan.com

Jason Haddix, operations supervisor, near the secondary sedimentation tanks at the wastewater treatment facility. (Brackett Green Drum Screen from Ovivo.)

> "Bright people in one area or industry can be bright in this one, and they've shown the ability to excel quickly."
> **MICHAEL MELADY**

By nitrifying the sidestream flow, the facility protects the quality of the plant effluent, while producing a nitrate-rich stream that is returned to the influent to reduce other chemicals. The sidestream treatment facility includes a flow diversion structure and a fine screen. A lime storage and feed facility ensures adequate alkalinity for the BNR process.

"In the past we had high loads of ammonia just sitting there in our storage basins," says Melady. "During high storm events the ammonia-loaded water would return to the plant and cycle through to our effluent. We couldn't allow that to happen with our new ammonia limits."

> "This project was built with operator input on a daily basis for over seven years."
> **MICHAEL MELADY**

Haddix looks over the BNR basins.

SIDESTREAM TREATMENT

Equally important was a new nitrifying sidestream treatment system that processes the flows returning from the solids storage basins. After five years of stabilization, the solids of each basin are harvested. Using harvest boats, the solids are dredged, extracted, and transferred to a land-based distribution manifold.

From there, the solids slurry is pumped to a series of tractors that cut grooves into the topsoil of lined basins into which the solids slurry is injected. After the slurry dries, tractor operations plow, till and disk the topsoil. Regional San injects about 20,000 tons of stabilized solids into lined basins per year.

ENGAGING OPERATORS

With many of these projects occurring simultaneously, communications and operator input were critical. "You have a third of your plant out of service," says Melady. "You've got raging storms during our rainy season. We couldn't use those parts of the plant that were being worked on. We bent over backward to give the contractors access to do their work, so we could meet the deadlines of our new permit.

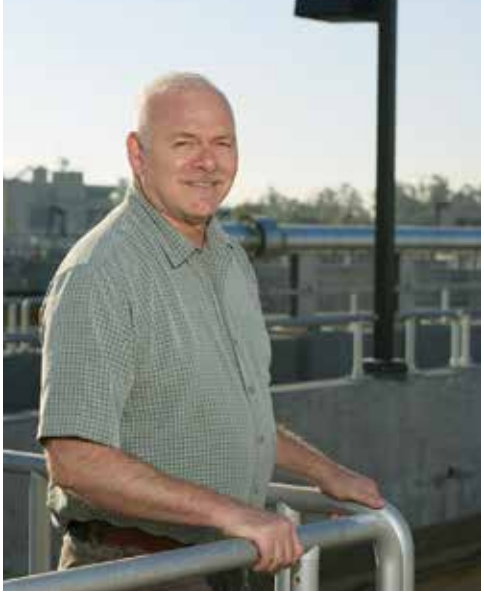
"It was a delicate path to walk, but the planning and implementation for each shut down and tie-in was excellent. With something this complicated, there is no way to just wing it and expect to have a successful outcome."

Regional San operators were in the mix right from the start of construction. "Initially, we took two of our best plant supervisors and over 5% of our craft staff and assigned them to the EchoWater Project.

"It hurt our staffing to take them away from operating and maintaining the plant, but we needed them as a clearinghouse for all aspects of the EchoWater. They were heavily involved with design input of the new facilities. They were also involved with construction oversight, tie-ins and commissioning, electronic documentation, standard operating procedures, and the training of our operators to run the new facilities."

Lonny Fawver, wastewater treatment operations supervisor, notes that the operators and craft staff assigned to EchoWater project went to the construction meetings from day one. Melady adds, "I credit our executive management for this. They understood what the operators and crafts were trying to do and invested the resources to make success a reality. The operators were not just in an advisory role. They were a valued part of the decision process.

"They looked at how the new plant was being built. They learned the contractors' language, what things to look out for, and how to get things done. The project engineers received valuable feedback from our operators as to what worked and what needed to be to be re-engineered. Lessons learned from one project tended to feed into another. All EchoWater projects ran through the group of assigned operators and crafts, and that was the first part of the success story."



Michael Melady, left, chief plant operator, and Lonny Fawver, wastewater treatment operations supervisor

The secondary sedimentation tanks at the Sacramento Regional County Sanitation District wastewater treatment facility

GENERATIONAL CHANGE

Like many water and wastewater agencies, Regional San experienced operator turnover throughout the project, mostly because of retirements. "At the beginning of EchoWater, a lot of our operators had been hired between 1970 and 1995," says Fawver. "Over the past seven years we've had a wave of operator retirements, affecting almost 50% of our positions."

To replace them, Regional San has hired a number of young people, many without significant experience in the field. "It was a generational change," says Fawver.

Where are new operators coming from? "All over the place," says Fawver. "Some from other plants, others from colleges, some with technical education or experience working in other industrial or technical fields."

Melady notes that it has been has been difficult to hire experienced operators recently:

"About a third of our operators over the past few years have been hired from other industries with no wastewater experience. We're willing to hire talented people with technical skills who are capable of learning wastewater operations. Bright people in one area or industry can be bright in this one, and they've shown the ability to excel quickly."

FULL STAFFING

Regional San has also made sure to have enough well-trained operators on board. "The last thing you want is not to have enough people," says Melady. "If you're short-staffed, you'll end up operating to meet a minimum standard. If anything, during the first few years of a new process, you want to be overstaffed and have enough resources to learn the finer points of operating and maintaining the new facilities."

Fawver says the new plant has about 60 certified operators working in the field, an increase of 10% over the previous staffing. Forty of the operators are assigned to five shifts overseeing plant operations, while the other 20 are assigned to three process maintenance teams called HyChem, Bio and Solids.

HyChem maintains chemicals systems, bar screens, grit handling and primary treatment systems, as well as hydraulics influent and effluent pumping. Bio is responsible for the new sidestream treatment and BNR facilities as well as the solids storage tanks and emergency storage basins. The Solids team manages the thickeners, digesters, gas management and flaring, and sludge storage harvesting.

Regional San also established a filtration team that went online last winter. All the processes are online, Regional San will be the second largest tertiary treatment plant in the United States.

BONDING EXPERIENCE

Melady and Fawver feel that while nothing has been easy with the EchoWater Project, it has delivered unexpected benefits to the people involved. Key team members besides Melady and Fawver include Jason Haddix, Brent Ramsey and Darren Roth, wastewater treatment plant operations supervisors; Ken Abraham, John Nurmi and Jill Teplin, process engineers; Leslie Knapp, process consultant; and Glenn Bielefelt, Regional San Director.

"Our old plant was in the middle of its life and things might have been getting a little stagnant," Melady recalls. He believes that EchoWater, as complicated and difficult as it has been, has revitalized things.

"It's not just a new plant with shiny new equipment. For everybody who has worked on this project — operators, supporting crafts and engineers — it has been a bonding experience. We're working with and for each other doing a lot of not-normal and exciting things to build something we can all be proud of." tpo

LESSONS LEARNED

Having spent several years shepherding the complex EchoWater project, Michael Melady shares what he calls a very important lesson about new construction and operations.

"It is critically impiortant when designing new facilities to give operators built-in options for taking field control of critical equipment in the event of a network failure," says Melady, chief plant operator and operations and maintenance manager for Regional San.

Contrary to some practices, he believes no plant should ever depend solely on any network to maintain flow or compliance. "Because of what I'll call seductive reliability, it's easy to overestimate the stability of SCADA systems, control networks and all the programmable routers and logic controllers that keep a plant running smoothly," he says.

"Our plants are critical infrastructure. We can't allow them to be dead in the water until a network technician can come in." He believes key equipment needs to have a start, stop, and control option in the field, or at least have manual machine interfaces in localized areas: "Stuff happens and things, even networks, can fail out of the blue. You need options when that happens."

A Tall Task. A Ton of Conviction.

GREG WRIGHT DOESN'T LET THE CHALLENGE OF OPERATING IN A RURAL COMMUNITY DAMPEN HIS ENTHUSIASM FOR PURSUING NET-ZERO ENERGY WITH COMBINED HEAT AND POWER

By Steve Lund

Greg Wright has found that the path to energy self-sufficiency has many obstacles for rural clean-water plants.

That hasn't discouraged him from continuing the journey. It has forced him to be patient.

"That, to me, is the ultimate goal, to get to the point where we are at least net zero, where it doesn't cost us any energy to operate the plant," says Wright, wastewater superintendent in Kinross, Michigan.

Kinross is the site of a former U.S. Air Force base in the Upper Peninsula. The plant serves a population of about 6,000, including two state prisons. The prisons produce about 75% of the flow to the wastewater treatment plant (2 mgd design, 0.5 mgd average).

It's a trickling filter plant with four rectangular clarifiers, used two at a time. Chlorine is dosed for disinfection, and ferrous chloride is added to remove phosphorus and suspended solids. In secondary treatment, sodium hydroxide is used for pH adjustment. The effluent flows into a swamp and then to a creek that flows into the Whiskey River. Biosolids are land-applied.

In recent years, the plant has added a second digester and equipment to remove hydrogen sulfide and siloxanes from the biogas produced in the digesters. Also recently added are two 100 kW generators (KB 100) for the combined heat and power system, a FOG receiving station and processing equipment for the food waste that boosts methane production.

> "You've got to produce enough energy to match what you're using to process food waste, but then you've got to go above and beyond that to end up at net zero."
> **GREG WRIGHT**

FACING LIMITATIONS

Only one digester is enough at this point; the second one is used to store and settle the biosolids from the first digester. The supernatant fluid is pumped back to the plant headworks. Then the solids are pumped to an old digester that was part of the original Air Force base plant, and the supernatant again is pumped back to the front. Use of additional digesters in this way has reduced biosolids volume significantly, cutting down land application costs.

Because of the plant's location, food waste sources are limited. The area has no large food processing plants, food distributors or waste food distributors. Originally, Kinross had an arrangement with a garbage collection company to deliver food waste, but that plan evaporated when the local hauler was bought out and the new owner wasn't interested.

"That threw a pretty big wrench into our plans," Wright says. "We had to figure out some way to collect the food waste, and that's when we decided to get our own truck (Mack) and containers (Ameri-Kan Container Service)."

The two 100 kW generators at the food waste processing building at the Kinross Wastewater Treatment Plant produce heat and power.

A FOG receiving station was recently added to the site.

Now Kinross places containers at the prisons and at Lake Superior State University in the nearby city Sault Ste. Marie. Workers at those places fill the containers with trash bags, and treatment plant staff members pick them up.

TROUBLE WITH BAGS

Kinross has equipment to separate the garbage from the bags, but often bags get wrapped up in the machinery. "The bags tend to stretch and wrap around the feed screws, and pretty soon it renders the machine incapable of feeding and separating the food waste," Wright says.

"Sometimes an hour of processing means four hours of maintenance just cleaning it out so we can run it again. That's been our No. 1 problem. We are trying some other ideas to see if we can cut that down to a lower maintenance time. If another community was looking at this, the most important

thing I could tell them would be to find sources that don't involve bags. Good, clean sources of food waste are an absolute necessity for this process to be successful."

Despite the processing issues, the food waste has boosted methane production significantly, and Wright is trying to locate more sources. He's also planning to mix FOG into the digesters: "We want to see what results we can get from that because in our situation, a best-case scenario would be to run FOG, if we can get enough of a source. It's a much simpler process receiving that compared to food waste."

Another issue with the food waste is consistency. The bags' contents can vary significantly. It's not as consistent as, for example, waste from a vegetable processing plant or dairy plant or a brewery. The inconsistencies could lead to problems that show up in the effluent.

"That is why I say that patience is a virtue," Wright says. "Obviously, we want to move forward and keep trying to make the project succeed. But, like everywhere, we have permit limitations that we have to stay within, and that's always going to be the No. 1 priority."

NOT ENOUGH POWER

Even with the boost in methane, the plant doesn't produce enough to generate a lot of power.

"Compared to what we're putting into it at this point, it's costing us money, if you look at man-hours and equipment and everything," Wright says. "I know we're not running enough even to recoup our cost right now."

But Wright can envision a day when the tide will turn and the combined heat and power project will be a good investment. He's looking to bring in a new source of clean food waste. His first goal is to produce enough methane for one of the generators to run 24 hours a day all week.

That's important not just for power production, but for heat, especially in winter. "There's not a part of this process that doesn't take some sort of power," he says. "It requires energy to run. "You've got to produce enough energy to match what you're using to process food waste, but then you've got to go above and beyond that to end up at net zero.

Food waste arrives in plastic bags that often foul the machinery.

"It can be a tall order. We have two big limitations because of our location and the size of our system. The No. 1 thing would be the sources of food waste, and that's because of our location, being a rural community." tpo

1. Russelectric power control systems are custom engineered for each specific installation.

2. Complete emergency power packages typically include an automatic transfer switch.

Backup Power and More

PARALLELING SWITCHGEAR FROM RUSSELECTRIC INTELLIGENTLY TRANSFERS ELECTRICAL LOADS TO EMERGENCY GENERATORS AND HELPS CONTROL MICROGRIDS WITH DIVERSE POWER SOURCES

By Ted J. Rulseh

Hurricanes, floods and other natural disasters in the news highlight the importance of reliable emergency power for water and wastewater treatment facilities.

Besides providing backup electric power, engine-generator sets and accompanying switchgear can deliver cost savings through peak shaving and utility-sponsored demand response programs.

Russelectric, a Siemens business, offers sophisticated emergency power systems. The company's paralleling switchgear offers redundant programmable logic controller controls and manual backup capability.

The complete systems are custom designed and UL listed. The design allows manual start and synchronization of the generator sets if automatic controls malfunction. The systems can also control microgrid systems using combinations of conventional and renewable power sources.

Designed for safety and operating simplicity, the systems are SCADA-compatible. A 23-inch LCD touchscreen display enables operators to view system one-line diagrams, alarms and setpoints. Load demand sensing determines the number of generators online. John Stark, product line manager and marketing communications specialist with Russelectric, talked about the technology in an interview with *Treatment Plant Operator.*

tpo: What is your company's history in the emergency power sector?

Stark: The impetus was the 1965 blackout in the Northeast that left 13 million people without power. Before that, people used portable generators for emergencies. Our founder, Ray Russell, was in that business. After the blackout the government began to mandate on-site emergency backup power systems. And Ray switched his focus to manufacturing power control systems for critical facilities.

tpo: How has your emergency power system evolved since then?

Stark: We manufactured our first emergency system in 1973, and it has been an evolving product ever since then. The structures and mechanical components, and the circuit breakers and automatic transfer switch technology, have remained largely unchanged. It's in the electronics where we keep generating design improvements and enhancements.

> "Every power control system we build is custom engineered."
> **JOHN STARK**

tpo: What would you cite as a unique feature of your systems?

Stark: We build a manual hard-wired backup into our systems, in case computerized control fails. Our systems have dual computers. In the unlikely event that both of them go down, the users only have to flip one switch to activate full manual control. Then they assume control through the traditional means of turning knobs, flipping switches and reading meters.

tpo: What is your basic approach to working with customers on installations?

Stark: Every power control system we build is custom-engineered. We work with a consulting/specifying engineer to tailor the system to perform the way it has to for the specific installation. We have a very high ratio of in-house project engineers to manufacturing people. We fabricate and paint systems in-house. Our structures are assembled using numerous welds instead of bolts. We build extremely durable switchgear.

tpo: How do operators monitor and operate the system?

Stark: The operator interface panel is a touchscreen control on the cabinet. It can be connected to multiple monitors and control rooms throughout a facility. The operator interface allows users to exercise complete con-

trol from the cabinet door. In addition, as an option, we can provide a simulator where users can train operators to use the system. It's not a generic simulator. We can completely simulate the custom-designed power control system that we built for the customer.

tpo: How does your system respond to a utility outage?

Stark: On receiving the signal of loss of the normal power source from automatic transfer equipment, the system automatically sends commands to start on the engine-generators. The first generator set to reach the preset voltage and frequency is connected to the bus by automatically closing its circuit breaker. The system then permits the first-priority loads to transfer to that genset while delaying the transfer of lower-priority loads until more generator capacity has been connected. In most cases this is hardly a delay at all.

tpo: How is system control maintained through the duration of the outage?

Stark: The system manages automatic paralleling of the remaining generator sets to the emergency bus, as they are available, through their individual synchronizers and circuit breakers. The system signals lower-priority loads to transfer to the emergency power system as generator sets are added to the bus. If a generator set fails during emergency operation, the system manages the shedding of low-priority loads, thereby ensuring that the high-priority loads receive continuous power. When normal power is restored, the system alerts the generator sets to disconnect and shut down after an unloaded cooldown period.

tpo: Beyond emergency power, what kinds of applications can your systems control?

Stark: We can manage utility paralleling, demand response and peak shaving as well as prime power for remote sites. And now with climate change and the challenges we face with weather events, we have added the ability to incorporate solar panels, wind turbines and other types of power generation in our advanced microgrid control systems.

tpo: How does the technology function in microgrid environments?

Stark: We're plugged into all the different power assets, and we monitor and control them. An analogy is that these power sources are like musical instruments. We harmonize them so that they make good music. Our systems are essentially the conductors of the orchestra. They make sure the power sources play nicely and dynamically together.

> "In microgrids we harmonize the power sources so that they make good music. Our systems are essentially the conductors of the orchestra."
> **JOHN STARK**

tpo: What are some specific functions the technology can perform in a microgrid?

Stark: The switchgear physically and electrically connects and controls facility loads and generation. Meanwhile a state-of-the-art-of software controller can configure microgrid performance and the sequence of operations; optimize the system for resilience, cost and carbon emission mitigation, secure cyber communications, forecast loads and renewable generation, manage energy market transactions and more.

tpo: What other attributes does your company offer?

Stark: We have been in the power control system business for over 60 years. We have an excellent capability to support our customers. We have a reputation for reliability. Our equipment is made in the USA. tpo

Three Kinds of Maintenance

CORRECTIVE, PREVENTIVE AND PREDICTIVE APPROACHES CAN COMBINE TO HELP TREATMENT PLANTS DELIVER RELIABLE, COST-EFFECTIVE PERFORMANCE AND CONSISTENT REGULATORY COMPLIANCE

By Eric Whitley

Effective maintenance is critical to reliable water and wastewater treatment. An unplanned breakdown of a critical piece of equipment can lead to a process interruption, a permit violation or a costly unplanned repair.

Three basic maintenance strategies — preventive, predictive and corrective — help facility personnel keep the treatment plant in running condition with optimum performance. Plant maintenance personnel physically inspect all process stages and their critical components. A sound maintenance strategy enables team members to detect trouble and repair or replace devices and parts before breakdowns occur. Here is a look at the basic components of a sound maintenance program.

CORRECTIVE MAINTENANCE

Corrective maintenance (sometimes called break-fix) refers to making repairs to return a system to a working condition after it has failed. It is considered a reactive strategy. Plant teams can manage corrective maintenance manually or use software solutions that automate different parts of the process.

Manual methods involve significant paperwork and require team members to execute the entire process from receiving complaints to deploying personnel and keeping records. This approach comes with issues that include incomplete records, failure to make repairs in a timely manner and difficulties with replacement parts inventory. It also burdens maintenance personnel with documenting routine activities.

The automated method applies software programs called computerized maintenance management system or enterprise asset management software. These tools help manage treatment plant maintenance by taking control of planning, documentation and resource allocation. CMMS and EAM help streamline corrective maintenance using five approaches:

- Generating tickets (work orders) automatically, notifying the maintenance department and closing the tickets with all the necessary details documented.
- Keeping necessary records and providing easy access to information about assets.
- Deploying maintenance staff based on the scheduling plan.
- Providing a line of communication for maintenance staff.
- Minimizing corrective maintenance by helping staff execute proactive maintenance strategies.

PREVENTIVE MAINTENANCE

Preventive maintenance is a planned activity performed at regular intervals based on time or equipment usage. Time intervals can depend on the equipment manufacturer guidelines provided, such as changing the oil in the clarifier drive every four weeks. On the other hand, assets can be serviced after a specific use period, such as cleaning the surface of a filtration membrane after a certain number of working hours.

In treatment plants, equipment calibration is an essential part of preventive maintenance. Calibration is the verification of an instrument's output against a standard reference. Its main purpose is to identify any defective instrument for rectification or replacement. All measuring instruments and gauges should be calibrated at a fixed interval each year.

In today's world, water and wastewater treatment plants increasingly automate routine processes, helping to optimize production, maintain compliance and maximize operating staff efficiency. CMMS and EAM tools help manage preventive maintenance activities through the following methods:

- Scheduling incoming maintenance work automatically.
- Preparing preventive maintenance checklists.
- Distributing preventive maintenance schedules to relevant departments and personnel.
- Involving relevant departments before planned maintenance work begins so they can execute necessary preparations.
- Updating the records and tracking preventive maintenance treatment plant assets.
- Scheduling calibration tasks and tracking their completion.

PREDICTIVE MAINTENANCE

Predictive maintenance continuously monitors critical components and water plant sections to detect the likelihood of a fault or breakdown before it occurs. It relies on condition monitoring sensors that feed data into complex predictive algorithms. Data fed into predictive algorithms include vibration analysis, oil analysis and infrared sensing or thermal imaging.

Vibration analysis, which detects abnormal movement in rotating or moving components. Sensors such as accelerometers detect abnormal vibration levels and then are used to diagnose potential trouble, such as bearing faults, gear faults and unbalancing.

Corrective, preventive and predictive maintenance offer different strategies and tactics. Treatment plant owners and maintenance personnel can benefit greatly when all three are combined.

Oil analysis, which is used to study the condition of lubricants. Defects in any component can contaminate oil and change its properties. When an anomaly in the oil is detected, the device can be investigated for any potential fault.

Infrared sensing or **thermal imaging,** which detects abnormal temperatures in mechanical, electrical, and electronic components. Since abnormal temperatures result from unusual stress or load, the results can be used to investigate the potential for faults.

CMMS and EAM help streamline predictive maintenance using four methods:

- Providing historical asset information and other asset data that can be used to build predictive models.
- Performing data analysis to catch impending failures early, and prevent costly breakdowns.

- Automatically creating work orders based on asset condition and predictive algorithms, or at least notifying the maintenance team about required actions.
- Helping maintenance planners schedule timely maintenance work.

WORKING IN CONCERT

Corrective, preventive and predictive maintenance offer different strategies and tactics. Treatment plant owners and maintenance personnel can benefit greatly when all three are combined. Corrective maintenance is a good choice for assets that are nonrepairable and easy and cheap to replace, such as UV lamps and filter cartridges.

Preventive maintenance is suitable for assets that can cause serious operational problems if they are out of service, and for assets such as valves, sensors and measuring instruments. Predictive maintenance applies mainly to critical assets such as blowers, motors and pumps. Treatment plant managers who combine the three strategies maximize equipment uptime, extend asset life, save money and labor, and avoid permit violations.

Tools for maintenance activities are essential in today's automated environments. They help plant owners and maintenance personnel concentrate more on the core business of producing clean wastewater effluent or safe drinking water, instead of focusing on routine tasks. However, careful selection of these tools is critical: it leads to optimum efficiency, high return on investment and effective plant performance.

ABOUT THE AUTHOR

Eric Whitley is director of smart manufacturing with L2L, a company based in Salt Lake City, that helps businesses accelerate digital transformation. He writes a blog at www.l2l.com/what-is-cmms-software. **tpo**

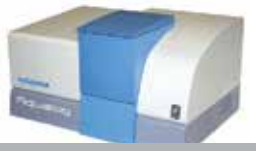
Online Exclusives at www.tpomag.com

Monitoring and Instrumentation

By Craig Mandli

Analytical Instrumentation

HORIBA SCIENTIFIC AQUALOG A-TEEM



Aqualog A-TEEM fluorometer from HORIBA Scientific

The Aqualog A-TEEM from HORIBA Scientific is a fluorometer that simultaneously scans for absorbance and fluorescence excitation and emission matrix. Unlike traditional scanning spectro-fluorometers that take hours, its optical technology with multichannel CCD detection allows for rapid A-TEEM scans from seconds up to minutes per sample. A-TEEM provides true, traceable molecular fingerprints as well as precise quantification for compounds of interest. Its ability for automatic inner-filter effects correction not only ensures the accuracy of the fluorescence spectra but also extends the sample's concentration linearity range. With the combination of multivariate analysis, it complements an organics lab as an advanced tool for organic matter characterization. It is a simple, fast and powerful analytical tool that in some cases displaces laborious and expensive chromatography-based techniques. **866-562-4698; www.horiba.com/scientific**

Controllers

OLS Control Panels from Orenco Controls

ORENCO CONTROLS OLS CONTROL PANELS

OLS Control Panels from Orenco Controls come with the choice of either integrated starters or variable-frequency drives that optimize system operation. These panels are suitable for a variety of pumping applications such as lift stations, stormwater pump stations, water boosting, dewatering or sludge pumping. They can also be used as a SCADA patch, connecting peripheral equipment to future or existing SCADA systems. Parameters can be configured via a human-machine interface and include a user-friendly startup wizard. Engineers can preprogram user interfaces to the site-specific needs of an installation, making the panel virtually plug-and-play. Maintenance staff can easily adjust settings and monitor the system remotely. These weatherproof control panels are UL 508A listed and include service-rated circuit protection, phase and voltage protection, and level controls. **877-257-8712; www.orenco.com**

SMITH & LOVELESS SHADE AIDE

SHADE AIDE screen protector from Smith & Loveless

The SHADE AIDE from Smith & Loveless is a human-machine interface screen protector that easily installs onto a variety of control panels so that operators can see their HMI no matter how sunny of a day. It collapses when not in use and is fully lockable. It also protects the display from the harmful effects of constant UV ray exposure, saving the maintenance budget from replacement HMI costs due to excessive sun exposure. The product is compatible and customizable to fit every HMI screen sold today, with custom sizes available. **800-922-9048; www.smithandloveless.com**

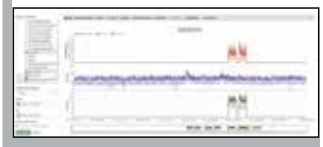
Flow Control and Software

ALLMAX SOFTWARE OPERATOR10

Operator10 from AllMax Software

Operator10 from AllMax Software provides a central database for all of a plant's operational and process control data. Users have the ability to manually enter data, pull data directly from SCADA and/or import data from LIMS programs. Built-in tools allow for regulatory reporting/electronic submittal, custom report creation, graphing, process control calculations, built-in formulas (mean cell residence time, sludge volume index, food-to-microorganism ratio, etc.), easy customizable data entry sheets, customizable user dashboards, a full audit trail and a biosolids module. Users benefit from easy access to historical/current plant data, decreased time on monthly reporting, better overall data management and improved plant efficiency. **800-670-1867; www.allmaxsoftware.com**

INFINITII AI FLOWWORKS PRO



infinitii ai flowworks pro

infinitii ai flowworks pro is a powerful predictive analytics software suite that performs real-time analysis, checks flow monitoring status and sets alarms through a single interface, accepting all types of data from any source with unlimited data transactions. It includes a manual I&I pump station calculator and rainfall Intensity-Duration-Frequency analysis. It also includes infinitii face pro, a streaming analytics application for data transformation that allows the user to add logic and algorithms for real-time processing and deploy machine learning to manage and operationalize production-ready models for generating new data or output events such as predictions. Build analytic models that act on sensor data or other data sources with its built-in script editor, using existing scripts from open source libraries or ones you create. **778-379-0275; www.infinitii.ai**

SEALRYT FLOW METERS

Flowmeters from SealRyt

SealRyt recommends installing flowmeters on flush lines to properly regulate seal water in sealing applications. To ensure that the media is not infiltrating the stuffing box, using flush in pump seals is only effective when the flush pressure is 15 psi above media pressure. The pressure differential is crucial to the seal mechanism. Once media is introduced to the stuffing box, it can clog the lantern ring, raising friction and heat buildup. Media contamination degrades the packing, which compromises the seal. The flowmeters give accurate pressure readings of flow rate and pressure, allowing the seal to be optimized depending on the media pressure. **413-564-5202; www.sealryt.com**

YSI, A XYLEM BRAND IQSN MOBILE

IQSN Mobile from YSI, a Xylem brand is an application that provides instant access to a YSI IQ SensorNet network of sensors and analyzers from a mobile device. This app displays live readings, data trends, sen-

sor health notifications, maintenance reminders and alarms. It allows users to view process data from the comfort of an office, home or anywhere with Internet access on a cell phone or tablet. Users can monitor sensor health in real-time with colored indicators and customizable push notifications for alerts, alarms and reminders on a mobile device. Stay on top of maintenance with factory default maintenance reminders and customized alerts to clean and calibrate sensors. Manage, export, and share measured data, maintenance history, system configuration and sensor logbooks from the mobile app at any time. Quickly respond to plant upsets and retain peace of mind with remote data visibility to IQ SensorNet data 24/7 — even away from the plant. **937-767-7241; www.ysi.com**

IQSN Mobile application from YSI, a Xylem brand

Gas/Odor/Leak Detection Equipment

Reporting platform from Blackline Safety Analytics

BLACKLINE SAFETY ANALYTICS

Blackline Safety Analytics is a comprehensive reporting platform that delivers deep insights into a gas detection safety program. Users can interpret the data from connected safety devices to drive efficiencies and improve safety. Essential reports help understand usage, manage compliance, and investigate incidents. They can gain insights into how, when and where devices are used to understand worker behaviors, improve scheduling and productivity. Devices are connected to the cloud the moment they are turned on and begin logging usage, location and compliance data, with no manual collection or docking required. Real-time location information allows for fast and informed responses. And from safety monitoring settings to emergency response protocols and notifications, everything is tailored to fit safety needs. Companies can configure, customize and monitor all their safety devices from a single screen, with no IT integration required. **800-486-8889; www.blacklinesafety.com**

RKI INSTRUMENTS GX-6000

The GX-6000 from RKI Instruments simultaneously monitors up to six gases, including combustibles, oxygen, carbon monoxide and hydrogen sulfide. Two smart sensor slots accept PID, infrared or other toxic gas sensors. It includes an internal sample pump, man-down and panic alarm, LED flashlight and large auto-rotating LCD. It operates as a single-gas PID unit or a multifunctional tool using all six channels. The PID sensor comes equipped with a library of more than 600 VOC gases and can personalize a favorites list of 30 commonly used VOCs as well as a list of eight of the most recently used VOCs. A benzene-specific PID sensor is also available using a pre-filter tube for detecting low levels of benzene. Four PID sensors are available, 10.0 eV, 10.6 eV (low or high range) and 11.7 eV. Any combination of two PID sensors can be installed. **800-754-5165; www.rkiinstruments.com**

GX-6000 monitor from RKI Instruments

Meter

SUBECA AMI SOLUTION

Subeca's AMI solution includes an AWS IoT Core for LoRaWAN technology. Meter data is captured via the Subeca PIN register while the Subeca LINK delivers that data through the AWS cloud to both agencies and consumers. LINK also communicates with other smart devices such as irrigation controllers, water quality sensors or customer smart valves via an edge network. PIN and LINK retrofit any brand of meter — including deployed inventory — in minutes. The Engage Platforms are comprehensive yet intuitive software interfaces that keep agencies and consumers in control of water consumption. Engage makes sense of water data, detects leaks and makes it possible to respond through remote valve control. **760-275-2296; www.subeca.com**

AMI solution from Subeca

Process Control Equipment

DE NORA WATER TECHNOLOGIES MICROCHEM 450

The MicroChem 450 controller from De Nora Water Technologies was designed with decades of chlorine management and analysis experience. Easily tailored to meet unique instrumentation needs, process input signals like water flow and residual concentration are applied to user-adjustable preprogrammed control strategies to automatically adjust disinfection feed rates. Automatic process control with the ability to fine-tune to site conditions assures the process remains in control as water conditions change. It is compatible with De Nora gas feed equipment or other systems that utilize a mA control output signal. Its large color LCD shows process inputs at a glance. It gives fingertip access to most common controller settings of ratio and setpoint. Smart software only shows tuning parameters related to the selected control scheme. It has an intuitive software layout and touchscreen display, with 28-day internal datalogging built in, along with six language options. **215-997-4000; www.denora.com**

MicroChem 450 controller from De Nora Water Technologies

ENVIROSUITE SEWEX

Under humid conditions, methane and hydrogen sulfide in sewer networks can lead to hazards and odor nuisance to customers, as well as compromising the safety of field operators. Hydrogen sulfide may be oxidized to sulfuric acid, causing corrosion. An unexpected failure due to corrosion can cost a wastewater utility millions of dollars. Using network facts, hydraulic data and wastewater characteristics as model inputs, SeweX from Envirosuite uses predictive modeling to optimize dosing decisions across the entire network, thus avoiding corrosion, odors and safety incidents. Evidence-based decision-making identifies and evaluates available solutions, based on the concentration details of pH, various sulfur and carbon compounds, the service life of the sewer and a heatmap of the identified hotspots. The Software-as-a-Service product allows utilities to understand and manage risks more easily. **424-335-1331; www.envirosuite.com**

SeweX from Envirosuite

(continued)

FORCE FLOW WIZARD 4000

Wizard 4000 chemical inventory system from Force Flow

The Wizard 4000 from Force Flow is a powerful chemical inventory system for monitoring chlorine gas, sodium hypochlorite, hydrofluosilicic acid and all other chemicals used in water treatment. It can help ensure a safe process and a safe plant by providing essential information such as current chemical feed rate, how much chemical has been fed and how much chemical remains. With four separate channels, it can be used to simultaneously monitor levels in up to four separate tanks. Each tank can be monitored independently while monitoring combined totals for all the tanks. The daily usage function allows for easy recordkeeping, and a days-until-empty function makes it simple to anticipate tank refilling and chemical reorder points. A feed-rate function allows early warning of dangerously low or high feed-rate conditions, preventing hazardous underdosing or overdosing of chemicals to the water supply. **925-686-6700; www.forceflowscales.com**

FRANKLIN ELECTRIC CERUS X-DRIVE

Cerus X-Drive drive solution from Franklin Electric's all-inclusive

Designed for variable torque applications up to 600 hp, the Cerus X-Drive is Franklin Electric's all-inclusive drive solution for a variety of markets. Available as a standalone drive and in multiple enclosed configurations, these panels are built to last, according to the maker, with every detail and component centered around the application's specific requirements. It can be paired with a choice of motors and pumps to maximize the performance of the application. **866-271-2859; www.franklinengineered.com**

HEMCO AIRFLOW MONITOR

AirFlow Monitor from HEMCO

The AirFlow Monitor from HEMCO continuously monitors face velocity air flow of a fume hood. The user simply selects and calibrates it at a desired FPM velocity set point. If the hood face velocity falls below that set point, an audible alarm sounds and a visual red indicator light appears. The monitor is factory installed, or can be field installed using 115/60Hz AC. **800-779-4362; www.hemcocorp.com**

PULSAFEEDER PULSATRON MP SERIES

Pulsatron MP Series from Pulsafeeder

Pulsafeeder's Pulsatron MP Series now features an optional 4-20mA output signal that provides a remote indication of pump speed to remotely confirm the pump's speed is adjusting to process parameters, and more accurately estimate chemical usage over time. The pump transmits a 4-20mA signal proportional to the actual speed of the unit and is factory calibrated for easy installation in the field. It is a true microprocessor-controlled instrument delivering precise and accurate metering control. Packed with standard features, it includes automatic control via 4-20mA or 20-4 mA inputs, an external pace function with a stop feature, and a graphical LCD display with support for English, French, German and Spanish languages. Models are capable of flows ranging between 3 and 504 gpd and pressure ranges from 20 to 300 psig with a turndown ratio of 1000-1. **800-333-6677; www.pulsafeeder.com**

SCADA System

EMERSON MOVICON.NEXT

Movicon.NExT from Emerson

Discrete and hybrid manufacturing applications in food and beverage, consumer packaged goods, and other industries now require both local and remote/web visibility, robust data connectivity and analytics to support manufacturing efficiency and optimization efforts. Emerson's Movicon. NExT is an advanced platform meeting these needs, built on a performance-enhancing open framework that is flexible and scalable from small IIoT applications to large server-based and cloud systems. Available modules support essential industry needs for lean manufacturing and energy monitoring, in addition to new innovations, such as augmented reality. Cybersecurity is built-in, with conformance to standards for openness and reliability, and powerful wizards, libraries, and toolboxes within the software ensure rapid development. Developers can use it for HMI/SCADA and much more, to progressively achieve sustainability and performance improvements, one step at a time, easily and cost effectively. **800-972-2726; www.emerson.com**

Sensors

ADS AV|MAX

AV|Max sensor from ADS

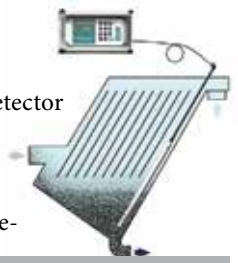
The AV|Max from ADS is an area-velocity sensor for the ADS TRITON+ monitors. The wetted sensor is installed directly in the pipe flow to provide consistent, high-quality data collection capability. Its low-profile, impact-resistant polycarbonate housing with recessed sensors brings new levels of durability in sewer flows. The sensor design is tested and proven to collect accurate and consistent data in depths from 1 to 60 inches and in flows of up to 30 feet per second. In areas of intermittent no-flows (dry-pipe) the company recommends the sensor can be used in combination with one of their noncontact sensors. The sensor measures four key parameters: depth — using ultrasonic UpDepth, depth — pressure, velocity — continuous wave ultrasonic Doppler, and water temperature. **877-237-9585; www.adsenv.com**

KELLER AMERICA ECONOLINE

Econoline pressure transmitter from Keller America

The redesigned Econoline pressure transmitter from Keller America is built for consistent performance. The Lean Production cell provides maximum versatility for customer-specific applications with short lead times, thus negating the need for the user to maintain extra inventory on site. It combines a media-isolated piezoresistive silicon sensor with signal conditioning electronics to provide a compact pressure transmitter with < ±1% total error band accuracy over 0-50 degrees C. The industry standard 4-20mA analog output is compatible with most existing monitoring infrastructure and SCADA systems and provides meaningful output in ranges from 30 to 10,000 psi. The design makes it suitable for use under harsh environmental conditions, including those with high levels of electromagnetic radiation, both conducted and radiated. As a result, it provides trouble-free service and sufficient accuracy for almost any application, including those involving aggressive media and/or high levels of electromagnetic interference and where small size, low weight and reasonable cost are required. **877-253-5537; www.kelleramerica.com**

MARKLAND SPECIALTY ENGINEERING AUTOMATIC SLUDGE BLANKET LEVEL DETECTOR



Automatic Sludge Blanket Level Detector from Markland Specialty Engineering

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

Security Equipment/System

PHOENIX CONTACT SMART CAMERA BOX

Smart Camera Box from Phoenix Contact

The Smart Camera Box from Phoenix Contact is an all-in-one device that securely connects IP surveillance cameras to the video server. It integrates the functions of conventional connection boxes assembled with standard DIN rail devices into a single compact device. This saves planning, installation time, and cost. It provides reliable data communication for up to four PoE devices via an internal Ethernet switch. The uplinks to the video center are standard Ethernet or fiber optic, made easy with an integrated fiber optic splice cassette. The integrated surge protection and door opening sensor provide additional reliability and security. The IP67 housing and wide temperature range enable reliable use in harsh environments, while the integrated mounting adapter for wall and mast mounting makes installation much quicker and easier. Numerous management and monitoring functions ensure the reliable operation of the video system. **800-888-7388; www.phoenixcontact.com** tpo

Aqueous Vets recognized by ASCE Los Angeles

Aqueous Vets was recognized by the American Society of Civil Engineers Los Angeles for its collaboration with Orange County Water District and Yorba Linda Water District to design, manufacture and install a single-site ion exchange PFAS treatment facility. The YLWD PFAS treatment facility was awarded the Water Treatment Project of the Year by ASCE LA. In partnership with Tetra Tech and Pacific Hydrotech Corp., AV worked with OCWD and YLWD to install 11 pairs of PF12-520 LowPro IX resin systems. These systems were instrumental in bringing all nine of the site's impacted wells back into service, enabling YLWD to increase its groundwater usage. The plant became operational in December 2021 and can treat up to 25 million gallons of water per day.

Asahi/America welcomes Steve Landry as district sales manager


Steve Landry

Asahi/America announced the addition of Steve Landry to its outside sales team. Landry joined Asahi/America in December as district sales manager for the Texas region. He will work closely with Asahi/America's distribution network and business development team on sales efforts and engineering specifications for the company's industrial valve, actuation and piping product offerings. Landry comes to Asahi with over 20 years' experience in thermoplastics.

Endress+Hauser receives philanthropy award from ISU

Endress+Hauser received Indiana State University's March On! Philanthropy Award. The award highlights the company's collaboration with the school's Bailey College of Engineering and Technology and Scott College of Business, along with donations to support students and faculty. ISU honored Endress+Hauser for its close work with the Bailey College of Engineering and Technology in creating opportunities for students through internships that progress into full-time positions. Endress+Hauser also recently collaborated with the school's Scott College of Business to further aid the career success of ISU students. Additionally, ISU recognized Endress+Hauser's donations to support student scholarships and assist school faculty.

Badger Meter acquires Syrinix

Badger Meter has acquired Syrinix, a privately held provider of intelligent water monitoring solutions, for $18.3 million. Founded in 2010 and headquartered in the UK, Syrinix specializes in high-frequency pressure monitoring and leak detection within water distribution and collection networks. Its remote network monitoring equipment and cloud-based software platform deliver data, customized alerts and insights that empower customers with real-time asset monitoring to reduce water loss and improve asset life.

Bentley Systems promotes Brock Ballard, adds Eric Boyer


Brock Ballard


Eric Boyer

Bentley Systems announced that Brock Ballard, previously vice president and regional executive, Americas, has been promoted to the role of chief revenue officer, and that Eric Boyer has joined as investor relations officer. Ballard succeeds newly retired Gus Bergsma who joined with Bentley Systems' acquisition of RAM International in 2005. Prior to joining Bentley Systems in 2020, Ballard served in sales leadership positions with Dassault Systèmes, Autodesk and Océ. Boyer brings over 20 years' experience in investor relations and equity research, a knowledge of capital markets, and a strong network of relationships. Prior to Boyer's investor relations career, he spent more than a decade as a sell-side equity analyst at Wells Fargo and Deutsche Bank.

Xylem honors Texas, Michigan water utilities

Xylem recognized utilities and distributors who go above and beyond in the areas of customer service and community impact with a 2022 Reach award. The City of Fort Worth earned the Reach Transformation Award for deploying Xylem's digital solutions to optimize their utility operations and meeting customer demands in one of the country's fastest growing cities. And the Village of Mattawan in Michigan was presented the Reach Resiliency Award for modernizing their operations with smart water technology to multiply the efforts of their four-man public works team.

Cemen Tech expands manufacturing facility

Cemen Tech completed the expansion of its facility in Indianola, Iowa, by adding 12,000 square feet, bringing the total square footage of the company's manufacturing facility to 120,000 square feet. The expansion is part of the company's commitment to investing nearly $3 million to upgrade facilities, equipment and technology. As part of the facility expansion, the company is setting aside space for the new Cemen Tech University, created to develop employees with highly desired, specialized skills.

infinitii ai signs national distribution agreement with Core & Main

Vancouver-based infinitii ai has signed a national distribution agreement for infinitii flowworks predictive analytics software for Smart City water and wastewater infrastructure utilities with Core & Main. The software has already been adopted by utilities in Los Angeles County, Boston, Seattle and Miami-Dade County.

Greene Tweed names new president and CEO


Magen Buterbaugh

Greene Tweed announced the appointment of Magen Buterbaugh as president and CEO of Greene Tweed. Buterbaugh brings two decades of experience in progressive management, and a long track record of leading cross-functional teams in a variety of industries and markets, from large corporations to startups. She replaces Kevin Lukiewski, who retired at the end of 2022.

Nedwick named ResinTech's new director of research and quality


Paul Nedwick

ResinTech welcomed Paul Nedwick as its director of research and quality. Nedwick brings a wide-ranging chemical background that began at Rohm and Haas, where he focused on marketing, manufacturing operations and technical support. He subsequently moved on to product innovation roles at Seal Strip and Dow Chemical in a career that has spanned more than 30 years.

Thompson Pump adds new central U.S distributor

Thompson Pump and Manufacturing announced its distributor's agreement with Kirby-Smith Machinery. With this new partnership, Kirby-Smith will be selling, servicing and renting Thompson Pump's products throughout Oklahoma and North and West Texas within markets like governmental sales, oil and gas, construction, mining and industrial. tpo

What Does Wastewater Treatment Cost?

THE 10TH SURVEY OF SEWER USER CHARGES IN WISCONSIN PROVIDES DATA THAT CAN SUPPORT SOUND DECISION-MAKING ON RATES AND FOSTER EFFECTIVE PUBLIC COMMUNICATION

By Ted J. Rulseh

Pat Morrow

In my first newspaper jobs I covered a wide range of municipal organizations, including water and sewer utilities. One water utility had a small poster on a bulletin board next to where users paid their bills, comparing the cost of water to that of milk, beer, soda pop and other products. It listed the cost of water as: "Four gallons for one cent — delivered."

That's what I call a great piece of public communication. That utility's water certainly costs more now (this was 40 years ago), but it's surely still a terrific bargain next to, say, bottled water from the grocery store.

In any case, it's wise to help people understand the cost/value ratio of water and wastewater services. To that end, the MSA Professional Services consulting firm produces the Wisconsin Sewer User Charge Survey. The company recently released its 10th such survey, drawing on information solicited from more than 700 WPDES permit holders.

The report gives utility departments a candid, comparative analysis of sewer rates. It's designed to help communities when applying for funding or making decisions about infrastructure upgrades and resulting rate increases. It can also help them calm the waters when proposing rate increases to the public. Pat Morrow, P.E., wastewater team leader with MSA, talked about the report in an interview with *Treatment Plant Operator.*

tpo: What is the history of the Sewer User Charge Survey?

Morrow: We have been doing this report every three years or so since 1996, spearheaded by our CEO, Gil Hantzsch. It came out of a history of telling communities they needed to upgrade their treatment facilities to and increase their sewer rates to some number, based on the cost and their eligibility for loans and grants. In that process we were asked many times: Is this fair? Is this normal? What are other communities nearby paying? There was no body of evidence at the time that documented what communities were paying for clean water.

tpo: How is this report compiled?

Morrow: Historically we send a survey questionnaire to all municipalities in the state that have sewer rates. It started out small and kept growing. In 1996 we had just over 100 respondents. The responses peaked in 2010 with over 500. Then it started declining, and we have been maintaining at around the 300 mark. In December 2021 we sent out 778 surveys, and there were 310 respondents, which is almost 40%.

tpo: Who can get copies of the report?

Morrow: When municipalities return the questionnaire, we collect their data, and when the report is finished we offer them a free electronic download. For those that don't return the survey, we have charged for a digital download or hard copy.

tpo: Does this survey cover industrial and commercial sewer rates?

Morrow: The study focuses on residential rates because the DNR and USDA Rural Development look at the cost of residential sewer rates when evaluating needs for funding. They don't provide grants or low-interest loans to industrial or commercial users because those entities can increase the cost of their goods or services to make up for the rate increase. Residential users don't have that kind of leverage.

tpo: Does this report have usefulness outside Wisconsin?

Morrow: We don't solicit utilities from other states, but the sewer rate data is pretty applicable to neighboring states. We also have long-term aspirations to expand the survey, at least within the geographic region we serve. We have offices in Minnesota, Illinois and Iowa as well as Wisconsin.

tpo: What trends in sewer rates have you observed over the years?

Morrow: One trend that's apparent is that people in smaller communities tend to pay more for wastewater treatment. It's an economy of scale issue, but in addition, it's because many smaller communities have to meet the same new and stricter regulations as bigger cities. The advanced technologies needed to accomplish that don't scale down perfectly.

> "One trend that's apparent is that people in smaller communities tend to pay more for wastewater treatment."
> **PAT MORROW**

tpo: What about rates in very small communities?

Morrow: Communities with populations less than 500 have slightly lower average costs due to the prevalence of lagoon-based systems. They tend to have constructed those lagoons a long time ago, so they've already gone through the pain of elevated sewer rates. Often they haven't had to increase their rates because the lagoons are still viable. But if a new WPDES permit is issued, those communities may receive stricter effluent limits. That can bring the largest rate increases, because the communities haven't been raising their rates every couple of years; they haven't needed to.

tpo: Generally speaking, what is happening to rates over time?

Morrow: In general, rates have increased 4-5% on average per year. One metric regulators use for affordability is a comparison between a community's annual sewer service cost and the median annual household income. Historically, they have used a threshold of 2%, so that if the annual sewer

> “Wastewater treatment is a highly sustainable practice, and it is undervalued and underappreciated in many cases.”
> **PAT MORROW**

service cost exceeds 2% of median household income, that's too expensive and will cause economic hardship. In that event the community may be eligible for more funds by way of grants or low-interest loans.

tpo: What has been happening to that affordability metric over time?

Morrow: Sewer rates have been decreasing significantly as a percentage of household income. In recent years, median household incomes have increased faster than the sewer rates. That indicates municipalities perhaps are not increasing sewer rates maybe as much as they should. That contributes to the large rate increases we see when upgrades become necessary.

tpo: Would you say that communities are charging rates that reflect the value of the service and the needs of the infrastructure?

Morrow: I would say the answer is no. Clean water and safe drinking water historically have been undervalued, and municipalities have become really good at making do with what they have. Elected officials take a lot of pride in keeping rates affordable. Keeping the current rate structure is a big goal of many city councils and utility boards. But that does them a disservice when the upgrade is needed and they have to ask their residents for a 20%, or 30%, or 50%, or even 100% rate increase.

tpo: How do you convince utility officials to keep rates adjusted appropriately?

Morrow: I like to tell my clients about that the cable company doesn't worry about increasing people's bills. The gas company just makes an inflationary increase year to year. Providers of other basic services have no qualms about raising rates. Why should wastewater utilities be any different?

tpo: How would a utility use the information in this survey?

Morrow: It enables them to look at trends and see how they compare to their peers, while at the same time looking ahead to see where they are in terms of need for future upgrades. If they know things are wearing out and they need an upgrade in the next handful of years, they can use the data to help gauge where their rates ultimately need to be. Then they can decide to increase rates gradually and avoid a huge increase for the upgrade. That's a lot less painful for customers, and the utility then has money in the bank to offset some of the principal on the loan they will need.

tpo: Does the rate survey information help utility leaders explain rate increases to users?

Morrow: Absolutely. When we go to a community and say they need an upgrade and will have to increase sewer rates, one of the first questions is what the rates are in the community down the road that is about the same size, or in a community that just did a similar upgrade. With the survey data, we have that information.

tpo: What typically happens to the ranking of a community's rates after an upgrade?

Morrow: The report shows that on average the closer they are to having done an upgrade, the higher their sewer rates are. Those that have done a treatment plant upgrade in the last five years tend to have the highest rates. They might start out in the lower 20% of all sewer rates, but after the upgrade they are likely to be in the 80th or 90th percentile. Then as they pay down their 20-year loan and other communities start having to upgrade, they slide toward the bottom again.

tpo: Have you seen communities use data from this report in a public meeting to help justify a rate increase?

Morrow: That is a very common practice. If you look on the web pages of utilities that are planning upgrades, you might find information from this very report. It's good information to have at a public hearing. The data helps people realize that they're not alone, that they're not the only ones facing an increase.

tpo: How do sewer rates compare with those of other basic residential services?

Morrow: I often show a figure that compares what people spend on water and sewer to what they spend on things like mobile phones, satellite TV, natural gas, electricity and other critical and optional services. Ever since we've been doing this report, water and sewer is on the far end of the spectrum as the least expensive. Wastewater treatment is a highly sustainable practice, and it is undervalued and underappreciated in many cases.

tpo: Who has been instrumental in creating this report?

Morrow: For their assistance in providing data for this study, we are grateful to Steve Kemna, P.E., and Andrew Fisher of the Wisconsin Public Service Commission; Jeanne Cargill of the DNR; David Pawlisch of the Community Development Block Grant Program, and Julie Giese of USDA Rural Development. MSA team members Shelley Granberg, Susan Marcott, and Troy Weber played key roles in compiling the data and putting the report into an easy-to-read format. Finally, Tom Fitzwilliams, while no longer with the company, was instrumental in creating this and several previous editions of the report. tpo

By Craig Mandli

Reclamation facility uses online THM analyzer

Problem

The upgraded Tres Rios Water Reclamation Facility, operated by the Pima County (Arizona) Regional Wastewater Reclamation Department used a five-stage Bardenpho process for ammonia, nitrate and nitrite reduction. However, reduced effluent ammonia and the use of chlorine disinfectant increased potential for total trihalomethane formation in the effluent. Operations experimented with adding centrate as an ammonia source before chlorination to make chloramines, since that disinfectant produces lower THMs than chlorine.

Solution

The online **THM-100 analyzer (Aqua Metrology Systems)** was used to characterize and monitor THM formation. The device comes with a standard sampling schedule every four hours, but the sampling frequency can be changed to meet specific needs. Analytical results, system performance and analyzer health are remotely monitored 24/7 by AMS to ensure that the online THM instrument remains online and working under optimal conditions.

RESULT:

The self-calibrating analyzer gave operators immediate and accurate daily reports on THM levels. By monitoring real-time THM formation after the addition of ammonia, operators were better equipped to control THM production and optimize the process. After successful testing, the instrument was placed into full-scale use. **408-523-1900; www.aquametrologysystems.com**

Online turbidimeter delivers higher accuracy, easier maintenance

Problem

The MidAmerica water treatment plant provides drinking water for tenants of the 9,000-acre MidAmerica industrial park in Pryor Creek, Oklahoma. Most instrumentation in the plant was aging and obsolete. Turbidimeters were no longer supported by the manufacturer and required excessive maintenance.

Solution

The plant staff chose the **MTOL+ Online Turbidimeter from HF scientific, a Watts brand.** The instrument, which measures turbidity or presence of suspended particles, was installed as a trial. Plant instrument and maintenance staff found the unit much easier to calibrate and maintain than the previous instrumentation. The low-range three-point calibration also yielded higher accuracy at the very lower turbidities at which the plant operates.

RESULT:

The plant replaced all turbidimeters with the HF MTOL+, Stagg has been happy with their reliability, support and ease of use. The team then evaluated the CLX chlorine analyzer from HF Scientific and found it superior to that of the existing device. **239-337-2116; www.hfscientific.com**

Remote terminal units installed on lift station

Problem

The Gwinnett County Department of Water Resources, near Atlanta, Georgia, needed remote monitoring for the sewer lift stations.

Solution

All 211 lift stations have been equipped with **Mission Communications remote terminal units,** enabling the county to monitor the stations remotely, receive automated alarms, and integrate with the customized SCADA system. The department also upgraded all its lift stations to the newer MyDro series RTUs, which feature a boost-buck converter with a 12- or 24-volt DC selectable auxiliary output, removable terminal blocks, high-current onboard relays, increased memory, a backup battery charging unit and digital inputs.

RESULT:

The upgrades took minimal time to install. "The LCD display is helpful for weekly and monthly inspections on every station," says James Brannen of the pump stations group. Another benefit was over-the-air firmware updates: "We've saved incredible amounts of labor time, and it has led to less wear and tear on vehicles and increased fuel savings." **877-993-1911; www.123mc.com**

Sanitary sewer system updated with remote monitoring capabilities

Problem

The Minneapolis Public Works Department needed to modernize the sanitary sewer system. Nine wastewater lift stations and 23 storm sewer pump stations were spread throughout the city. None had remote monitoring capability.

Solution

PRIMEX was chosen to retrofit the stations with **remote monitoring.** The mandate was to develop and install a complete SCADA system, including digital cell routers on the Verizon network to improve monitoring. The upgraded system also incorporated local computer memory at each site, so that if the cell connection failed, data would not be lost. The local Wonderware Edge graphical operator interface has native capabilities to store and forward all data. When Verizon communications are lost, the system logs data to memory. On restoration of cellular communications, all historical information is backfilled to the historian.

RESULT:

The system met the department's goals. Remote monitoring added to all systems improved data analytics and enhanced the ability to manage storm sewers and sanitary sewers. **844-477-4639; www.primexcontrols.com**

Laser technology allows for noncontact influent flow measurement at large treatment plant

Problem

The Ankara Central Wastewater Treatment Plant in Turkey serves a population of 4 million. The high concentration of solids in the plant inlet limited flow measurement options. AV contact sensors required time-consuming maintenance work and was rejected. AV radar for surface velocity measurement yielded unsatisfactory results.

Solution

Noncontact laser technology allowed for measuring velocity at multiple points in the flow profile below the water's surface. A Teledyne ISCO LaserFlow sensor was mounted over a rectangular channel 15 feet wide and 13 feet deep. Two **Teledyne ISCO Signature flowmeters** were permanently installed at plant inlet and on the 20-foot wide overflow channel.

RESULT:

The customer estimated that the noncontact laser technology provided significant savings over installing a traditional flume system. **800-228-4373; www.teledyneisco.com**

Remote monitoring and control reduces false alarms

Problem

False alarms from lift station pumps required frequent evening and weekend operator attention at a California community services district. Seven lift stations had aging instrumentation comprised of auto-dialers with traditional SCADA, which required operators to respond in person to each alarm. Operators needed a reliable way to monitor wet well levels and pumps remotely.

Solution

The district installed **XiO's Lift Station Control System** throughout the collections system. The cloud-based system allows operators to view status on sensors and pumps as well as wet well levels from any web-enabled device. They can receive alarms and control equipment, such as turning pumps on and off, via smartphones, greatly reducing the time required to respond to alarms.

RESULT:

The system immediately reduced false alarms. Data collected gave operators insights to the health of the pumps, enabling a proactive maintenance schedule. **877-946-0101; www.xiowatersystems.com** tpo

It's your magazine. Tell your story.

TPO welcomes news about your wastewater or water treatment operation.
Send your ideas to editor@tpomag.com or call 877-953-3301

OZ Lifting XR Series davit cranes

OZ Lifting Products has launched its XR Series of davit cranes for wastewater and water operators. The Winona, Minnesota-based manufacturer has released the model in 500- and 1,000-pound capacities, but the long reach of the range is a standout benefit for operators. Where other davit cranes typically have reduced capacity when it is in the longest reaching position, this series maintains its maximum capacity rating in all configurations. This means wastewater and water professionals can lift more weight, further out, which presents many benefits for numerous lifting and material handling applications. The smaller crane weighs only 57 pounds and the larger crane weighs 95 pounds. Both have a maximum 62-inch reach and maximum hook height of 87 inches.
800-749-1064;
www.ozliftingproducts.com

Asahi/America T-342 diaphragm valves

Asahi/America now offers T-342 diaphragm valves with optional sanitary adapter end connectors. The T-342 diaphragm valve with sanitary end connectors is now available in Purad PVDF, PolyPure PPn and PP-Pure PP materials from 1/2- to 2-inch sizes. The sanitary end connections for the valve are added using beadless welding, which leaves no weld bead or crevice for bacteria buildup. The T-342 is fabricated, cleaned and then double bagged in the company's class 1000 cleanroom to ensure a particle-free product arrives at the job site. The valves are an ideal choice in a high-purity water system, such as RO/DI applications and UPW lines, as the valve design eliminates entrapment areas for bacteria to grow.
800-343-3618;
www.asahi-america.com

product spotlight
wastewater

Aerobic granular biosolids key to treatment technology

By Craig Mandli

One of the most expensive processes in wastewater treatment is initial pollutant and nutrient removal. The industry is constantly in pursuit of smaller, more streamlined systems that boast improved performance — at a lower cost and with reduced energy usage. **AquaNereda Aerobic Granular Sludge Technology** from **Aqua-Aerobic Systems** is a biological wastewater treatment system that provides efficient advanced treatment using aerobic granular biosolids.

"The process utilizes compact, fast-settling aerobic granular biosolids rather than typical flocculent activate sludge," says Brett Quimby, senior process engineer for AquaNereda. "This allows for many benefits such as reduced footprint and energy savings compared to conventional technologies, while producing high-quality effluent. To date, no other technologies have demonstrated production of granular sludge at the concentrations and particle size distribution typical of the AquaNereda process."

The aerobic granular biomass is comprised of compact granules which consist of layered microbial communities and provides superior settling compared to conventional activated sludge. Within a single tank, the process creates proper conditions to develop and reliably maintain a stable granule population without the need for a supplemental carrier. The layered aerobic and anaerobic zones within the granule allow for simultaneous processes to take place in the granular biomass, including enhanced biological phosphorus reduction and simultaneous nitrification and denitrification.

AquaNereda Aerobic Granular Sludge Technology from Aqua-Aerobic Systems

The process, according to Quimby, is flexible and compact, offering energy efficiency and significantly lower chemical consumption culminating in a low life cycle cost. Based on the unique characteristics of granular biomass, the AquaNereda system uses an optimized batch cycle structure. There are three main phases of the cycle to meet advanced wastewater treatment objectives. The duration of the phases is based upon the specific waste characteristics, the flow and the effluent objectives.

Compared to the previous conventional treatment process, AquaNereda achieves overall power cost reduction of 40%, zero chemical usage, 30% of footprint, a 75% increase in treatment capacity, elimination of secondary clarifiers and RAS pumping, increased process resilience during peak wet weather, events and influent load variations. The system also exceeds anticipated future nutrient removal requirements.

Since its introduction into North America, we continue to further advance development of the technology at our full-scale demonstration facility," says Quimby. "Feedback from customers has generally been quite positive. Most have reported being happy with the ease of operation, energy savings, and high effluent quality associated with this technology."
800-940-5008; www.aqua-aerobic.com

RPS Composites grooved adapter

RPS Composites' newly engineered RPS grooved adapter is designed to be used in conjunction with RPS FRP piping systems and a Victaulic Style 296-A coupling to create a robust, reliable FRP piping joint. The FRP adapters comply with the requirements of ASME NM.2-2020. The adapters were also tested in a pipe bending test to demonstrate a factor of safety of no less than 6 in bending with a coincident pressure of 150 psi. Designed for both the corrosion resistant P-150 piping system as well as the corrosion and abrasion resistant A-150 piping system, the joint will maintain the rating of the piping systems (150 psi at 180 degrees F). The adapter is designed for mildly corrosive environments including water, seawater, wastewater, and some FGD services, up to 180 degrees F and 150 psi, and is available in 2- to 12-inch diameters.
800-343-9355;
www.rpscomposites.com

Graco QUANTM double diaphragm pump

Graco's next generation electric-operated double diaphragm pump, QUANTM, features a new motor design that is up to eight times more efficient than a standard pneumatic pump. The pump is suitable for nearly any fluid transfer application and

offers a wide range of materials of construction to support multiple industrial and hygienic applications, including chemical processing, water treatment, paint manufacturing, food and beverage, pharmaceutical and more. It is built for harsh industrial or hygienic environments, yet its efficient design is lightweight and easy to maintain. With built-in controls and no gearbox, the pump also fits seamlessly into most fluid transfer applications.
612-623-6000; www.graco.com

Cortec Boiler Lizard rust inhibitor

An effective and easy-to-apply boiler rust inhibitor, Cortec's Boiler Lizard protects costly assets from corrosion, avoiding short-term problems like leakage and clogging, and helping to extend boiler service life. While the Boiler Lizard is an exceptional tool for dry layup of mid-sized boilers, it does not always make sense to cut it in pieces to fit small boilers or, conversely, to add 50 Boiler Lizards into a giant boiler. In order to fit boilers of all sizes, Cortec has expanded its selection of boiler layup options to create inhibitor tools that offer the same effective protection technology in a format that makes sense for each boiler size. Boilers under 100 gallons are great candidates for the Boiler Gecko; boilers of 1,000 to 10,000 gallons are ideal candidates for dry layup of boiler watersides with the Boiler Lizard; and boilers of over 10,000 gallons are the best candidates for dry layup with the Boiler Dragon. Cortec also offers options for boilers that require wet layup, wet layup on standby, or the flexibility of wet-dry layup options.
651-429-1100; www.cortecvci.com

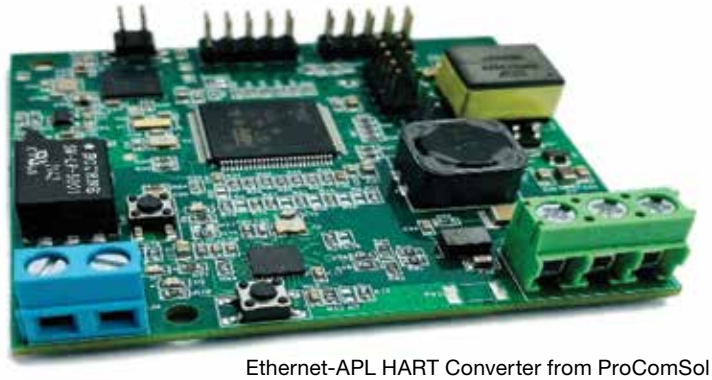
Lhoist SLS45 hydrated lime slurry

Lhoist's SLS45 hydrated lime slurry is a calcium-based alkali that offers the best features of lime and caustic soda: it is nonhazardous, easier to work with, price stable and

product spotlight water

Converter upgrades transmitters to new data interface

By Craig Mandli



Ethernet-APL HART Converter from ProComSol

As technology advances, the sheer amount of data at a treatment plant operator's fingertips continues to increase. However, this technology creates so much data that, at times, finding ways to transfer, store and interpret it is sometimes challenging. In an effort to make that data interpretation process run more smoothly, **ProComSol** recently released an **Ethernet-APL HART Converter.**

The converter allows transmitter manufacturers to easily convert existing HART transmitters to the new Ethernet Advanced Physical Layer interface — billed as the fastest and most efficient way to continuously communicate large amounts of data from hazardous areas to the cloud. The converter can be customized to incorporate custom features or size requirements. Users can also quickly design "direct to APL" transmitters without using HART.

"Ethernet-APL is an exciting new technology," says Jeffrey Dobos, president of ProComSol. "Manufacturers who want to add it to their product portfolio can now do it quickly and without high cost."

The HM-APL-PCB consists of a ready-to-use PCB with a HART connector and an APL connector. The operator simply has to connect the HART transmitter to the HART connector to make it an APL transmitter. The APL connection supplies all the power needed for the PCB and the connected HART transmitter. ProComSol also offers full PCB customization capabilities, including board layout, to fit any existing HART transmitter enclosure.

The HART-IP protocol is used by the host system to configure and monitor the transmitter using Ethernet. Any HART-IP compliant host (such as ProComSol's DevCom family of apps) can access the APL transmitter via Ethernet through an APL Switch. No software development required. The PCB can also be used as a baseline "direct to APL" design for new transmitters. The PCB supports various hardware peripherals such as Analog I/O, I2C and SPI Flash memory so the user can quickly prototype and demonstrate APL functions on a new transmitter without using HART. In combination with the modems, the company's DevCom and DevComFF Smart Communicator App family is used to convert a PC, tablet, or smartphone into a full-featured, DD-based HART or FF Communicator.
877-221-1551; www.procomsol.com

reacts quickly. SLS45 works for both drinking and wastewater plants and can be used for pH adjustment, water softening, precipitation of heavy metals, odor control and/or sludge treatment.
281-415-8696; www.lhoist.com

Tnemec Series 975 Aerolon coating

Tnemec launched its Series 975 Aerolon, a further advancement of the company's insulative coating technology. Series 975 builds on the legacy of Series 971 in the Aerolon brand by delivering multiple benefits as a fluid-applied insulation coating system. Unlike Series 971, which is based on aerogel particles, Series 975 contains an advanced porous material for low thermal conductivity. Series 975 provides long-term insulation and corrosion protection. Other features and benefits of Series 975 Aerolon include high hydrophobicity, excellent heat and mechanical stability, low VOCs, low odor and noncombustibility.
800-863-6321; www.tnemec.com

Torrey Pines Scientific's EchoTherm stirring hot plate

Torrey Pines Scientific's EchoTherm programmable digital stirring hot plate is designed for use in chemical, pharmaceutical, environmental, biochemical, and other laboratories where reproducible, accurate chemical reaction control and sample preparation are a must. With the easy-to-use EchoTherm Model HS40, programming is done through the front panel membrane switch and full-functioned custom liquid crystal display. The unit can store 10 programs in memory of as many as 10 steps each where each step is a temperature, temperature ramp rate, stirring speed and time. Each program can be made to repeat itself automatically from 1 to 98 times or infinitely if wanted. All programs are stored electronically.
866-573-9104;
www.torreypinesscientific.com

Stenner Pump S50 model for the S Series

With the addition of the S50 model to the S Series, Stenner Pump has expanded the available flow rate outputs up to 315 gpd at 25 psi and 125 gpd at 100 psi maximum. The pump can interface with process control systems, has a NEMA 4X enclosed housing and multiple modes of operation such as 4-20mA with scalability. There are status indicators such as pump run confirmation and leak detection. Leak detection also has a display alarm on the control panel. The backup pump capability allows transfer of operation from the primary to a secondary pump in standby. There are three programmable output relays for indication to a pump, system or other device. The control panel offers choices in the units displayed such as oz/min or ml/min.
800-683-2378;
www.stenner.com tpo

exam STUDY GUIDE

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

WASTEWATER

By Rick Lallish

When using membrane bioreactors, what is typically required for upstream screening?

A. Stringent pretreatment standards for all industrial users
B. Primary clarification followed by UV pretreatment
C. 1 to 3 mm fine screens for larger particles and debris
D. Pre-aeration in the grit chamber followed by primary clarification

ANSWER: C. Membrane bioreactors are becoming more common. Due to their fragile and somewhat stringent membrane technologies, fine screens with 1 to 3 mm openings are typically used upstream. It is important to remove as much debris and solids as possible, as those items may clog the membrane pores, which may be as small as 0.01 µm. More information may be found in the WEF textbook: *Wastewater Treatment Fundamentals III: Advanced Treatment,* Chapter 6.

DRINKING WATER

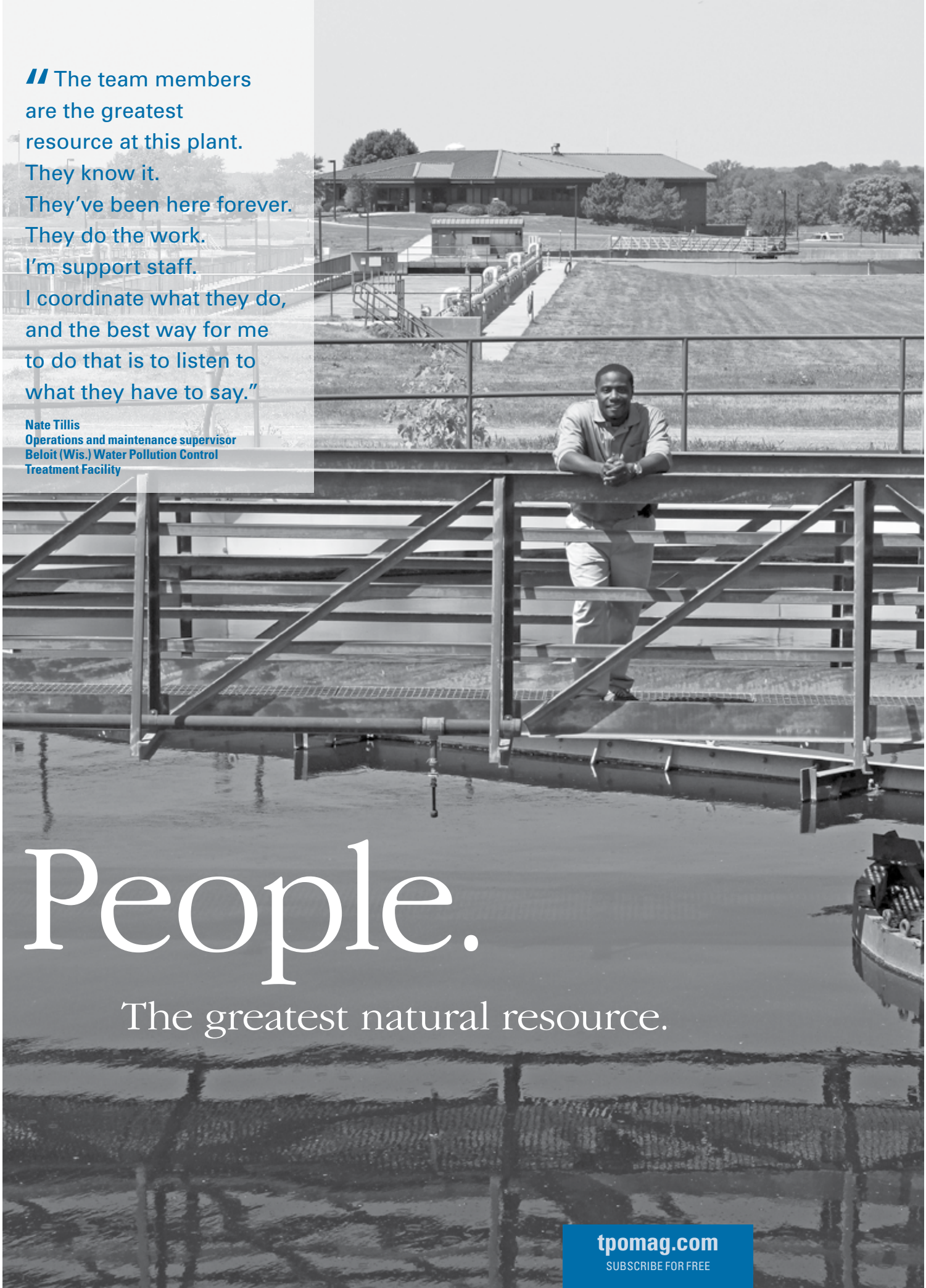
By Drew Hoelscher

What chemical is used for haloacetic acid sample preservation?

A. Sodium sulfite
B. Sodium thiosulfate
C. Ascorbic acid
D. Ammonium chloride

ANSWER: D. Halogenated disinfection byproducts are the result of hypochlorous acid (or hypochlorite) reacting with naturally occurring organic matter in water. Disinfection byproduct compliance samples are collected from the distribution system and analyzed by a certified laboratory within 14 days. The samples are preserved so that the analytical results reflect the concentrations at the time of sample collection. Preservation of HAA samples is best done with ammonium chloride because it is less likely to cause HAA degradation. The ammonium chloride reacts with the free chlorine and creates a chloramine, which helps prevent bacterial degradation.

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



"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
Beloit (Wis.) Water Pollution Control Treatment Facility

People.

The greatest natural resource.

people/awards

Dale Bennett, a water treatment operator with the city of Siloam Springs, won a Northwest Arkansas Water Equality Assistance Award from the Arkansas Water Works Association.

Columbus City Utilities was named Plant of the Year by the Southern Indiana Operators Association.

Shay Ralls Roalson was appointed water director for Austin, Texas, and is the first woman to serve in that role.

The Hicksville (New York) Water District received the 2022 Community Achievement Award from the Hicksville Chamber of Commerce.

The **Clanton Water Treatment Plant** received a 2021 One-Year Optimized Plant Award from the Alabama Department of Environmental Management.

National Renewable Energy Laboratory materials scientists **Mou Paul** and **Abhishek Roy** won the 2023 Polymer Science and Engineering Cooperative Research Award for their work in global water sustainability.

The **Danville (Kentucky) Water Plant** received an award from the U.S. EPA for achieving area-wide optimization goals in 2021.

Gary Lessard, superintendent at the Iron Mountain-Kingsford (Michigan) Wastewater Treatment Plant, has retired.

The East Bay Municipal Utility District (California) Board of Directors welcomed its newest member, **April Chan.** Outgoing board member **Frank Mellon,** board member since 1994, retired spring. **John Coleman** was elected board president and **Andy Katz** vice president for 2023, the district's centennial year.

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

events

April 4-7
Wisconsin Rural Water Association Annual Technical Conference, La Crosse Center. Visit www.wrwa.org.

April 10-28
AWWA High-Tech Operator Course 2, online. Visit www.awwa.org.

April 11-14
Water Environment Association of Texas, Texas Water 2023, George R. Brown Convention Center, Houston. Visit www.weat.org.

April 12
AWWA Boosting Your Next Water Project with Visual Inspection Technology webinar. Visit www.awwa.org.

April 12-13
Nebraska Water Environment Association 2023 Great Plains Conference, Embassy Suites by Hilton Omaha La Vista Hotel and Conference Center. Visit www.nebwea.org.

April 16-19
AWWA Sustainable Water Management Conference, Hyatt Regency Minneapolis. Visit www.awwa.org.

April 17 - May 19
AWWA High-Tech Operator Course 3, online. Visit www.awwa.org.

April 18-21
California Water Environment Association AC23 Annual Conference and Expo, Town and Country, San Diego. Visit www.cwea.org.

April 19-21
Oklahoma Rural Water Association Annual Technical Conference, Tulsa, Oklahoma. Visit www.orwa.org.

April 25-27
Montana Section AWWA/Montana Water Environment Association 2023 Joint Conference: Working Together to Protect Montana's Water Resources, Copper King Hotel and Convention Center, Butte. Visit www.montanawater.org.

April 25-28
Water Environment Association of Utah Annual Conference, Dixie Convention Center, St. George. Visit www.weau.org.

April 26
AWWA Compliance Tool or Major Opportunity? The Future of The Consumer Confidence Report Under EPA's Proposed Rule Revisions webinar. Visit www.awwa.org

EASY

Chloramination Monitoring

WITH

Results

YOU CAN

Rely On

MCX™ Monochloramine Analyzer

1. Reliable, Easy-to-Use Instrumentation
2. Accurate Readings Every 15 Minutes
3. Save Labor, Time, & Money

HF scientific
A WATTS Brand

See if You Qualify for a 2-Month Demo

HFscientific.com | (888) 534-4708

ELEVATE YOUR LIFT STATION PERFORMANCE

LIFT STATION SOLUTIONS

Elevate your lift station performance with reliable solutions from Vaughan. Our industry-leading pumps and alternative mixing options eliminate lift station clogging and handle the toughest solids to create a homogenous slurry which becomes easy to pump through the station. Connect with our Vaughan team to see how we can keep your operations running smoothly.

Vaughan
Unmatched Reliability

Choose the unmatched reliability of Vaughan.
Ask about our free trial program and on-site demos.

FIND THE RIGHT PUMP FOR YOU

GUARANTEED PERFORMANCE | EXPEDITED DELIVERY | ADAPTABLE OPTIONS

888-249-CHOP | CHOPPERPUMPS.COM