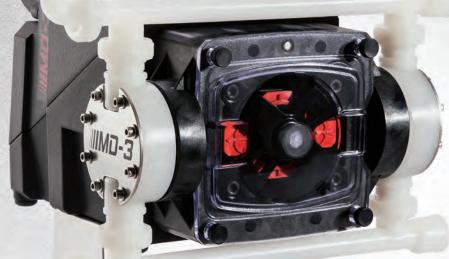


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#### on the cover

Jim Baird has a passion for operator education. As engineering and operations manager for the Roseburg (Oregon) Urban Sanitary Authority, he also does volunteer work that helps make

sure water and wastewater operators get the training and education they need to be successful. (Photography by Ethan Rocke)

#### top performers:

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Water Plant: West Shore (Pennsylvania) Regional Water Treatment Plant

Wastewater Operator: James Dean, Bay Minette,

- >> How We Do It: Long screw pump life in Calhoun, Georgia
- ➤ Sustainable Operations: South County Regional Wastewater Authority
- In My Words: Water Environment Federation creates Pure Water Brewing Alliance
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#### A Week Worth Celebrating

AMONG ALL THE SPECIAL NATIONAL
WEEK CELEBRATIONS, ONE DESERVES
SPECIAL ATTENTION FROM MEMBERS OF
THE WATER AND WASTEWATER PROFESSIONS

By Ted J. Rulseh, Editor



t seems there's an official month, or week, or day for almost everything. In April alone there's Golden Rule Week, National Public Health Week, National Library Week, National Tattoo Week, Coin Week, National Volunteer Week, Bedbug Awareness Week, American Quilters Society Week, and many others.

Amid all this, there's one special April week that water professionals should take seriously. That's Water Week, celebrated this year April 15-21. It's a week created by and for organizations connected

with water and the environment — you can see a list of them at www.waterweek.us/supporting-organizations.

#### FOCUS ON ADVOCACY

Water Week is emphatically about politics, not tree plantings and children's festivals. While the focus is on the federal government, there's no reason water and wastewater agencies can't take actions locally and make the day their own. To help generate ideas, here are some activities that last year's Water Week included:

**National Water Policy Fly-In.** Water professionals from around the nation flew to Washington, D.C., to meet in-person with policymakers on issues like infrastructure funding, service affordability and regulatory reform.

Water & Wastewater Equipment Manufacturers Association 44th annual Washington Forum. Members of the WWEMA attended a forum to learn about the direction of a new administration and what it might mean for the water industry and water-related businesses. The event included a Congressional Reception.

**Rally for Water.** Held on the grounds of the U.S. Capitol, this highlight of Water Week was a water sector show of force and grass-roots unity, looking to focus lawmakers and the nation on sustaining and ensuring public access to clean water in America.

Water = Jobs: The Economic Opportunity of Investing in Water Infrastructure. Here, the Value of Water Campaign unveiled a report evaluating the economic benefits of investing in water infrastructure. The report stated that

closing the investment gap for water infrastructure would have a ripple effect of job creation and economic growth.

American Water Works Association Water Matters Fly-In. Hosted by the AWWA Water Utility Council since 2002, this event brought members from across the country to Washington to express the water community's concerns directly to members of Congress and their staffs.

Deloitte and Water For People. This forum in a panel format convened water and urban sector experts and decision-makers to discuss practical ways to harness the potential of women in urban water management.

If you can't get away to join the events in Washington, D.C., no doubt Water Week activities can translate to the local level. For example, how about a presentation about infrastructure investment before the city council or village board? Or a tour of one community's water and wastewater treatment plants for all elected municipal officials in a county? The possibilities are limited only by the imagination.

Vater Week is emphatically about politics, not tree plantings and children's festivals. While the focus is on the federal government, there's no reason water and wastewater agencies can't take actions locally and make the day their own.

#### THERE'S ALSO A DAY ...

Incidentally, if you're looking for a special day to celebrate, there's World Water Day (www.worldwaterday.org), held each year on March 22 to focus attention on the importance of clean water and advocate for sustainable management of freshwater resources. This global observance was designated by the United Nations General Assembly in 1992 and first celebrated in 1993. The 2017 theme for the day was wastewater. On this day, there's plenty of room for "softer," less political observances like water festivals, classroom presentations, public exhibits, open houses and plant tours. How will you and your staff mark these special observances? The time to make plans is now. tpo





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#### **THE POOFIGHTERS**

#### **Industry Recruitment**

Forming the four-member Poofighters Operations Challenge team was one way the King County Wastewater Treatment Division sought to attract recruits to the industry. The team's vision is to provide learning and training experiences for employees, showcase wastewater careers as dynamic and fun, and promote King County as a great place to work. tpomag.com/featured

#### **OVERHEARD ONLINE**

"Many people assume that when you apply salt to roads and other surfaces it just gets washed away and disappears."

North American Waterways Are Becoming Saltier and More Alkaline tpomag.com/featured



#### **POLAR VORTEX**

#### **Utility Struggles**

In 2013, winter came a little early for the Madison (Wisconsin) Water Utility. It turned out to be a season the city's utility crews would never forget, and as winter settles in for 2018, they're looking back to learn from past mistakes. Check out this online exclusive and see how the utility dealt with the Polar Vortex of 2013-2014 and

what it does differently now.

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#### **RAW WATER**

#### **Another View**

Raw water has been in the news a lot lately, and most of the coverage consists of ridicule. Although the prices it's selling for in enclaves like Silicon Valley are ridiculous, the water itself is on a par with the unsterilized, unfiltered and untreated water millions of Americans are pumping out of private wells.

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CROSS-TRAINING AND IN-HOUSE IMPROVEMENT PROJECTS HELP THE CARPINTERIA (CALIFORNIA) SANITARY DISTRICT KEEP TREATMENT COSTS DOWN AND MAINTAIN QUALITY PERFORMANCE

STORY: **Jim Force** PHOTOGRAPHY: **Collin Chappelle** 

#### CROSS-TRAINING STAFF IN ALL FACETS OF TREATMENT

plant operations, maintenance and laboratory analysis is yielding big dividends at the Carpinteria (California) Sanitary District.

One reward was the 2016 Small Plant of the Year award from the California Water Environment Association, the second time Carpinteria has received that honor for plants treating less than 5 mgd. The district also won the 2016 Small Collection System of the Year award, becoming the first agency of any size to win both in the same year.

"Cross-training has enhanced our ability to manage and improve our treatment processes," says Mark Bennett, plant superintendent. "There is no division of duties within the operations department. Our small plant and team atmosphere keep everyone in the loop, whether we're working on projects or day-to-day operation and inspection of the plant and lift stations."

The district strives to maintain a staff where everyone brings a different strength or talent to the table. "Leveraging these strengths, along with the district's training regime, has been invaluable in normal operating conditions, in times of crisis, and in our discussions to improve our processes and performance," Bennett says.

#### OCEAN OUTFALL

The Carpinteria district was established in 1928 and owns and operates 46 miles of wastewater pipelines serving a population of 15,000. The district's 5-square-mile service area lies 12 miles southeast of Santa Barbara and contains a mix of residential, commercial, light industrial and agricultural land uses.

The wastewater treatment plant lies near the Pacific Ocean beach, close to the center of town. The original plant was built in the 1950s. After substantial upgrades in the 1960s and a total rebuild in the 1990s, it is designed for 2.5 mgd; average flow is 1.1 mgd.



Water drains from the mechanical dewatering process at the Carpinteria Sanitary District.

Pumps deliver influent to the headworks with a self-cleaning mechanical bar screen (Parkson Corp.) and a J+A Jeta grit cyclone grit separator (Ovivo USA). The flow then enters a primary clarifier, covered to limit odors. Primary effluent is blended with return activated sludge as it enters two activated sludge basins, operated in series in the extended air mode.

Air is injected into the two basins (four zones) with new high-speed turbo blowers (APG-Neuros) and fine-bubble diffusers (Sanitaire - a Xylem Brand). Each zone has a dissolved oxygen probe, airflow meter, and motorized flow control valve. The speed and airflow for each blower are determined by a DO setpoint.

Effluent is disinfected with sodium hypochlorite and dechlorinated with sodium bisulfate before discharge to the ocean through an ocean outfall with



the remote network for the district's new APG-Neuros NX75 turbo blowers. diffusers. An in-house dive team conducts a video survey to assess the outfall's condition once a year. Biosolids are aerobically digested, then dewatered on a belt press from Envirex (Evoqua Water Technologies) to 18-19 percent solids.

The plant also uses a screw press (Huber Technology) for dewatering. Cake is conveyed to 10-ton roll-off bins, which are hauled by a private contractor to an Engel and Gray fully permitted composting site near Santa Maria, 65 miles away. There, the material is mixed with green waste and feedstock from local wineries and marketed locally as a soil amendment.

#### **WELL-ROUNDED STAFF**

Bennett started at Carpinteria as an operator-in-training in 1988 and worked up through the ranks, earning his Grade 5 certification and becoming operations manager. With 29 years' experience, he also holds California Water Environment Association Grade 4 plant and collection system maintenance certification. His experience follows the crosstraining matrix used at Carpinteria.

Mark Rogers, treatment supervisor, has 24 years at the district and is a Grade 3 operator; he also has certifications as a mechanical technologist, laboratory analyst, and collections system maintenance technologist. Keith Sweningson, Grade 3 operator, has 15 years' experience and holds the same additional certifications as Rogers.

Frank Gonzalez, laboratory director and a Grade 3 operator with 32 years' experience, manages the plant's quality assurance/quality control

#### Carpinteria (California) Sanitary District **Wastewater Treatment Plant**

AREA SERVED: | Carpinteria and surrounding areas

FLOWS: | 2.5 mgd design, 1.1 mgd average

TREATMENT PROCESS: | Activated sludge

RECEIVING WATER: | Pacific Ocean

ANNUAL BUDGET: | \$3.6 million (operations)

WEBSITE: | www.carpsan.com

GPS COORDINATES: | Latitude: 34°23′16.70″N; longitude: 119°30′25.82″W



Operator Keith Sweningson, a 15-year veteran of the district, works on the daily mixed liquor suspended solid (MLSS) and total suspended solid (TSS) samples in the district lab.

program and handles lab training. Branson Taylor (12 years) is a Grade 2 operator certified in collections and mechanical; and Kenneth Balch (6 years) is a Grade 2 operator certified in collections and plant maintenance. Julio Martinez is an operator-in-training.

Bennett feels strongly about having operators who can work in the laboratory, besides being able to troubleshoot SCADA systems, repair pumps and perform general maintenance. "By running the lab, operators gain a unique perspective that comes from collecting the sample, performing the analysis, and adjusting treatment processes as needed," he says.

#### OUT WITH THE OLD

As Bennett and his team take on many plant improvement projects themselves, Carpinteria saves money on outside labor. Recently, the district replaced two anaerobic digester tanks that dated to the original plant with new aerobic digesters. New feed pumps move the biosolids to the dewatering system.

"We contracted with Carollo Engineers to do a solids handling master plan for us," Bennett says. "The plan included the possibility of upgrading the old digesters to meet new seismic standards for California and adding redundancy to our system, but the cost was virtually the same as constructing the new aerobic digesters. During the transition, operators converted one of the existing aeration basins to aerobic sludge digestion, and we operated for about a year with one activated sludge basin online."

The staff cleaned the old anaerobic digesters before their demolition, saving the district thousands of dollars. The district also installed a new storage and chlorination-dechlorination facility using equipment from Evoqua Water Technologies and UGSI Chemical Feed a UGSI Solutions. During that transition, the operators ran a temporary dis-

infection system using salvaged equipment.

"Without the buy-in and hands-on approach to completing these projects, we feel the district is at the mercy of a vendor or contractor," Bennett says. "That's certainly not a good place to be when a critical piece of equipment fails."

#### PLC PATCH

On the controls side, the Carpinteria staff planned and completed replacement of two PLCs and concurrently installed two local HMI screens. "First, we did the one that controls the influent lift station," Bennett says. "That was completed early in 2016. Later that year, we did the one that controls the return activated sludge and primary and secondary wasting."

The PLCs replaced obsolete electrical equipment installed in the early

#### **PAPER LITE**

Operator ingenuity at Carpinteria Sanitary District has enabled a giant leap forward in data management. Superintendent Mark Bennett calls the program "Paper Lite," and it figured prominently in the Small Plant of the Year award that Carpinteria received in 2016.

"The project was initiated and implemented entirely by our plant operations staff," Bennett says. What began as a pilot test using two refurbished Apple iPad Mini tablets turned into a plantwide system of data management and retrieval that has streamlined the inspection process across the board.

"It started with the creation of an Excel worksheet that mimicked the paper forms used for daily plant and lift station inspections," Bennett says. "The familiar layout made it easy for operators who were less tech savvy to learn the format."

At first, the inspection findings were captured each day on the iPads and then emailed to the supervisor. It has become much more

sophisticated. Using the same layout, the inspection sheet uses circular referencing, meaning staff can time-stamp the inspection of each piece of equipment or process. Also, the form now has fields for notes and comments that allow for voice data entry, digital photos and other features to accurately reflect conditions in the field. A drop-down menu speeds up data entry.

There was a learning curve, although younger operators readily accepted the new format. "The greatest benefit is that inspection forms for each day are stored in a flat PDF file format that is searchable," Bennett says. "This allows staff to find information quickly, using a wide variety of search parameters."

Savings from paper costs alone have already paid for the iPad tablets. "We now have an iPad assigned to each operator," Bennett says. "When we move our asset management system to the platform, we will be totally paperless."

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Founded in 1928, the Carpinteria Sanitary District services coastal hamlets with a growing population of residents and visitors. Total design treatment capacity is 2.5 mgd.

Carpinteria (California) Sanitary District Wastewater Treatment Plant PERMIT AND PERFORMANCE						
	INFLUENT	EFFLUENT	PERMIT			
BOD	317 mg/L	5.9 mg/L	30 mg/L			
TSS	297 mg/L	5.2 mg/L	30 mg/L			
Turbidity	N/A	1.58 NTU	75 NTU			

1990s. "The new controllers are networked to our SCADA system, allowing process monitoring and reliability," Bennett says. "The project was designed by our operators, with programming assistance from the district's contract SCADA integrator, Nader Vakilian from AIA Automation. Each PLC was installed and tested in-house." The total cost was \$59,000, far less than if the work had been contracted.

Carpinteria also made significant improvements to the plant's communication backbone as part of the \$7 million digester capital improvement program. These included major SCADA enhance-

great pride in operational efficiency. Each year, we strive to achieve highest level of facility maintenance and improvement at lowest possible cost to ratepayers."

ments, a new fiber optic system, and the installation of telemetry throughout the plant.

The staff was also instrumental in digitizing the plant's existing and new operations and maintenance manuals.

"Our staff scanned the majority of the manuals and downloaded the others from manufacturer's websites," Bennett says. "In the process, we updated all our manuals to reflect current information." The digital manuals reside on the district's server but have also been uploaded to the cloud to allow secure internet access. Operators can download the manuals on their tablets and have access to them in the field.

#### **UP WITH EFFICIENCY**

Operators have also worked with design consultant and district management to reduce the plant's energy usage. "Our new Huber screw press uses less energy than the previous dewatering equipment, and it returns less centrate to the plant for additional treatment," Bennett says. "Likewise, new return activated sludge pumps are better sized to current plant flows."

The plant also took part in district-wide replacement and retrofitting of lightning with low-energy LED lamps. The new 75 hp high-speed turbo blowers with variable-frequency drives replaced oversized 150 hp multistage



centrifugal blowers that dated back 25 years. Bennett estimates savings near 33 percent from the blower-diffuser project alone: "Plus, we have substantially reduced our carbon footprint and improved our odor control."

In Carpinteria's Plant of the Year award submittal, Bennett writes, "The district takes great pride in operational efficiency. Each year, we strive to achieve highest level of facility maintenance and improvement at lowest possible cost to ratepayers. The result is a lean and efficient staff coupled with smart and calculated resource allocation."

It pays off: Investments in improved operations have essentially allowed spending to remain level from year to year. Bennett observes, "Current year spending is actually 0.08 percent less than last year." **tpo** 

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Students from Lassiter High School collect water chemistry samples in Rubes Creek.

A lot of the
Advanced
Placement kids want
to eventually go into a
biology or chemistry
field. This program
allows them to explore
their interests and
make connections
between what they've
read in a book and
the real world."

JENNIFER McCOY

## **Recruiting Stream Stewards**

A WATERSHED STEWARDSHIP PROGRAM IN GEORGIA GIVES STUDENTS OF ALL AGES HANDS-ON EXPERIENCES IN MONITORING STREAM QUALITY

#### By Craig Mandli

hange comes slowly when cleaning rivers and streams, so it's up to the next generation to carry on the legacy of water stewardship.

For years, the Cobb County Watershed Stewardship Program based in Marietta, Georgia, has fought to protect Nickajack Creek, Rottenwood Creek, Sewell Mill Creek, Sope Creek, Sweetwater Creek, Willeo Creek and other streams.

Soon after the passage of the Clean Water Act in 1972, the Cobb County Water System began collecting stream data. Over time, water-quality monitoring expanded to include community engagement and presentations. These efforts eventually led to the formation of the county watershed program.

Jennifer McCoy, watershed stewardship program coordinator, says the program aims to encourage practices to improve quality of life and promote respect for the environment by educating residents about the connection between behavior and water quality.

The major problems include runoff from impervious surfaces including chemicals (fertilizers and pesticides) and bacteria (pet waste), sedimentation, elevated water temperature, excessive stream flow, and invasive species. The stewardship program educates about these concerns and provides activities to address them.

#### STUDENTS OF ALL AGES

The program reaches students from third to 12th grade in the county's 118 public schools. Younger students focus on basic lessons like "What Is a Watershed?" and "What Is Your Eco-Footprint?" Middle and high school students learn what county Water System personnel do to keep water sources clean and clear.

"The students put on their knee boots and get right in the stream to monitor water quality and conditions for themselves," McCoy says. "We want them to understand how to look at a creek and determine if it is a healthy habitat. We even sometimes go to the school and do outdoor presentations if they have a stream close by. The hands-on experience is very valuable."

A lesson for high school biology classes teaches that sediment is a problem because it covers up the rocks in the stream, destroying habitat for insects on which fish depend. Students also learn how nutrients like nitrogen and phosphorous feed excess algae that can deplete oxygen and harmful aquatic life. Chemistry classes learn to perform pH and other testing on creek water samples.



Walton High School students evaluate stream habitat quality at a tributary of Sewell Mill Creek.

MEASURING SUCCESS

While the program's success will ultimately be measured in students who choose to become environmental protectors, McCoy is excited by the short-term victories. Those include reaching more than 88 percent of the county's high schools and 52 percent of the middle schools in 2016. "Our big goal is to reach them all," McCoy says. "We work very hard to shape our presentations so they fit the class curriculum. We want to work with

the teachers to make sure we're on the same page."

High schools that use block scheduling are a good fit because students can spend longer periods of time in the field. They also have in-class programs where instructors bring water samples and testing equipment to create a "virtual laboratory" experience. "Clean water fits into so many lessons, and we like the challenge of finding a fit with each class," McCoy says.

#### **DEALING WITH DIVERSITY**

County schools are in a mix of urban and rural areas, so elementary students bring varied outdoor backgrounds. "The younger students are often scared to be in the forest or on the water," McCoy says. "A lot of students who live in the inner city haven't been exposed to nature or haven't had much opportunity to study an ecosystem. For some, this is their first chance to really see the wildlife of a stream. They ask questions like 'Are there alliWalton High School students work in the field at a tributary of Sewell Mill Creek, collecting stream crosssection measurements.

gators in the water?' or make statements like 'I can't swim' or 'I don't want to drown.' But once we get going, they are into the lesson, and before you know it, they are finding salamanders and holding insects."

Older students, especially high

school students in Advanced Placement and upper-level biology and chemistry courses, are more eager to get their hands dirty. "A lot of the Advanced Placement kids want to eventually go into a biology or chemistry field," McCoy says. "This program allows them to explore their interests and make connections between what they've read in a book and the real world."

#### REACHING OUT

McCoy has spoken with counterparts in other municipalities and is happy to share the successes and challenges. The key is to identify and build on small victories: "Just seeing the wonder in the kids' eyes is the start. Don't try to grow too big too fast. If you start small and build on the successes, it won't be too overwhelming."

She warns that it's smart to know the program's limitations and take care not to spread resources too thin. "When working with educators, you can't over-commit and promise something you can't deliver. In the end, we want to work with teachers to provide an enriching experience they can piggyback off of. That's how the legacy continues." tpo

In the end, we want to work with teachers to provide an enriching experience they can piggyback off of. That's how the legacy continues." JENNIFER McCOY





High school students in the tour program learned about the characteristics of successful clean-water plant team members, like being self-motivated and having an interest in health and environmental safety. Students also learned about the water industry and the kinds of jobs available.

## **Spotlight on Careers**

A WATER AND SEWER DISTRICT AND A SCHOOL SYSTEM TEAM UP FOR A PRESENTATION TO INTRODUCE STUDENTS TO JOB OPPORTUNITIES IN THE WATER SECTOR

#### By Sandra Buettner

he Lakehaven Water and Sewer District in Washington is collaborating with the Federal Way Public Schools to introduce the wastewater industry to middle and high school students contemplating careers.

Last October, more than 40 students attended a program at the district's Lakota Wastewater Treatment Plant. "District commissioners Len Englund and Ron Nowicki have always been involved with the schools, and all of our commissioners wanted to introduce high school students to our industry," says John Bowman, district general manager.

"With succession planning being top of mind and the aging of the workforce that we are facing, they thought promoting the industry to students while they're still deciding what career path to follow would be a way to reach out to that next generation of workers."

#### A WIDER NET

The Lakehaven Sewer District, between Seattle and Tacoma in King and Pierce counties, encompasses some 35 square miles, serving about 115,000 residents. The district has served the Federal Way area and its school system for more than 60 years. The sewer system includes 350 miles of mainline, 32 pump stations, and two secondary wastewater treatment plants: the Redondo plant (5.6 mgd design) and the Lakota plant (10 mgd design).

While the district has given tours to grade school and middle school children for many years, last year was the first time the tour and program included

high school students. John Barton, wastewater operations manager, says most students aren't aware of the industry; he believes it needs to be promoted for its career potential and its role in public health and the environment.

Commissioner Nowicki and Dr. Tammy Campbell, Federal Way Public Schools superintendent, attended a chamber of commerce luncheon and there discussed whether some of her students could tour the Lakota plant. She suggested members of a scholar advisory group she established three years ago — a diverse group with representatives from Federal Way's 15 middle and high schools.

We wanted the students to know that the field is very dynamic and really growing and will provide a lot of opportunity for them, now and in the future."

JOHN BARTON

#### PROMOTING OPENINGS

After that discussion, Nowicki worked with the Lakehaven staff to assemble a program for the visit. Since some of the students were juniors and seniors, Nowicki wanted to teach them about the water and wastewater industry in general and about the kinds of jobs at the district and the openings then available. He noted that the jobs include roles for four-year degree college and noncollege students, as well as students considering two-year tech-





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nical degrees. Students learned about careers as operators, engineers, electricians, custodians and administrators.

The day started with a welcome from Nowicki and Campbell. The students then broke up into two groups of 20. One group stayed in the administrative building and heard staff members describe the jobs in the Engineering and Water departments of the utility.

The water manager talked about equipment and grounds maintenance, water production and water quality testing. Engineering described roles in computer-aided design, geographical information systems and utility locating. The speakers told about the education levels, certifications and salary ranges related to each role.

The other group went to the maintenance building and split into two groups of 10. One group toured the Lakota plant, and the other group heard representatives from field operations talk about their jobs, such as installing and maintaining fire hydrants, sewer systems and pump stations. The maintenance personnel talked about fleet vehicle upkeep. The two groups of 10 then switched places and then switched again with those in the administration building.

#### VIABLE CAREER PATH

"We wanted the students to know that the field is very dynamic and really growing and will provide a lot of opportunity for them, now and in the future," Barton says. He noted that the field now encompasses robotics and computers and is technologically driven. He also told the students about the rewards of good-paying careers working in environmental stewardship.

Attendees learned about the characteristics of successful employees at the plant, like being self-motivated and having an interest in health and environmental safety. "As rules and regulations change, we need to keep up with the technology and processes," Bowman says. "Students considering careers in our industry need to keep up with ever-evolving technology, and that requires continual learning."

One student told the district's field operations manager after the presentations that the day's events had changed his thinking about his future — an indication that the day had an impact. Students' feedback was positive and eye-opening: Campbell reports that they were amazed at the variety of roles, pay ranges, availability of local jobs, and opportunities that do not require a fourvear degree.

The Lakehaven Water and Sewer District also has a history of working with nearby Green River Community College on its wastewater curriculum and operator program. About eight years ago, district staff started working with the college on a model to get students from the classroom to practical experience. Each year, the district places up to two nonpaid interns from the college at both the Redondo and Lakehaven wastewater treatment plants.

As for the high school offering, "I was very impressed with the tour and program," Campbell observes. "We will definitely keep it up for future years. I also would like to work with my staff to see if we can help Lakehaven set up an internship program at the plant for the students still in school to familiarize them with the industry and give them the experience they need to break into it after graduation." too

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# AND GOING AND GOING...

DUSTIN C. COLES THRIVES ON A HECTIC SCHEDULE AS HE LEADS
THE KANSAS TEAM AT TOPEKA'S SECOND LARGEST TREATMENT PLANT,
SERVES AS A CONSULTANT, AND CONTRIBUTES TIME TO HIS STATE ASSOCIATION

STORY: Jack Powell | PHOTOGRAPHY: Daniel Caponera

DON'T BLINK. YOU MIGHT MISS DUSTIN C. COLES, LEAD OPERATOR at the North Topeka (Kansas) Wastewater Treatment Plant.

In his 21-year career handling wastewater issues for the capital city of Kansas, Coles has become the go-to guy for everything from equipment repair to certification testing at the 24 mgd (peak) facility.

An activity-filled schedule and deep commitment to protect the environment have earned Coles praise from his boss ("one of our most dependable employees"); coworkers ("a nice person who's always willing to lend a hand"); and his father, a section manager for the Topeka Water Pollution Control Division. They cite his willingness to pitch in, mentorship, and mechanical ability as major contributors to the division's success.

"Sometimes I feel I may have a little too much going on with being an operator, a consultant and a volunteer," Coles says with a chuckle during a rare quiet moment. "But I've really enjoyed my job since I started here in 1996 and all the other jobs I do. Wastewater is definitely a good career, and I'm proud to know we're making a difference to the community by returning clean water to the Kansas River."

Last August, he received the William D. Hatfield Award from the Kansas Water Environment Association.



Dustin Coles, lead operator at the North Topeka Wastewater Treatment Plant

Fort Scott Community College but left before earning a degree, an oversight he's determined to correct one day. In 1991, he joined the Topeka/Shawnee County Health Department and was so successful doing maintenance that he received an employee-of-the-month award in 1993.

After a shake-up at the department, Coles' father, Sylvan Coles, encouraged him to apply for an operator position at Topeka's Oakland Wastewater Treatment Plant. Initially, Sylvan Coles wanted to bring Dustin Coles in as an apprentice, but the superintendent at the time wasn't receptive. Finally, things changed, and when a job opened at the facility, Coles took it and never slowed down.

Sylvan Coles heads the city's state-certified wastewater laboratory, which tests samples from the three wastewater treatment plants, and manages the residuals and odor control programs. As such, he isn't directly involved in plant operations, so there's no conflict of interest with his son working at the plant.

"Dustin was interested in wastewater even as a youngster," says Sylvan Coles, who earned a bachelor's degree in chemistry from Washburn University in Topeka and a master's in environmental engineering from the University of Kansas. "He's a mechanical kind of fellow who has always loved working on cars and figuring out how things work. That's what has made him a top-notch wastewater operator."

#### MECHANICAL APTITUDE

It's all in a day's work for Coles, a Topeka native who graduated from Seaman High School in 1988. He majored in environmental technology at

#### **ALWAYS IN MOTION**

At his busiest, Dustin Coles could put the Energizer Bunny to shame. As lead operator since 2015 at the \$28 million North Topeka extended aera-





Dustin Coles doubles as a consultant to treatment facilities in smaller communities nearby and statewide. He's on a state call list of people operators can contact when they need help solving problems.

tion facility, he makes sure that effluent meets all state and federal standards. In that capacity, he supervises operators Derrick Hart and Paul Pfannenstiel, oversees operations, and works closely with the maintenance staff to repair equipment.

Coles works Monday to Thursday 7 a.m. to 3 p.m. and Friday 5 a.m. to 1 p.m. He walks the plant and checks with maintenance to see what needs fixing or rebuilding. An admitted hands-on guy, he'll tackle just about anything. That includes the mechanical bar screens (Vulcan Industries), PISTA Works grit separators (Smith & Loveless), primary and secondary clarifiers (WesTech Engineering), pumps from Marlow Pumps / ITT Controls (Goulds Water Technology, a Xylem brand), and aeration blowers (Spencer Turbine). He does whatever it takes, crediting "a great team whose support has made it possible to get everything done."

At a moment's notice, Coles will help operators and maintenance crews at the division's two other facilities: the 32 mgd (peak) extended aeration Oakland Wastewater Treatment Plant and the 1 mgd Sherwood Wastewater Treatment Plant, a modular activated sludge facility built by

#### **WASTEWATER A 'FAMILY AFFAIR'**

For Dustin C. Coles, wastewater isn't just a fulfilling career. It's practically in his DNA.

Coles remembers coming to work as a youngster on weekends with his father, Sylvan Coles, who in the course of 47 years with the city of Topeka, Kansas, has worked in every area related to wastewater treatment — operations, process control, biosolids and the state-certified laboratory at the Oakland Wastewater Treatment Plant — and learning about the treatment business firsthand. At Sylvan Coles' urging, Dustin Coles became an operator at the Oakland plant and eventually moved up to lead operator at the North Topeka Wastewater Treatment Plant.

With 60 years' combined experience, father and son have formed a mutual admiration society. Dustin Coles calls his dad "a great teacher with so much knowledge to share." Sylvan Coles returns the compliment to his firstborn: "I love that boy to pieces. He's one of a very few operators I've known who has the mechanical knowledge, process knowledge and observational skills to get to the root of a plant-performance problem quickly and find a solution."

The father and son Coles also share a commitment to the Kansas Water Environment Association. Sylvan Coles has been a member since 1979 — ultimately earning Life Member status — and encouraged Dustin Coles to get involved shortly after the younger Coles came on board as an operator in 1996. They have coordinated conferences and provided hands-on support to the association's voluntary accreditation program, and they're mobilizing support to institute a national certification program for treatment plant operators using the Kansas Water Environment Association's program as a model. Sylvan Coles even got his late wife involved in the association, and when she died in 2003, the organization created the prestigious Shirley Coles Memorial Scholarship in her honor.

Not to be outdone, Dustin Coles' son, Mathew, worked at the plant in the collections system for about three years, which meant the city had three generations of Coles working in wastewater. Dustin Coles says, "Mathew is of the guys we most want to come back because he worked so hard and did such a good job." It's easy to see where he learned.

#### **Dustin C. Coles. North Topeka (Kansas) Wastewater Treatment Plant**

POSITION: | Lead operator

EXPERIENCE: | 21 years in the wastewater industry

**DUTIES: | Handle treatment operations, supervise** operators, work with maintenance crews

EDUCATION: | Seaman High School graduate: attended Fort Scott Community

College

CERTIFICATIONS: | Class IV wastewater, Class III **Maintenance, Class II Collections** 

MEMBERSHIPS: Kansas Water Environment

Association, Water Environment **Federation** 

"Continue to do what I love: being a wastewater treatment plant operator."

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Aero-Mod that (when it opened in 1999) was the largest such package plant in Kansas. Coles troubleshoots equipment problems, fixes what's broken, and acts as a sounding board on plant operations and treatment issues.

#### CONSULTING HELP

Coles' boss, Kyle Salmon, Topeka's operations manager, rates his lead operator's knowledge of wastewater as second to none. "We use Dustin in both maintenance and operations," Salmon says. "One big benefit of Dustin is that he's our means of communications and organizing work between maintenance and operations. That really helps lighten my workload."

On his off hours, Coles, who has Class IV wastewater certification, does wastewater consulting. It's an outgrowth of a now-defunct business (Coles Consulting) that he and his father started in 2006 to bring their expertise to smaller treatment operations and those in less-developed areas.

As a consultant/operator at small package plant in rural Lakewood Hills (population 2,600), Dustin Coles troubleshoots mechanical and design problems and has helped resolve the facility's NPDES permit compliance issues. He has also done consulting work for the Auburn-Washburn Unified School District and for Westar Energy, the state's largest electric util-

ity. He ran two of Westar Energy's wastewater treatment plants in the Kansas communities of Lawrence and Tecumseh.

Despite his hectic schedule, Coles is proud of his consulting work: "I'm on the state's operator call list, so when a treatment plant gets in trouble, they call me. Most of the communities are small and often had no idea what they were getting themselves into with their treatment plants. I'm glad to help them with preventive maintenance and testing and help them understand what's going on with their processes."



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#### VOLUNTEER EXTRAORDINAIRE

Then there's Coles' 15 years of service to the Kansas Water Environment Association. Spurred by his father, who has been active in the association since 1985, Coles has been coordinator for the group's annual joint conference with the Kansas Section of the American Water Works Association. In 2010, he was named to the Kansas Water Environment Association's Select Society of Sanitary Sludge Shovelers (Sylvan Coles became a 5S member in 1987).

He's a mechanical kind of fellow who has always loved working on cars and figuring out how things work. That's what's has made him a top-notch wastewater operator." **SYLVAN COLES** 



JED FETTERHOOF

At the 2016 meeting in Topeka, which brought together about 300 water and wastewater professionals, Dustin Coles roamed the Capitol Plaza Hotel, troubleshooting everything from the temperature of the conference rooms to the projectors and AV equipment to make sure the engineers, scientists, operators, and other professionals attending got the most from the event.

Beyond the conferences, Coles plays a major role in the Kansas Water Environment Association's voluntary accreditation program, in collaboration with the Asso-

ciation of Boards of Certification. Essentially it's for professionals other than water and wastewater operations — people in fields such as residuals management, maintenance and distribution — to help them expand their knowledge and skills and increase their competency. He proctors about 200 certification exams per year throughout the state, and he's always available to help others prepare for exams as part of his commitment to share his wastewater expertise.

Such help is vital, says Jed Fetterhoof, lead maintenance mechanic at the North Topeka plant: "Dustin is always willing to share what he knows about wastewater processes, treatment techniques and equipment with those of us on the maintenance side. He's a big part of why the plant is a great place to work and why wastewater is such a good career."

#### ADVOCATE FOR WASTEWATER

For Coles, it's all about giving back to a field he's passionate about. "Wastewater is a definitely a wonderful occupation, but not enough people know about it," he says. "Here in Kansas, we're really struggling to find young people interested in this industry. Wastewater treatment isn't going away; we'll always need clean water in our rivers and streams. We've tried to hire people, and it's been a struggle, so I'm glad to share my knowledge with anyone who's interested."

Coles' schedule will get even busier — if that's possible — as Topeka moves forward with its plans over the next three years to generate pipelinequality biogas at the Oakland facility. The \$9.5 million investment, with a projected four-year payback, will take solids from the Oakland and North

what he knows about wastewater processes, Topeka plants and run it through Oakland digesters. The biosolids will be applied to farms. "It's an exciting treatment techniques project," Sylvan Coles says. "For someone like Dustin, it will be yet another opportunity to get involved in a and equipment with new technology." those of us on the maintenance side."

When not working, helping, volunteering, or proctoring, Dustin Coles rides his motorcycle and works on two old Volkswagen Beetles and two other old cars that he occasionally drives to work, "just to get a reaction

from my colleagues." He also plays golf and tennis when-

ever he can. One son, Timothy, a graduate of Kansas State University, teaches math at Larned (Kansas) Middle School and is the head wrestling and football coach; son Matthew is a heavy-equipment operator for a firm dismantling barracks at the Fort Riley Army base in Junction City, home of the Army's Big Red One 1st Infantry Division.

As he thinks about all that's going on, Dustin Coles remembers one more: He's president of the United Workers of Environmental Trades of Topeka, a position he's thinking of giving up in the next year or so: "I've got enough on my plate; I don't want to get overloaded." tpo

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By Ted J. Rulseh

he regenerative emissions treatment system at the Buckman Regional Residuals Biosolids Treatment Facility suffered from frequent clogging of the ceramic block media.

The media at the facility, owned by JEA (formerly Jacksonville Electric Authority), had to be cleaned frequently and changed out roughly every 18 months, adding to operating costs and causing shutdowns lasting up to two weeks.

Today, the three 17-year-old regenerative thermal oxidizer (or RTO) cells use ceramic blocks with a pattern of channels much less susceptible to clogging. The new blocks have been in place for three years with only periodic cleaning, significantly increasing uptime and reducing maintenance costs.

#### **CENTRALIZED PROCESSING**

JEA, a publicly owned water, sewer, and electric utility in Jacksonville, Florida, serves some 240,000 water customers and 186,000 sewer customers. Its Buckman Regional Residuals Biosolids Treatment Facility stands at the 30 mgd (design) Buckman Water Reclamation Facility, which treats an average of about 22 mgd in an activated sludge process.

We've had the Type 88 FLEXERAMIC structured media in there for the last three years without any changeout.

About every six months, we do a shutdown, water-wash with fire hoses back through the blocks, and just start from fresh."

DALE WILES

The biosolids facility processes solids from the Buckman Water Reclamation Facility and four other JEA clean-water plants. The material is delivered by truck or pipeline and first passes through three Alfa Laval gravity belt thickeners on its way to three anaerobic digesters.

The digested biosolids are dewatered on three centrifuges (Andritz Separation) that produce cake at 20 percent solids for feeding to an Andritz Separation drum drying system 70 pelletizer. Finished pellets are stored in silos; a contractor purchases the inventory and trucks it out. Production averages about 70 tons per day.

#### TREATING EMISSIONS

The waste gas from the pelletizer is treated in the RTO cells to burn off air pollutants and odors. "It's basically a giant catalytic con-

media blocks (Koch Knight) have improved airflow and increased uptime in the JEA regenerative thermal oxidizers.

FLEXERAMIC 88 structured ceramic

verter that cleans the waste gas before it exits the plant," says Dale Wiles, maintenance coordinator at the biosolids facility.

RTOs burn natural gas but employ ceramic block media that serves as a

heat sink to augment combustion, reducing gas usage. The waste gases pass through channels in the ceramic blocks; the natural gas burner at Buckman heats the blocks to 1,600 degrees F. However, efficiency is lost when the channels become clogged with silica powder, a byproduct of siloxanes (components of personal care products) found in wastewater.

At startup in 2000, the Buckman RTO cells used conventional monolithic ceramic blocks with straight-through, quarter-inch square channels. "We would have

to change those blocks out about every year and a half because they would clog up with silica," Wiles says. Looking for an alternative, the JEA team in 2005 turned to Koch Knight, a company specializing in corrosion-proof materials and environmental heat transfer equipment.

#### **IMPROVING AIRFLOW**

After consulting with Koch Knight RTO experts, JEA operators installed Type 28 FLEXERAMIC ceramic structured media, composed of vertically aligned corrugated ceramic sheets, in one of the three cells. The structured packing reroutes the hot gases to help negate imbalances from gases moving at different velocities and limit buildup of particulate matter.

After six months of running the unit with both types of blocks, the operators saw that the cell with structured media resisted clogging, improved airflow and enabled effective cleaning in less time than the previous material.

"Several variables affect airflow in RTOs," says Charles Crosby, manager of byproduct services at JEA. "But we were convinced that the FLEXE-RAMIC media blocks were superior to the old style. We went from cleaning the RTO cells about every three weeks to about every four months." Although



Three regenerative thermal oxidizers remove odors and pollutants from biosolids dryer emissions at JEA.

the structured media had less surface area than the previous material, the greater airflow, improved distribution, and reduced clogging led to more effective use of the surface area and a lower pressure drop.

JEA operators looked to further optimize efficiency by turning alternating layers of blocks 90 degrees, forcing the gases to change direction and spread more evenly. The media then acts as a large static mixer, spreading the gases across the bed. The JEA team used 1-inch-wide FLEXISADDLE packing to fill the voids between the cubic media blocks and the round walls of the RTO cells.

#### **OPTIMIZING EFFICIENCY**

After several years of improved uptime and efficiency, the JEA team learned about Type 88 FLEXERAMIC ceramic structured media, offering still larger corrugated passages. In 2015, they outfitted all three RTO cells with a total of 2,400 cubic feet of that media and used both 1-inch and 3-inch FLEXISADDLE ceramic random media. This time, they stacked the rows of blocks without alternating the layers' orientation.

"We've had the Type 88 FLEXERAMIC structured media in there for the last three years without any changeout," Wiles says. "About every six months, we do a shutdown, water-wash with fire hoses back through the blocks, and just start from fresh. We have another set of blocks on hand because we know the silica will eventually overtake it, but so far, it has been a great change."

Natural gas consumption in the RTOs has not increased, and JEA officials estimate savings averaging \$100,000 per year from lower maintenance and less frequent media replacements.

Doug Popek, Koch Knight sales manager, observes, "Between our media design and the way the operators have installed the product, JEA has figured out how to get the maximum efficiency out of the RTO." tpo



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# FOR THE GOOD OF THE CORDER

JIM BAIRD DEVOTES MUCH OF HIS FREE TIME TO IMPROVING TRAINING PROGRAMS THAT HELP MAKE WATER AND WASTEWATER OPERATORS MORE EFFECTIVE AND VALUABLE IN THEIR CAREERS

STORY: Steve Frank | PHOTOGRAPHY: Ethan Rocke

### JIM BAIRD HAS A PASSION FOR OPERATOR EDUCATION.

As engineering and operations manager for the Roseburg (Oregon) Urban Sanitary Authority, he manages the engineering and collections teams in all aspects of operation, maintenance and construction. He also oversees the authority's \$1.4 million annual contract with CH2M to operate the wastewater treatment plant.

His other job — the volunteer work that gets him animated — is making sure water and wastewater operators get the training and education they need to be successful. "As vice president of Pacific Northwest Clean Water Association, I spent the past year going to as many short schools and operator conferences as I could," Baird says. "When I meet with those operators, there's a lot of gray hair.

"With every talk I give, I thank them for being the professionals they are and for their years of dedication to our industry. I say, 'Look around. Kind of scary, isn't it? A lot of you are going to retire one day soon and head to your rocking chair.' We have to figure out a way, as an industry, for the youth in our communities

Jim Baird, engineering and operations manager, Roseburg (Oregon) Urban Sanitary Authority

to see this as a profession, a value, as something they could do for their entire life and feel wonderful about."

#### LONG CAREER PATH

Baird's path to his current position is similar to that of many water professionals. He began work life as a ranch hand but wasn't making much money and moved on to timber. "The entry-level job is on what they call a reforestation crew," he says. "I signed up with that group and planted trees all fall and spring.

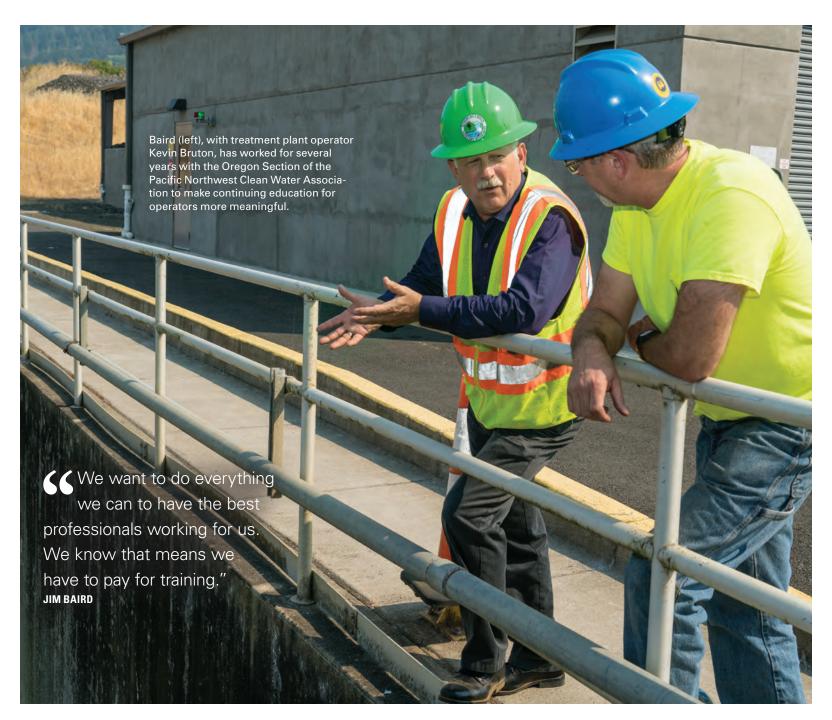
"When we were done, the folks who wanted to stay on were offered other positions. I was offered one working with their surveyor, laying out roads. I really enjoyed it. The surveyor was a very giving guy and shared a lot. We worked most of the summer doing that, and then we ran out of work, so I started with a crew logging the roads we'd just laid out."

Logging meant getting up at 3 a.m. and getting to the crew transportation van by 4 a.m. They'd drive to the job site and work eight hours, then head back down home by 5 p.m.

When the crew was laid off for the winter, Baird decided to do something different. Umpqua Community College offered a twoyear associate of science degree in civil engineering technology, and Baird signed up.

He went to school and had surveying jobs

during summers. When he finished school, he took a job in Public Works with the city of Roseburg, handling road projects as an engineering techni-





#### Jim Baird, Roseburg (Oregon) **Urban Sanitary Authority**



POSITION: | Engineering and operations manager

EXPERIENCE: | Nine years with the Roseburg Urban Sanitary Authority

EDUCATION: | Associate degree, civil engineering technology,

**Umpqua Community College** 

LICENSES: | Grade 3 collection system operator, Grade 2 wastewater

treatment operator

AFFILIATIONS: | Pacific Northwest Clean Water Association, vice president GPS COORDINATES: | Latitude: 43°12'34.03"N; longitude: 123°23'46.72"W

Baird believes operators need to depend on software and equipment to make themselves more productive.



cian. From there, he was shifted into the water sector. While working for the city, he took a volunteer position in 1994 with the Roberts Creek Water District. That job, which lasted 15 years, became his water management learning laboratory.

#### **FAMILY MAN**

It doesn't take long when talking to Jim Baird to discover he's a family man. When he decided to attend Umpqua Community College, he was already married. He and his wife, Nancy, figured out a budget so he could attend school full-time. As his first-year finals approached, he asked the professor for one course how he was doing. The professor said he had a strong A. Baird asked what he would get if he skipped the final. The answer: B. So Baird went home to bed after being up all night while Nancy delivered their twin boys. Seven years later, daughter No. 1 came; she's just graduating from college. Seven years after that came daughter No. 2, now a sophomore in high school.

"I can't go without saying I have probably the most wonderful wife in the world," Baird says. "Through all this stuff — through her working up until it was almost time for the boys to be born, to figuring out how to live on a really reduced budget while she worked part-time so I could go to school, to putting up with 15 years of me being gone two or three nights a week while I worked with Roberts Creek and Romtec Utilities — she was home with four kids.

"I got on a plane every other Sunday or Monday and wasn't home until Friday. I couldn't be where I am without Nancy."

#### TOWARD "DIRTY WATER"

He spent 10 years with Roseburg and then went into private practice as a technician with an engineering company, laying out and working on projects. That lasted about 18 months, after which he joined a startup company, Romtec Utilities, that was designing and installing sewage lift stations.

"That was my introduction to dirty water," Baird says. "Up until then, I'd been with clean water and roads. I was the only employee in the beginning. I learned a lot about the wastewater sector and about pumping and all the challenges. I developed six patents on the equipment we designed, and I worked with two or three engineering firms to bring the idea to market. Then I sold it all over the U.S. for 10 years." As technical sales manager and senior applications engineer, he also designed and delivered courses to teach engineers what his company did and the advantages of purpose-built lift stations. He had installed more than 200 lift stations by the time he left Romtec Utilities after 10 years, weary of being on the road and away from his family for weeks at a time.

#### **WORKING WITH THE PROS**

In 2009, he signed on for his current job with the Roseburg Urban Sanitary Authority. "It's a good job, and it means being away from home only about four times a year, rather than every other week," he says.

"When I went to work for the Roseburg Urban Sanitary Authority, one requirement was that I become a certified collections system operator. So, I got involved with our local Pacific Northwest Clean Water Association section, the Umpqua Basin Operators Section." He attended the Umpqua Basin Operators Section short school and began accumulating continuing education credits so he could take the Grade 3 (second highest) collections exam, which he passed.

"I refer to my people here as professionals," Baird says. "I do that because No. 1, they are, and No. 2, we require our people to do more with the same number of people on staff. Increasing staff is hard to get past your board and

We have to figure out a way, as an industry, for the youth in our communities to see this as a profession, a value, as something they could do for their entire life and feel wonderful about."

JIM BAIRD

your ratepayers. The question is always: 'Why do you need another person? We haven't grown that much."

Baird believes water utilities must depend upon tools — software and equipment — to make themselves more productive. "We give the operators very little training. We give them the book and say, 'Go make it work.' And they do."

#### **HELPING OPERATORS**

Wearing his Pacific Northwest Clean Water Association vice president hat, Baird says the best way to help operators help their employers is to provide training: "We want to do everything we can to have the best professionals

working for us. We know that means we have to pay for training. We also know that training may make our employees more attractive in the marketplace, so they can move on to better jobs. But we benefit from their training and certifications while they're here."

Baird notes that some municipalities, especially smaller ones, have a tough time paying for training. So he has worked for the past several years to make CEU training for operators more meaningful. Working with the Oregon Section of Pacific Northwest Clean Water Association, Baird changed the annual short school training in his local Umpqua Basin Operators Section to the Oregon Operators Conference.

He brought in vendors to show the operators new technologies and generally enhance the experience. Vendors' fees for booth space helped keep the training affordable to operators from communities of all sizes. Baird worked with Umpqua Basin Operators Section to develop specific exam-related training through a partnership with Umpqua Community College. With other operators, he looked at the exam failure rates: "They were pretty dismal. So, we started a class with the Umpqua Community College during spring break, when the college has a lot of classrooms open. It was designed to go over the types of exam questions and the information operators needed to know to take each of the certification exams." Separate courses are offered for operators preparing for Grades 1-2 and Grades 3-4 collection and treatment certification exams.

One day is devoted to math, taught by an engineer from Klamath Falls. Average attendance has increased from 28 the first year to 65 now, and exam pass rates have turned around. The Umpqua Basin Operators Section has generated enough money through the improved conferences to make \$5,000 donations to the Pacific Northwest Clean Water Association for the past two years. The money funds an operator scholarship and a brand-new scholarship in the name of Lucas Eibel, who worked with Roseburg Urban Sanitary Authority as an intern.

"Lucas was just a stellar human being, a kid you knew would make some great contributions to this world," Baird says. He was one of the victims of a shooting at Umpqua Community College in 2015. Umpqua Basin Operators Section members worked with the Pacific Northwest Clean Water Association to start the scholarship in his memory.

"It's essential that we do everything we can within

the limits of technology and finance to be as good at our jobs as possible," Baird says. "The only way we're going to do that is to make sure the operators and midlevel managers get all the training they can." tpo

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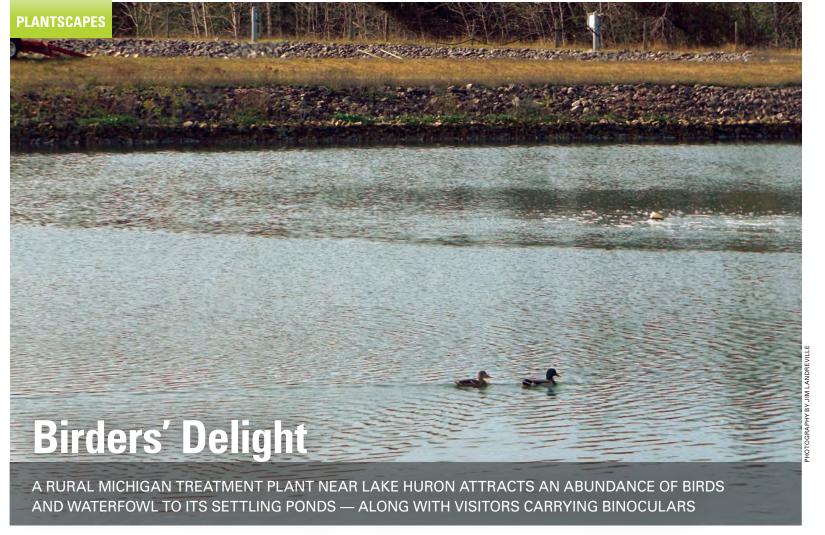
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#### By Jeff Smith

he Clark Township Wastewater Treatment Plant has nearly 1,000 users in Michigan on the north shore of Lake Huron. With an average flow of 150,000 to 250,000 gpd, the facility serves the towns of Cedarville and Hessel, along with inhabitants on two of the Les Cheneaux Islands, a popular resort destination.

The settling pond treatment system lies 2 miles north of Cedarville on 20 acres, surrounded by more than 200 acres of a township-owned forest of pine, cedar, spruce and hardwoods. The ponds attract abundant wildlife, especially birds.

"It wasn't always like that," says Jim Landreville, plant superintendent. "Several years ago, no one knew we were here. Then a retired college professor began watching the birds attracted to the plant. Now we are a designated birding location on the North Huron Birding Trail."

Bird-watchers can see sandpipers, bitterns, killdeer, pileated woodpeckers, osprey, terns, sapsuckers, ducks, herons, common loons, geese and more. The woods attract migrant flocks of warblers, flycatchers and swallows. Deer are common, and occasionally a bear shows up.

Built in 1972 to serve 300 users, the plant has been expanded to include two 1.5-acre aeration ponds near the headworks and three settling ponds, each more than 8 feet deep and covering 4 to 6 acres. A surge in maintenance costs and difficulty in repairing aeration equipment installed in 1990 led the plant team to investigate an alternative solution. In 2015, a Lake Savers aeration system was installed.

ABOVE: The aeration pond at the Clark Township Wastewater Treatment Plant attracts waterfowl like this pair of mallards.

An air compressor (Mink from Busch Vacuum Pumps and Systems) at each storage pond feeds 11 lake-bottom bubble diffusers. The inlet aeration ponds are similarly equipped with compressors and air-mixing units. Effluent is discharged during spring and fall into a nearby creek, which flows to Cedarville Bay and into Lake Huron.

 ✓ Several years ago, no one knew we were here. Then a retired college professor began watching the birds attracted to the plant. Now we are a designated birding location on the North Huron Birding Trail."

JIM LANDREVILLE

A 4-foot-high security fence outside the berm of each pond surrounds the plant. A 50-foot buffer of grass lies between the fence and the forest, and a 10-footwide dirt road circles the buffer area to provide easy access for bird-watchers.

Clark Township's year-round population of 2,500 doubles in summer, when the most bird-watchers arrive. Each August, the population jumps to more than 10,000 when the town of Hessel hosts the Les Cheneaux Island Antique Wooden Boat Show. "It's one of the biggest antique boat shows in the nation, and that really brings in the visitors," Landreville says.



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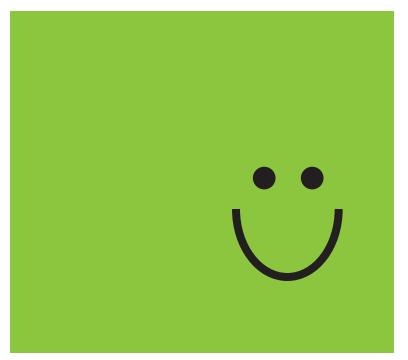


A North Huron Birding Trail sign marks the Clark Township Wastewater Treatment Plant as a designated observation area.

The gate to the plant is open all year so that visitors have easy access to the ponds. Each spring, a

high school biology teacher brings students to learn how the ponds work and to take effluent samples for classroom study. "We've never had a problem with visitors," Landreville says. "We welcome them so they can watch the birds, as long as they don't bother anything." tpo

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





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## **Licensing Across Borders**

THE WATER ENVIRONMENT FEDERATION IS WORKING TOWARD THE DAY WHEN CERTIFICATION RECIPROCITY WOULD REMOVE BARRIERS THAT LIMIT OPTIONS FOR OPERATORS AND UTILITIES

#### By Ted J. Rulseh

t's no secret that waves of operators are retiring and that water and wastewater utilities need replacements. It's also no secret that operators wish they weren't constrained in their mobility by state-by-state licensing and certification.

Reciprocity in licensing would help both sides. Ideally, a license earned in one state would be recognized in the other 49. The reality is, to say the least, a bit more complicated. Different states have their own sets of criteria, their own programs, their own exams. States may differ greatly in what skills, for example, a Class 1 (or Grade I) operator needs to have.

Still, that's no reason to give up on reciprocity, proponents say. Now the Water Environment Federation, through its Operator Advisory Panel, has started the slow, meticulous process of working to increase reciprocity. The same panel is also working on other initiatives to advance operators' training, job opportunities, and prestige.

One member of the panel is Joan Hawley, P.E., principal of Superior Engineering in Muskego, Wisconsin. Hawley has a master's degree in civil engineering and a Wisconsin Grade 4 wastewater operator license; she also holds a Professional Operator credential in collections from the Association of Boards of Certification, or ABC. Hawley is a WEF trustee and past chair of the WEF Collections Committee. She talked about reciprocity and the Operator Advisory Panel's other activities in an interview with *Treatment Plant Operator*.

#### **LDO:** What is the basic structure and role of the Operator Advisory Panel?

**Hawley:** The panel is almost a think tank, and it has specific positions. It is led by Mike Kyle, executive director of the Lancaster (Pennsylvania) Area Sewer Authority. I serve on it as a WEF board member. The

vice chair of the board's Plant Operations and Maintenance Committee and the vice chair of the Operations Challenge are members. We also handpicked experts from across the United States as well as one from Canada. Our goal is to make sure WEF is doing its best to serve operators.

used to be the norm, but now people are moving around. They're changing jobs more. They want to be able to go from state to state and take their license with them. They say, "I worked hard. I studied. Why do I need to take the exams over and over?" Or people from rural areas move away, earn their credentials in another state, and then want to come back to their hometown.

#### **LDO**: How can reciprocity benefit utility management?

**Hawley:** I've talked to utility managers who say they're desperate for key operators and staff. Their operators are retiring. Prospective replacements are moving into the area, but getting them the credentials they need is really critical. Another issue that is rumbling about is that the person in charge at a facility — the person who signs on the permit — potentially can face liability in a manner similar to a Professional Engineer, or P.E., in charge who has to stamp the drawings. It's really important for utility managers to raise the level of professionalism to be able to pull in qualified people from different areas.

#### **tpo**: Why are some states reluctant to accept other states' licenses?

**Hawley:** For one thing, regulatory agencies each have their own licensing entities. They developed the programs, and they take pride in them. Why would they want to take somebody else's? Also, in the old days, maybe the quality of some states' testing requirements weren't very good. States look at each other suspiciously; people bring things up that happened 30 years ago, not realizing that times have changed. In addition, operator classifications are kind of a hodgepodge. One state will have Grades 1 through 4. Another has Class A through D. Some states have Class 1 to 5. Sometimes 4 or 5 is the highest, and sometimes 1 is the highest.

[Operators today are] changing jobs more. They want to be able to go from state to state and take their license with them. They say, 'I worked hard. I studied. Why do I need to take the exams over and over?'"

JOAN HAWLEY

#### **LDO**: What are the main priorities of the panel?

**Hawley:** Reciprocity is a big one. Another is workforce development, which includes training programs, but also communication and outreach — promoting our profession through public information and toolkits for schools and targeting veterans and underrepresented groups.

#### **LDO**: Why is reciprocity so important for operators?

**Hawley:** Operators are a lot more mobile nowadays. Many operators who are retiring now have been in their positions for 30 or 40 years. That

tpo: What general approach is WEF taking toward developing

**Hawley:** We are partnering with ABC, which was created by WEF and the American Water Works Association in 1972 as a separate entity to provide operator certification. ABC has been a game-changer in how they put their programs together. They have gone through and defined Class 1, Class 2, Class 3 and Class 4 and the hours of experience, hours of classes, and job skills required for each one. They've standardized all that. A lot of states use part of ABC. Some states already use all the ABC tests. We're not promoting that everyone has to use ABC, but we'd like people to consider using it or consider reciprocity to be the norm.

#### **LDO**: Are there examples of full reciprocity in water-related professions?

Hawley: I use the example of the P.E. credential. As a P.E. in Wisconsin, I can essentially fill out a form and pay a fee and I'm a P.E. in another state. In Canada, the English-speaking provinces use ABC for all their testing, and operators can easily go from province to province. The Frenchspeaking province of Quebec works closely with the other provinces to provide reciprocity.

## **LDO**: How much reciprocity already exists?

**Hawley:** It's kind of confusing. Each state has its own process. Some states automatically recognize operators from certain other states. Some use ABC but then they tack on additional requirements, or they might revise some of the ABC tests. We're trying to get away from that so the ABC test is standardized.

You can't outsource our water and wastewater jobs. We have to be at the plant and be around the collections system. We do what is probably one of the most important jobs - keeping our water clean."

**JOAN HAWLEY** 

## **LDO**: Do you envision reciprocity helping to drive up salaries for operators?

**Hawley:** I would hope that it would help bring them up to a level of pay commensurate with their competency. I see some cases where the pay is probably acceptable, but in some cases, it's not commensurate with their skill set. The skill sets that are needed today, even at the basic level, are a lot more extensive than many people know.

## **LDO**: What needs to be done to encourage more reciprocity among states?

**Hawley:** It's going to take a lot of one-on-one with the state agencies, getting people to recognize that this is a significant problem and they need to be part of the solution. It also takes bringing ABC to the table to say, "Here's our program. Here's what we've changed. Here's our offering." As state funding is cut and jobs are cut, maybe some states will see that adopting ABC isn't a bad idea because they don't have the manpower to run their own programs anymore.

## **LDO**: How quickly do you envision full reciprocity becoming a reality?

**Hawley:** I would love to see every state turn around in the next year and say, "We're on board with this," but we have to face all the challenges I've mentioned. For some states, it might be a matter of utility managers insisting on reciprocity because otherwise they're not able to get the quality of people they need.

## **LDO**: Turning to another priority, what is driving the emphasis on workforce development?

**Hawley:** At WEF, we deal with a lot of utility executives who see a grinding need for sophisticated operators. Our treatment plants for some 50 years were activated sludge — the same philosophy and the same technology. Now with nutrient recovery, energy efficiency, sophisticated instrumentation, and automation, we need a whole different kind of operator. Even small plants are increasingly sophisticated. We need top-notch operators out there.

## **LDO**: What are a couple of examples of what WEF is doing for training?

**Hawley:** We've created an On-Demand Wastewater Library — an OWWL. It's free for WEF members and includes short items, five to seven pages — information in bite-size segments. Operators want quick segments or videos that show them how to do things. We're also creating training man-



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uals more focused on operators. For example, we're taking the WEF Manual of Practice that was written for design engineers and putting it in a format where it's going to be easy for operators to understand. That manual will be available in spring 2018.

## **LDO**: What needs to be done with public outreach and education as it relates to the stature of operators?

**Hawley:** We need to do a better job at promoting our profession. We're not patting ourselves on the back and saying, "Look at all this great work we're doing." You can't outsource our water and wastewater jobs. We have to be at the plant and be around the collections system. We do what is probably one of the most important jobs — keeping our water clean. tpo

# Above and Beyond

OPERATORS IN SALEM DO MORE THAN DELIVER HIGH-QUALITY WATER. THEY EARN AWARDS FOR EXCELLENT PERFORMANCE AND HELP TRAIN OTHER OPERATORS FROM AROUND VIRGINIA.

STORY: **David Steinkraus** PHOTOGRAPHY: **Joe Hermitt** 

# EACH YEAR FROM 2013-16, THE WATER FILTRATION plant in Salem, Virginia, has earned a Gold Award from the Office of Drinking Water in the Virginia Health Department.

That means meeting goals stricter than state and federal regulations, says Frank Young, the plant's chief operator: "You kind of go above and beyond trying to get the best water possible to your customers."

Yet the plant team isn't just in the business of winning awards. It's chiefly about delivering high-quality water to customers while serving as a handson training site for students at Virginia Tech.

## **DOING MORE**

The Virginia performance award program is voluntary. To earn recognition, plants must meet three goals related to clarification, filtration, and filter backwash. A Bronze Award meets the filtration standard. A Silver Award meets the filtration standard and one of the other criteria. A Gold Award meets all three.

The Salem operations team members have fully bought into the award program. "They take it personal," Young says. "I think everybody wants the award for their own. We have a pretty close-knit group, and a lot of us have been together for a long time."

City officials are also fully on board: "Our management has let us have control over the plant. They're not just interested in having a plant that only meets regulations and does nothing more."

Young himself is not one to accept the status quo. In 2017, he received the Edward H. Ruehl Operator of the Year Award from the Virginia Section of the American Water Works Association. In his letter nominating Young, Greg Boardman, professor emeritus at Virginia Tech, says he met Young



through the hands-on training program and finds him curious, energetic, organized, personable, caring, honest and sincere. "The other operators not only respect him for what he knows, but for the example he sets," Boardman writes.

#### THE NEXT GENERATION

Meanwhile, Virginia Tech has recognized the plant for outstanding service and excellent instruction in the form of hands-on training. The program, launched several years ago, educates operators mainly from Virginia but also some from other states. Salem has been involved since 2010.

At the outset of training, some students have an idea of what happens inside a water plant, and others have none. But, all of them find out when they walk into the Salem facility. "Everyone in this whole plant participates," Young says. "We do our normal, everyday things like filter backwashing."

Students come in twice a year. Each class of 15 is broken into three groups. "With that small a group, you can get your hands dirty and really learn something," Young says. Instruction is spread over two days, typically a Thursday and Friday. Young tries to schedule team members to rotate among subjects so the same person does not teach the same thing year after year.

The team at the Salem Water Treatment Plant includes, front row, from left, Marcus Potts, chemist; Christopher Litteral, Class I operator; Dennis Hardy, Class II operator; Larado Robinson, director; Michelle Cock, utility asset manager; and Laura Tucker, executive secretary. Second row, Frank Young, chief operator; Justin Epperly, Class I operator; Will Shaner, water department lead; and Brian Hiner, senior operator.





While some water plants have to worry about blending surface water with well water, that is not the case in Salem, Virginia. "The wells are very similar to what we're pulling out of the river," says Frank Young, chief operator.

Although considered to be groundwater, the well water is heavily influenced by the surface water just above. Young says, "People say, 'Aren't you just pulling water out of the river?' Technically, no." The well water has been tested for iron, manganese and other substances, and it has proven to be very similar to the river water.

In case something should happen to its supply sources — the river and the wells — the Salem team has yet another option: two interconnections with the Western Virginia Water Authority, which comprises of Roanoke County, the city of Roanoke, and other municipalities that surround Salem.

Salem sold water to those communities before the authority was formed, and Young and his team find it comforting to know that in an emergency, their city won't be isolated.

## THE RIVER FACTOR

As for daily operation, the Salem plant is built right beside the Roanoke River, one of its water sources. The plant is elevated to keep it above the 100-year floodplain. Three wells also help meet the city's demand; two are on the plant site, and the third is nearby.

Water from the river comes in through a 36-inch pipe. The intake structure is fitted with 3-mm screens from Johnson Screen (Aqseptence Group) to exclude small aquatic creatures or fish eggs, says Will Shaner, assistant chief operator. The screens have automatic air blowers to remove debris.

Pumps (Aurora Layne/Verti-Line 50 hp, 2,900 gpm) deliver the water to a pair of 500,000-gallon presedimentation basins. Detention times averag-

## **Salem (Virginia) Water Treatment Plant**

BUILT: | 2004

POPULATION SERVED: | 25,000

SERVICE AREA: | 14.5 square miles

FLOWS: | 10 mgd design, 4-5 mgd average

 ${\tt SOURCE\ WATER:}\ |\ \boldsymbol{Roanoke\ River\ and\ three\ wells}$ 

SYSTEM STORAGE: | 6 million gallons

DISTRIBUTION: | 150 miles of water mains

ANNUAL BUDGET: | \$3 million (operations)

KEY CHALLENGE: | Dealing with variable river water quality

WEBSITE: | www.salemva.gov

GPS COORDINATES: | Latitude: 37°15′53.94″N; longitude: 79°54′43.22″W

ing four to eight hours (depending on demand) remove much of the sediment from the river water before it enters the plant. One benefit of being high above the river is that the flow through the plant is entirely by gravity.

At the head of the plant, water goes past Chemineer 15 hp flash mixers (NOV) that feed coagulant (DelPAC from USALCO) and fluorosilicic acid. For algae control, mainly in summer, sodium permanganate is also fed. The 1.5 hp flocculators (also Chemineer) have 87.5-inch impellers. After the sedimentation basins, the water flows through sand, anthracite, and gravel filters with a Leopold - a Xylem Brand underdrain system.

Two 1-million-gallon storage tanks hold the water for distribution. Gaseous chlorine is fed there for disinfection. "A nice thing with this plant is that our wells come directly to the plant," Young says. "They do not feed the presedimentation basins. So if there is an issue with the river, we can shut the intake down and pull directly from the wells."

Interstate 81 lies about 13 miles upstream, and on occasion, a spill or accident can contaminate the river water headed for the plant. Operators stay

(continued)



in close contact with state officials, who alert them to problems upstream. "Anytime there's an accident, we shut the intake until we hear from the state," Young says. Most instances are false alarms.

#### FOCUS ON TRAINING

The plant used to operate 24 hours a day, seven days a week, but that changed a few years ago. It now operates from 7 a.m. to 11 p.m.; outside those hours, an autodialer function built into the control system alerts an on-call worker to problems that may occur.

"We found that shutting down helps with water turnover in the tanks," Young says. By 11 p.m., operators make sure all the storage tanks are as full as possible. The next day

is spent refilling the tanks. Another advantage is cost: Electricity is one of the largest expenses, and shutting down saves money.

In addition to Young and Shaner, the operations team includes Mark Goodman, Kenny Elmore, Brian Hiner and Justin Epperly, senior operators; Ben Hoose, Preston Fralin, Christopher Litteral and Charles Cook, operator I; Dennis Hardy, operator II; and Marcus Potts, chemist.

A separate maintenance staff includes Billy Williams, maintenance manager; Freddie Carroll, assistant maintenance manager; Brandon Poff, Michael Allen and Kevin Wilson, maintenance technicians; and Randy Epperly, custodian.

At press time, the Salem plant was on track to meet its goals again and achieve another Gold Award from the Office of Drinking Water. Training, a point of emphasis in Salem, helps sustain that level of quality. It's delivered through Virginia Tech and various online channels. "If somebody has an interest in something, we will look into it," Young says. "And our director Larado Robinson is very supportive of that." Workers also gain some continuing education credits by teaching the Virginia Tech hands-on classes.

Salem residents, to no surprise, care greatly about the quality of their drinking water. After the widely publicized problems with treating river water in Flint, Michigan, the Salem plant received a number of calls from concerned residents. It wasn't difficult to put them at ease, Young says.

"When I give a tour, I always say river water is one of the main challenges because you don't know if it's going to be the same five years from now. It's always changing." With a high-performing plant and a dedicated staff, the people of Salem don't have to worry. **tpo** 



The Salem plant is on track to win its fifth consecutive Gold Award from the Virginia Health Department's Office of Drinking Water.



Christopher Litteral works in the filter room, equipped with sand, anthracite, and gravel filters and an underdrain system from Leopold, a Xylem brand.

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When I give a tour, I always say river water is one of the main challenges because you don't know if it's going to be the same five years from now. It's always changing."

FRANK YOUNG



Frank Young, left, chief operator, and Will Shaner, water department lead, believe training is essential to sustaining award-winning quality.



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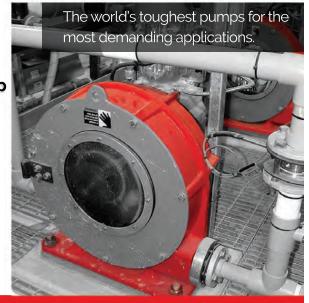
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Today, the cost of sensor technology is coming down, and communication is affordable. That makes it possible to monitor critical equipment more effectively and efficiently compared to route-based monitoring."

THOMAS SCHARDT



- The battery-powered sensor device measures vibration in two axes as well as surface temperature.
- The devices can be applied to motors, gearboxes and driven equipment like pumps, fans, and compressors.

# **Hands-Off Monitoring**

A WIRELESS REMOTE MONITORING SYSTEM OFFERS A LOW-COST WAY TO TRACK EQUIPMENT CONDITION, IMPROVE MAINTENANCE PRACTICES, AND PREVENT UNPLANNED DOWNTIME

## By Ted J. Rulseh

he cost of equipment monitoring technology is coming down; the technologies themselves are improving. In this environment, plant operations and maintenance people are seeking access to real-time data on equipment condition for less money than they are now paying.

That's the reality as the industry embraces the Internet of Things (IoT). Nidec Motor has stepped into the IoT marketplace with the FORECYTE wireless equipment monitoring platform. It lets plant operations personnel place small wireless sensors on equipment to collect data on vibration and temperature, then view and analyze the data on a webpage.

The technology can help users keep close track of equipment health and thus fine-tune predictive maintenance programs, extend equipment life, receive alerts to adverse conditions, and avoid the high costs of unplanned downtime and catastrophic equipment failures. Thomas Schardt, commercial and industrial senior director for IoT, and Pranesh Rao, senior product manager for IoT, talked about the technology and its benefits in an interview with *Treatment Plant Operator*.

## **Upo:** What led to the decision to bring this technology to market?

**Schardt:** Nidec Motor looked at what was changing in the market that affects our core business of developing and marketing motors and drives. We identified IoT, however one defines it, as a core technology we can use to improve our products and become not just a hardware provider, but a solution provider. That means taking our core competency and adding an IoT

component, enabling more data analytics, real-time evaluation, interoperability, and interconnectivity.

## **LPO:** How did you choose this monitoring platform as an entry to the IoT sphere?

**Schardt:** Millions of motors in the U.S. alone are not monitored through an automated process or plant management system. Traditionally, condition monitoring is route-based, where vibration analysts go from location to location with hand-held probes. Today, the cost of sensor technology is coming down, and communication is affordable. That makes it possible to monitor critical equipment more effectively and efficiently compared to route-based monitoring.

## **LPO:** Can this technology be applied to motors other than those made by Nidec Motor?

**Schardt:** Yes. It doesn't matter what kind of motor it is. It can also be applied to gearboxes and to driven equipment like pumps, fans, and compressors.

#### **LDO:** What exactly does the sensor device measure?

**Schardt:** It measures vibration in two axes and the surface temperature. Users can also add a thermocouple that plugs into the side and measures external temperature.

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## **LDO:** What attributes did you consider essential in designing this technology?

**Schardt:** First is simplicity — making it as easy to install and use as possible. There are no cables, and the online platform itself is simple and intuitive. Second is reliability. Third is interoperability — making sure we can integrate with SCADA systems and PLC-based systems that facilities use today and can connect to what is to come. Fourth is diagnostic intelligence, enabling users to understand and make use of the data.

## **LDO:** How is the sensor device attached to the equipment being monitored?

**Schardt:** The sensor can be attached using the built-in round magnet in the bottom of the case. However, most customers use a 1/4-inch, 28-thread stud mount, which is the best connection for collecting repeatable, high-frequency vibration data. The sensor can also be epoxied in place, but then the user loses the flexibility that a magnet or a stud mount provides.

## **LDO:** So a sensor doesn't have to be attached permanently to the equipment?

**Schardt:** You can leave it in place permanently, but you can also use it for temporary visualization of the equipment. You can use it to do commissioning or troubleshooting. It's highly flexible. You can program it to collect data once a week, once a day, every 10 minutes, down to every minute.

## **LDO:** How does this technology actually communicate, transmit, store, and analyze data?

**Rao:** The sensor communicates wirelessly to a gateway using a commercially available proprietary protocol. It's designed to communicate reliably over relatively long distances. The gateway collects the data and sends it to our cloud platform by way of Ethernet, Wi-Fi or cellular communication. It's stored in the cloud, and there's a web portal where customers can view the data.

#### **LDO:** How is the data presented?

**Rao:** Vibration data is typically presented graphically and temperature data in numeric form, although users can view it in a graph if they want to. They can also download the data and use their own analytical tools. The system can send alerts by email or text based on customer-set vibration and temperature levels, and for loss of communication and sensor battery level.

## **tpo**: What is the payment structure for purchasers of the technology?

**Schardt:** There is a hardware fee upfront for the gateway and the sensors, and then a monthly subscription fee for accessing the portal. There is no installation of software on the client's computers, and there is no per-user software license fee.

## **LDO:** How is this offering beneficial specifically for water and wastewater operators?

Rao: Many pumping stations are unmanned. So now operators can monitor equipment condition online and get email and text alerts. If they have a remote pumping station, instead of sending route-based monitoring specialists every one to three months to check the condition and take data samples, they can sign in, view and compare the data, and spot trends. If they see a situation developing, they can go out to the site already with some understanding of the condition.

## **LDO:** What does the future hold for this technology?

**Schardt:** We're planning to add more sensor capabilities, including a resistance temperature detector to directly measure temperature of the bearing, usually the biggest failure point in equipment. We're also looking at sensing for current, voltage, flow and pressure. In addition, we're seeking ways to take data from other sensors in a facility and display it on our platform so that operators only have to sign in to one platform to view complete sensor information. tpo





The turnaround at the water plant entrance provides an appealing view of the Lake Keowee reservoir.

# **Being Neighborly**

A WATER PLANT UPGRADE INCLUDES CHANGES FRIENDLY TO NEARBY HOMEOWNERS AND EARNS A SIGNIFICANT AWARD FOR INFRASTRUCTURE SUSTAINABILITY

## By Steve Lund

inning an award for sustainability was not top of mind when Seneca (South Carolina) officials began to redesign their water treatment facility.

Ultimately, the Seneca Water Plant received an Envision Silver award from the Institute for Sustainable Infrastructure, but the real drivers of the design changes were safety and compatibility with the surrounding neighborhood.

"What started the ball rolling was the safety concern of having chlorine gas cylinders this close to a neighborhood," says Steven Fletcher, plant superintendent. "After deciding to switch from the chlorine gas to generating our own sodium hypochlorite, we looked at updating the rest of our chemical feed system, which was 25 years old. In discussions, the homeowners association brought some concerns to our attention."

## **CLOSE COMMUNICATION**

Seneca is a city of about 8,300 people at the southern end of Lake Keowee, a man-made reservoir. The water plant (20 mgd design and 7 mgd average) is in the Normandy Shores residential neighborhood. Owned by Seneca Light & Water, it serves about 35,000 people, including the utility's wholesale customers.



The water plant administration building also serves as a civic center for the city of Seneca.

City officials held numerous meetings with the neighborhood association, starting about a year before construction began and continuing during construction. "We found that some of their concerns were also issues that we were looking to change and improve," Fletcher says.

One concern was the visibility of the tank farm in front of the building. "So we moved the tank farm from the original location, which was built with the plant in 1968, to the other side of the building. We also added a circular drive that made it a lot easier to receive chemical shipments."

Also in response to the neighborhood, the plant team changed the sludge-handling process.

"The clarifier that was part of the process was also really visible and ugly, according to the neigh-



The new stone tower intake structure encloses the intake pumps providing security and keeping their operation quiet.

bors," Fletcher recalls. "The process was outdated, and it was getting difficult to find parts to maintain it. After research and testing, we changed from labor-intensive plate presses to a screw press (Schwing Bioset). We tore down the clarifier and added a large bubble mixer (Pulsed Hydraulics) to the sludge-holding basins."

#### SAVING SPACE AND ENERGY

The screw press takes up less space than the old presses, but the real advantage is in labor savings. "The old presses basically had to be manned the whole time," Fletcher says. "There was a lot of labor to get the sludge off. With the new screw press, we turn it on, get it adjusted, and let it run." The new press produces sludge at 26 percent solids versus 24 to 25 percent previously, but the process requires far fewer labor hours.

Removing the clarifier also enabled some energy savings: "When we got rid of the clarifier, we got rid of two 25 hp transfer pumps. We took out all that and added a little 1 hp motor. We're saving power that way. Now, sludge

goes straight from the sludge holding basin to the screw press; it's a cleaner operation, contained within the press."

The neighborhood apparently appreciates the difference: Fletcher sometimes sees people stopping to admire the view from the turnaround at the plant entrance. That wouldn't have been possible before, because there was no place to turn around.

#### SCORING POINTS

The plant upgrades include a new administration building that also functions as a civic center for the city. Construction took about a year and a half and cost \$10 million. Fletcher credits the general contractor, Harper Corp., with having the project evaluated for an Envision award. "It wasn't something we planned on," he says. "As we were getting into the construction, we saw we were going to meet the Envision standards."

Envision is a set of resources created by the Institute for Sustainable Infrastructure in collaboration with the Zofnass Program for Sustainable Infrastructure at the Harvard University Graduate School of Design. Envision measures sustainability in five categories: Quality of Life, Leadership, the Natural World, Resource Allocation, and Climate and Risk.



The plant upgrade included replacement of plate presses for solids dewatering to a screw press (Schwing Bioset) that occupies less space and saves on labor.

According to Melissa Peneycad, Institute for Sustainable Infrastructure director of sustainable projects, Envision can be used in the earliest planning stages as a design tool or to retroactively assess project sustainability. The Institute for Sustainable Infrastructure provides free resources, including a guidance manual and online score sheets. It also provides training in using the resources and offers certification as an Envision Sustainability Professional, or ENV SP. At least one member of a project team must be certified as an ENV SP if a project is going to be submitted for thirdparty verification.

During the Seneca plant upgrade construction, Anne-Marie Moehring, a member of Harper Corp.'s Environmental Systems Division, earned credentials to become an ENV SP. The plant received multiple Envision points in Quality of Life. The upgrades enhanced safety for employees and the neighborhood. The plant is also more accessible for public education about water treatment, and it operates more efficiently.

#### **CREDIT FOR SAFETY**

The meshing of the plant's structures with the character of the neighborhood was also important for the Envision rating. Neighbors didn't like the old intake structure, which consisted of pumps on a dock, and requested something more attractive. The new intake structure is a stone tower that resembles a lighthouse. Enclosing the pumps in the tower provides more security and makes operation quieter.



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concern of having chlorine gas cylinders this close to a neighborhood."

STEVEN FLETCHER

The switch from gaseous chlorine to liquid sodium hypochlorite checked numerous boxes on the Envision scorecard, including the elimination of health and safety risks. The components of sodium hypochlorite, mainly salt, are easier to transport, and fewer shipments through the neighborhood are needed.

Collaboration with the neighborhood was also valuable in the Envision system. Seneca officials had channels of communication for neighbors through the city's website, and the city posted video updates of the renovations and the rationale behind them. Community leaders and residents attended a ceremony after the project was completed, and the homeowners association sent the utility a letter of gratitude.

## LOCAL SOURCING

The Envision rating was also improved by using locally sourced materials, estimated at 60 percent on a cost basis, and by reuse of existing materials. About 30 percent of the materials used were reused or contained recycled content, according to the Institute for Sustainable Infrastructure.

The institute cited the elimination of the old sludge clarifier and the switch to a screw press for providing significant energy savings. It estimates the Seneca plant operates on 30 percent less energy than the industry standard.

There was one other bonus to the project, although it wasn't a factor in the Envision award: "We ended up with a very nice building." tpo

# Pumps By Craig Mandli

## **Centrifugal Pumps**

## **GORMAN-RUPP 6500 SERIES**

The 6500 Series line of solids- and clean liquid-handling end suction centrifugal pumps from Gorman-Rupp includes sizes from 3 to 16 inches, flows to 15,000 gpm, total dynamic head to 530 feet, and solids-handling capabilities up



6500 Series line of centrifugal pumps from Gorman-Rupp

to 4 inches for applications in wastewater treatment plants, industrial facilities, construction, mining, and agricultural uses. The line comes standard with oversized bearings, atmospheric vent, side-access inspection port (on solids-handling models), and an indexable Smart Scroll discharge locator. 419-755-1011; www.grpumps.com

## **VERDER VERDERHUS**

Verderhus centrifugal screw pumps from Verder combine features of centrifugal and positive displacement pumps for low-head, high-flow pumping. Centrifugal screw pumps transfer the product gently and efficiently. The open impeller allows large solids to be easily pumped, reducing the risk of cavitation, which can cause serious damage to a pump and to the production process.

They can help lower both energy use and ownership costs. All models use an oil-lubricated, double-mechanical seal for reliability. Typical applications are wastewater, thickened biosolids, waste activated sludge and return activated sludge, food waste, and biogas slurries. They are available in submersible models. 877-783-7337; www.verder-us.com

## **Chopper Pumps**

Verderhus centrifugal screw

pumps from Verder

## VAUGHAN CONDITIONING PUMP

The Vaughan conditioning pump is a Vaughan submersible chopper pump mounted on a portable stand that's fitted with a high-velocity mixing nozzle. The unit recirculates the contents of the wet well, chopping and mixing to produce a homogeneous mixture that is more easily pumped out. Floating mats are removed, and solids accumulated on the floor are resuspended. The pump is mounted on a portable

Conditioning pump from Vaughan

stand, easily used in multiple applications at a single job site, facility or municipality. **888-249-2467**;

www.chopperpumps.com

## **CRANE PUMPS & SYSTEMS SITHE**

The SITHE submersible chopper pump from Crane Pumps & Systems solves clogging with a chopping technology that slices even the most troublesome solids in the waste stream. It provides value to customers such as ease of servicing, ability to upgrade, high reliability and low life cycle cost. It includes open center cutter design; field-replaceable,

SITHE chopper pump from Crane Pumps & Systems

heat-treated blades; plug-and-play cord; liquid-cooled motor; and a large lifting bail. They are available as standard and explosion-proof models in 4- and 6-inch discharge sizes. 937-778-8947; www.cranepumps.com

## **Dewatering/Bypass Pump**

## MYERS SETH PUMPS DD-6 SAFE

The DD-6 SAFE (Sound Attenuated Fully Enclosed) high-volume, double diaphragm dewatering pump from Myers Seth Pumps reduces noise output by up to 50 percent, making it ideal for metropolitan and urban environments. Its Hatz 1D81Z 10 hp, air-cooled diesel



DD-6 SAFE dewatering pump from Myers Seth Pumps

engine along with its 80 to 90 max cfm, Enduro diaphragm and 3/8-inch steel construction make it reliable and durable in rugged environments. It can pump 600 gpm, deliver 28-feet of vertical lift, and move 4.25-inch solids. It can also run 24 hours on 6 to 7 gallons of diesel fuel for up to 12 days continuously, and it can run dry indefinitely. It combines the key duty points and features of a 4-inch double diaphragm pump, 6-inch piston pump, 6-inch auto prime centrifugal pump, and 8-inch rotary lobe pump. 904-389-6114; www.myerssethpumps.com

## **Effluent Pumps**



**BLUEline Rotary Lobe Pump from Boerger** 

## BOERGER BLUELINE ROTARY LOBE PUMP

The Boerger BLUEline Rotary Lobe Pump is a self-priming, valveless, positive displacement pump used for the conveyance of viscous and abrasive materials. There are 21 pump models in six series with pulsation-free operation, fully reversible rotation, dry-

run capabilities and flow rates up to 7,500 gpm. They are stable and wear-resistant with MIP design

(maintenance in place) that allows for all wetted parts to be easily replaced through the front cover without the removal of pipe or drive systems. **612-435-7300; www.boerger.com** 

## **NOV MOYNO L-FRAME**

With a pin joint-design in mind to maximize operating efficiency, the compact Moyno L-Frame pump from NOV has a pin-type universal joint drive. It uses small borehole pipework, which eliminates the need for a series of pumps when pumping over long dis-



Moyno L-Frame pump from NOV

tances or with high head requirements. With up to 28 feet of suction lift capability, the user can easily pump deep sumps without the use of submersible equipment. In addition, low running speeds allow reduced wear and a longer working pump life. It is available in cast iron or stainless steel, with a choice of rotor and stator materials to suit individual applications. 832-424-7300; www.nov.com/industrial

## **VERTIFLO PUMP 1400**

The Vertiflo Pump 1400 horizontal end suction pump has a heavy-duty cast-iron frame that incorporates integrally cast support and ribbed mounting feet, which assure a solid, dependable pump installation and

operation. One frame fits all pump sizes. The frame has a back pullout design that allows for easy inspection or service/maintenance without disturbing the piping to the pump. It offers ease of mainte-

nance with external impeller adjustment. Its semiopen impeller design accommodates passage of solids or fines. All impellers have balance holes near the hub, which reduce thrust load and pressure in the packing or seal area. Wiping vanes reduce axial loading and prevent dirt from entering the sealing area. Packing or various mechanical seal arrangements are available. It is



1400 Series pump from Vertiflo Pump

offered in cast iron, 316 stainless steel fitted, all 316 stainless steel, or CD4MCu. Capacities range up to 3,600 gpm, with heads of 275 feet and temperatures of 250 degrees F. 513-530-0888; www.vertiflopump.com

## **Metering Pumps**



**MEMDOS SMART Series metering** pump from Lutz-JESCO America

## **LUTZ-JESCO AMERICA** MEMDOS SMART SERIES

The MEMDOS SMART Series mechanically actuated metering pump from Lutz-JESCO America is built for precise liquid dosing, and includes an additional size that delivers 12.7 gpd at pressures up to 300 psig in 316

stainless steel PVDF or polypropylene materials. Its compact design and sturdy tappet drive make handling acid, lye, coagulants and flocculants easy. It has remote start and stop control, level and diaphragm rupture monitoring, and batch dosing with interval and timer functionality. Double-ball check valves are standard, and it comes with an integrated dosing head venting device. 800-554-2762; www.lutzjescoamerica.com

## PULSAFEEDER PULSATRON

PULSAtron electronic metering pumps from Pulsafeeder have a guided check valve system with a seat-and-ball design that ensures reliable and accurate metering. Their fin-cooled solenoid enclosure dissipates heat, ensuring that the pressure-handling capability of the pump can be maintained. The thermally protected solenoid protects the pump from seizing up in extreme heat conditions with an automatic reset fea-

ture, allowing the pump to resume operation upon cool-down. Units are tested and rated under hot conditions so flow and pres-



sure ratings meet specifications. They offer flows up to 600 gpd and pres-

**PULSAtron electronic metering** pumps from Pulsafeeder

sures up to 300 psi, with a range of flows and pressures. Agency approvals include CE, ETL, ETL san. and NSF 61 approval on PVDF material and degassing head models. 800-333-6677; www.pulsatron.com

**BRAVO** chemical metering systems from SEEPEX

## SEEPEX BRAVO

BRAVO chemical metering systems from SEEPEX are plug-and-play, pre-engineered feed systems that improve process control with accurate and repeatable flows and lower chemical consumption. The system is an integrated, modular, and scalable solu-

> tion used for disinfection, pH control, flocculation, corrosion inhibition, oxygen scavenging, and contaminant elimination. It

is designed as single source for pumps and controls. Systems are built from standardized panels in floor- or wall-mounted simplex, duplex or triplex options. The system incorporates NSF/ANSI 61 certified SEEPEX progressive cavity Intelligent Metering Pumps. Slip is minimized even when fluid temperature, viscosity, or discharge pressure fluctuates. 937-864-7150; www.seepex.com

## **Peristaltic Pumps**

## **BLUE-WHITE INDUSTRIES** FLEXFLO A-100N

The FLEXFLO A-100N peristaltic pump from Blue-White Industries offers

low-volume, precision chemical metering and dependable service. The pump head is engi-



FLEXFLO A-100N peristaltic pump from Blue-White Industries

neered with a larger circumference to provide even greater accuracy than previous models. Upgrades include larger internal adapter ports that handle higher viscosity fluids. The tube assembly design includes overmolded adapters stamped with visible part numbers for easy reference and reorder. Units include a Tube Failure Detection system that will detect a range of conductive, noncompatible fluids. If it senses tube failure, the pump automatically shuts down and will energize a relay or switch permitting communication with external equipment, like a backup pump or alarm. The pump won't restart until the problem is resolved. It offers precise feed of 124 gph and working pressures to 100 psi. Laboratory listings include NSF, ETL and CE. 714-893-8529; www.blue-white.com

## STENNER PUMP S SERIES

Built to NEMA 4X for demanding applications, the S Series peristaltic pump from Stenner Pump interfaces with process control systems through multiple programmable inputs and outputs. Operational modes

include scalable, invertible 4-20mA or 0-10-volt DC inputs, Hall Effect (frequency), PPM feed,

pulse, timer and manual. Users can pro-S Series peristaltic pump gram up to three output relays in response from Stenner Pump to conditions such as tube leak, motor drive

fault, process alarms or transfer to a backup pump. The tube's life expectancy can be programmed to initiate a tube change indicator on the operating display when the set runtime is reached. Tube replacement without tools is standard with the QuickPro pump head. The totally enclosed pump is outdoor-rated, and the brushless DC motor has ball-bearing support. Agency listings include NEMA 4X, NSF 61 and 372, cULus indoor/outdoor and CE IP65. 904-641-1666;

www.stenner.com

## **Solids/Sludge Pump**

## GLOBAL PUMP 6GST MARK II

of 3,000 gpm and maximum total head

The model 6GST Mark II standard trash pump from Global Pump is designed to effectively handle a wide range of liquids from water to sewage and sludge that can contain solids and other material. It is capable of achieving maximum flows

6GST Mark II trash pump from Global Pump

of 202 feet while handling solids up to 3 inches in diameter. It is SAE flange mounted to a water-cooled, four-cylinder diesel engine. Alternative drives are available, including electric motors. A front pullout cartridge seal provides ease of maintenance as it can be quickly changed in the field, reducing downtime and expense. 866-360-7867; www.globalpump.com

## **Submersible Pumps**

## **BJM PUMPS XP-SKG**

The XP-SKG explosion-proof electric submersible pump from BJM Pumps is designed for tough conditions where explosion-proof, FM, C/US approved (Class I, Division 1, Group C & D) pumps are needed. It has RAD-AX Dual Shredding Technology designed to obliterate tensile fabrics and other difficult solids in municipal and industrial wastewater applications. All shredding elements are constructed of hardened 440C stainless steel

with a Rockwell hardness of 55C plus. It has shredding system efficiency to alleviate potentially high surge load to the motor,

XP-SKG submersible pump from BJM Pumps

including an efficient, high-solids passage impeller and volute design, coupled to a high-torque, four-pole motor available in 2, 3 and 5 hp models. Two impeller trims are offered to expand hydraulic coverage. Oillubricated, double-mechanical seals and a separate lip seal design protect the motor. 860-399-5937; www.bjmpumps.com

## POLYLOK INC. / ZABEL PL-CPE5A

The PL-CPE5A from Polylok Inc. / Zabel is a submersible 1/2 hp, 115-volt, single-phase effluent pump with a 2-inch NPT vertical discharge. It has a maximum head of 48 feet and a maximum flow of 64 gpm. It is designed with a 3,450 rpm, oil-filled permanent splitcapacitor motor and has an amp rating of 8.5 for 115 volts, cast-iron housing, and volute equipped with a castiron vortex impeller capable of passing 3/4-inch-diame-

PL-CPE5A submersible pump from Polylok Inc./Zabel

ter solids. The stainless steel shaft is supported by two single-row, oil-lubricated ball bearings. The shaft seal is

an inboard design with a secondary exclusion V seal. Construction materials are carbon for the rotating face and ceramic for the stationary face. All elastomers are Buna-N, and the hardware is 300 Series stainless steel. It has a 20-foot UL/CSA-listed power cable that's suitable for submersible service and fitted with a three-prong plug. It is supplied with an integrated clip on its piggyback mechanical float switch for automatic operation. 877-959-7751; www.polylok.com

## **Vertical/Lift Station Pump**

## SCREENCO SYSTEMS PATZ SHAFT DRIVE PUMPS

They have high solids and grit capac-

Patz Shaft Drive Pumps, distributed by ScreenCo Systems, are vertical pit pumps that can be used in above-ground or underground storage tanks and include choices of single- or three-phase electric motors.

Patz Shaft Drive Pumps, distributed by ScreenCo Systems

ities with large centrifugal pumps and hardened steel impellers. High capacities include the 3333 Series up to 500 gpm, and the 4444 Series up to 1,580 gpm. They can be deployed in depths from 3 feet to 12 feet 8 inches. The 6000 and 8000 Series have a three-point hitch with PTO drive and can offer up to 3,500 gpm at depths from 6 to 12 feet. They can be used with an agitator nozzle to mix and pump fast. The 616 vertical prop agitator is capable of mixing at 9,000 gpm, keeping grit and solids mixed at pit depths of 6 to 16 feet. 208-790-8770; www.screencosystems.com

## **Pump Controls**

## FRANKLIN ELECTRIC SUBMONITOR CONNECT

The SubMonitor Connect electronic motor protector from Franklin Electric provides peace of mind through three-phase motor protection and enhanced troubleshooting proficiency. Using the FE Connect mobile technology

app, it provides enhanced capabilities of



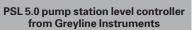
**SubMonitor Connect** electronic motor protector from Franklin Electric

real date and time-stamped system monitoring to improve troubleshooting while protecting three-phase motor and pump systems ranging from 1 to 700 hp, or those that require up to 1,000 amps. Contractors can easily monitor system status live, complete basic or advanced setup, save commonly used setups for later use, and view/send fault history through the convenience of Bluetooth connectivity. It protects against damage due to adverse conditions and provides protection against arc flash while also offering 1 percent power metering that eliminates the need for an additional meter while providing communication with building management systems to track energy costs and motor status. 260-824-2900;

## www.franklinwater.com

## **GREYLINE INSTRUMENTS PSL 5.0**

The PSL 5.0 pump station level controller from Greyline Instruments has redundant level sensing. It includes a noncontacting ultrasonic sensor and can be connected to a loop-powered pressure sensor for redundant sensing in applications with foam or grease. It will continuously



recalibrate the pressure sensor and automatically switch back and forth from ultrasonic to the pressure sen-

sor as required. It is designed for lift stations, wet wells and storage tanks. Calibration and relay setpoints are easy to enter through the user-friendly keypad and menu system. An automatic pump runtime logging and reporting system helps operators to plan pump maintenance and identify lazy pumps before they fail. It includes an isolated 4-20mA output and six programmable control relays for pump control, pump alternation and level alarms. An intrinsically safe sensor and a built-in data logger are optional. 315-788-9500; www.greyline.com

## **GRUNDFOS PUMPS GRUNDFOS** REMOTE MANAGEMENT

The Grundfos Remote Management system from Grundfos Pumps provides facility managers and engineers remote access and control to data and alarms from pumps, controllers, and auxiliary equipment such as sensors and

meters. The secure internet-based system saves time and cost by reducing the need for on-site inspection,



**Grundfos Remote Management** system from Grundfos Pumps

and it's designed for pump installations in various water infrastructure and commercial applications. A user-friendly interface provides a complete overview of system operation, including energy consumption and performance. Scheduling capabilities help streamline necessary maintenance work and plan who will respond to alarms. 800-921-7867; us.grundfos.com

## KSB SES SYSTEM EFFICIENCY SERVICE

SES System Efficiency Service from KSB can show operators ways to increase the energy efficiency of pump systems and prolong their service lives. Whatever the application is in energy, industry, water or wastewater, by recording extensive measurement data, it is possible to evaluate the operation of a system and identify potential savings as well as any causes of damage. Regardless of the installation



**SES System Efficiency** Service from KSB

type and manufacturer, the service assesses the operating range of pumps from ratings of 30 kW. It offers recording of process variables and vibration levels through on-site measurements, including pressure, rotational frequency, fluid and bearing temperature, analog signals to 0/4-20mA, and vibration. It helps determine the effective power, performs frequency

analyses to identify causes of damage, and reports and presents findings, including an action plan and profitability analysis. 804-222-1818; www.ksbusa.com

## PRIMEX KWIKSWITCH

The KwikSwitch quick-release float switch connection system from PRIMEX improves reliability and reduces installation and float switch replacement time. It is designed to be installed directly in a wet well. The four-port manifold easily connects one to four float switches for level control applications, and its color-coded wiring pairs and corresponding colored caps make installation and maintenance easy. It is rated for temporary submersion, and its dual-seal design provides improved protection against water ingress and corrosive

gases typically found in sewage lift stations. It includes a single manifold multicon-

KwikSwitch float switch connection system from PRIMEX

ductor direct burial rated cable and stainless steel mounting bracket for the manifold. Sealing plugs for unused ports and mechanically activated float switches are available. It is CSA certified. 844-477-

4639; www.primexcontrols.com

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For FREE information on these pu	mps products, check the box(es) belo	ow:
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Effluent Pumps  ☐ Boerger BLUEline Rotary Lobe Pump ☐ NOV Moyno L-Frame pump ☐ Vertiflo Pump 1400 Series pump	PRINT NAME:	TITLE:
Metering Pumps  ☐ Lutz-JESCO America MEMDOS SMART Series metering pump ☐ Pulsafeeder PULSAtron electronic metering pumps ☐ SEEPEX BRAVO chemical metering systems	FACILITY NAME:  MAILING ADDRESS:  CITY:	STATE: ZIP:
Peristaltic Pumps ☐ Blue-White Industries FLEXFLO A-100N peristaltic pump ☐ Stenner Pump S Series peristaltic pump	PHONE:  FAX:	CELL PHONE:
Solids/Sludge Pump Global Pump 6GST Mark II trash pump	Scan and email to: nicole.labeau@colepub	TP00318











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By Craig Mandli

# Double disc pumps solve problems at treatment plant

## Problem

In April 2010, the staff in Moline, Illinois, needed to replace a piston (plunger) pump at the North Slope Wastewater Treatment Facility. The pump, which fed a blend of wastewater and lime blowdown sludge at 8 to 10 percent solids to the belt filter press, needed to pull a small suction lift and operate against a discharge pressure of 10 to 20 psig because the press was across the plant.

## Solution

After a trial run, the plant team installed 6-inch **Penn Valley Pump Double Disc Pump Model 6DDSX76.** The city later purchased a second pump from Penn Valley Pump to replace a piston pump for press feed. In the next three years, the city chose pumps from Penn Valley Pump for other replacements at its South Slope plant, including a 4-inch pump for waste activated sludge



transfer and a 6-inch pump for primary sludge transfer.

## **RESULT:**

In 2014, the city took bids for a \$40-million upgrade at the North Slope facility, and plant staff urged the consulting engineer to specify pumps from Penn Valley Pump. That led to the purchase of seven of the company's 6-inch pumps. **800-311-3311**; www.pennvalleypump.com

## School district streamlines lift station maintenance

## Problem

As safety requirements tighten, specialized maintenance and service protocols for some lift stations are becoming burdensome and costly for many small- to medium-sized operations groups, like the Klein Independent School District outside of Houston. "When a submersible goes out, it's contractor time," says Steve Cox, maintenance supervisor. "My technician lets them in the gate, and that's about it."

## Solution

To become more self-sufficient and minimize costs, the district is converting its submersible pumps to above-grade **Wet Well Mounted Pump Stations** from **Smith & Loveless.** The systems include all pumps, piping, valves, and controls installed outside of the wet well, at grade, making operations and maintenance simple, safe, and low-cost. Twelve of the district's 20 lift stations have been converted.



#### RESULT:

One full-time technician now operates and maintains all the district's lift stations, easily and safely inspecting each one regularly by opening the lightweight enclosure. The technician can access all mechanical and electrical equipment including the pump internals after removing four bolts. There have been no pump repairs or replacements by contractors over the last decade. "With the above-ground stations, we can do just about everything, no problem, with just one guy," Cox says. "Problems are not very common. The stations run very well." 800-898-9122; www.smithandloveless.com

## Pump lets plant become a regional solution for biosolids

## Problem

The Bird Island Wastewater Treatment Plant serves the city of Buffalo, New York, and neighboring communities. The plant team wanted to accept biosolids from these communities and make the facility a regional processor.

## Solution

A 60-cubic-yard push-floor bin was installed where vehicles can deliver dewatered biosolids. The hydraulic push-floor sends material into a screw feeder, followed by a **Schwing Bioset KSP 12-volt pump.** The biosolids are then pumped up to the third floor for incineration. The plant team also has the option to transfer the



biosolids from the bin into the subbasement where it can be rewetted and sent to the digesters to produce methane.

#### **RESULT:**

The plant is accepting biosolids from several neighboring communities. The pump takes material at 26 to 28 percent solids range and sends it more than 65 feet up to the incinerator. The higher solids content has enabled gas consumption to be reduced by 65 percent. **715-247-3433**; www.schwingbioset.com

# Peristaltic pump used to deliver lime slurry to water treatment plant

## Problem

The North Regional Water Treatment Plant of Palm Bay, Florida, sought a pump to deliver a 10-percent lime slurry at 25 psig and 20 gpm. The superintendent of the facility was examining shoe designed peristaltic and single rolling design peristaltic pumps. He realized that a single roller design compresses the rubber hose only one time per 360-degree revolution, whereas the shoe design pumps compress their rubber hoses twice per every 360-degree revolution. This means that hose life in the single roller design is at least two times longer. Additionally, a single roller design generates no heat,



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whereas the shoe design generates significant heat, which can degrade rubber hoses, reducing hose life. The superintendent realized the operating costs would be significantly higher for the shoe design peristaltic pumps.

## Solution

## Flowrox single roller pumps only require approximately 10 percent food-grade glycerin when compared to shoe design pumps. The increased hose life and decreased glycerin consumption also helps the city to select the better pump for lime slurry pumping. The superintendent specified Flowrox LPP-T 1.5-inch pumps based on the technical merits and reduced operating costs by the single rolling design.



## RESULT:

The city ordered three 1.5-inch rolling design peristaltic pumps to minimize operating costs for the city. 410-636-2250; www.flowrox.com tpo

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## 1. MUELLER SWING CHECK VALVES

To meet the higher pressure requirements of today's water infrastructure systems, all 2- to 12-inch Mueller UL/FM swing check valves are now rated at 350 psig cold working pressure. In addition, the product line has been expanded to include 2-, 14- and 16-inch sizes. The two largest sizes are rated at 250 psig CWP. Standard features include all ductile iron construction, bronze to BUNA seating, lifting rings, PN16 drilling, bosses for bypass connections, and a drain plug. **800-423-1323**; www.muellercompany.com

## 2. HAWK MEASUREMENT OPTIOLASER 200 SERIES SENSOR

The OptioLaser 200 Series sensor from Hawk Measurement can be used for blocked chute detection, barrier detection, machine detection, stock pile monitoring and point level measurement. It incorporates an infrared 905 nanometers time-of-flight technology for reliable, accurate distance and level measurements. The sensor provides instant warning of level and position detection, has no moving parts and no calibration is needed. The OptioLaser can measure to most targets within its specified range, even penetrating dust and fog. 888-429-5538; www.hawkmeasure.com

## 3. JWC ENVIRONMENTAL SCREENING WASH PRESS

The Monster Wash Press by JWC Environmental processes screenings to separate water and organics from the solids. Debris enters a prewash zone where it is soaked to begin the separation of organics from inorganics. An auger rotor then transports the soaked debris into the active wash zone of the press, where a paddle spiral rotor agitates the material, enhancing water penetration. The segmented auger rotor brush allows in situ brush replacement. A removable top cover and drive end plate min-

imize the clearance space needed to remove the rotor and screen, which is field replaceable. Multiple inspection ports enable easy examination of the equipment and its operation. 800-331-2277; www.jwce.com

## **4.** KROHNE TIDALFLUX 2300 F ELECTROMAGNETIC FLOWMETER

KROHNE's TIDALFLUX 2300 F is an electromagnetic flowmeter that provides reliable flow measurement in pipes between 10 and 100 percent full. It features a noncontact sensor that is unaffected by oils and fats floating on the surface. Available in diameters to fit pipes up to 64 inches, it has high chemical and abrasion resistance to provide exceptional durability. The flowmeter has an integrated, noncontact capacitive level measurement and an approval for ATEX Zone 1 for use in hazardous environments. Wet-calibrated at the factory using a direct volume comparison, the TIDALFLUX does not require on-site calibration. 800-356-9464; www.us.krohne.com

## 5. ENVIRO-CARE BABY BEAST RECEIVING STATION

The Baby Beast 800 septage receiving station is a smaller, more compact version of the Flo-Beast septage, FOG, and sludge receiving and screening system for wastewater treatment plants. It has all the features of larger Beast models but is designed for septage receiving and has a reduced capacity of 450 gpm. It has an 800 mm drum and a shorter inlet tank, but it still includes the dual-drive screen and 25-degree angle of incline. The short influent tank allows the solids-laden liquid to be discharged directly into the rotating drum screen. As the screen rotates, solids are captured on flights that carry the material around the drum screen and deposit them into the auger trough. From the trough, solids are conveyed by the auger into the washing and dewatering zone. A two-stage tank design prevents sedimentation, and a dual seal on the screen cylinder prevents bypass. 815-636-8306; www.enviro-care.com

## 6. WESTECH ENGINEERING DENITROVI NITRATE REMOVAL

WesTech Engineering's Denitrovi nitrate removal solution process for groundwater converts targeted pollutants into harmless byproducts by using biocatalyst technology. The biocatalysts convert nitrate in water into nitrogen gas through a natural process that leaves no sludge, brine, or reject water — only the release of nitrogen gas. The microorganisms remain within the biocatalyst and do not enter the treated liquid. The process can withstand long periods without a food source, and it removes the risk of biomass washout during wet-weather events. Systems can be started up in days and maximize the use of existing infrastructure. 801-265-1000; www.westech-inc.com

## 7. ENDRESS+HAUSER TRUSTSENS **SELF-CALIBRATING RTD**

The TrustSens RTD from Endress+Hauser is a self-calibrating temperature sensor that functions in situ and provides the necessary documentation to meet the conformance requirements for various regulatory agencies. The sensor is calibrated after every sterilize-inplace cycle, eliminating the risk of an undetected calibration drift and the risk of bad batches. It has a built-in, high-precision ceramic reference based on the Curie Point of the reference material and can be detected electronically. TrustSens has built-in Heartbeat Technology to monitor the sensor and send warnings when it detects a sensor failure, drift, or other measurement errors. The unit measures temperatures from 40 degrees below zero to 320 degrees F, works in pressures up to 725 psi, and provides a 4-20mA output with HART. 888-363-7377; www.us.endress.com/TrustSens

## 8. MUELLER WATER PRODUCTS SINGER VALVE PRESSURE MANAGEMENT VALVE

Mueller Water Products' Singer Valve 106/206 PGM-2PR-630-SM Pressure Management Valve with integral backup hydraulically manages pressure to reduce water loss, save money and prevent unwanted pressure spikes that could contribute to premature pipe failure. Built on the Singer 106-PGM or 206-PGM main valve, a simple field retrofit is possible using the paddle-style orifice plate. The valve switches between high- and low-pressure pilots based on flow rate. The pressure-reducing pilots independently adjust to suit the optimal downstream pressure. The valve requires no electrical power or independent flow signal, as it takes its flow signal from an orifice plate installed on the valve inlet. The integral backup system protects against diaphragm or pilot failure, reducing the need for immediate service. The valve is available in sizes 4 to 12 inches with a minimum pressure at the valve inlet of 29 psi.

888-764-7858; www.singervalve.com tpo

(continued)

## wastewater: product spotlight

## **Meter with ultra-accuracy**

By Craig Mandli

No one can argue that purifying wastewater isn't an exact science. It requires the precision metering of fluids, which typically pose unique application challenges for other pump technologies. Fluids metered include sodium hypochlorite, calcium hypochlorite, caustic soda, soda ash, lime, hydrazine and many more. Application challenges include fluids, which outgas, crystallize, and contain various concentrations of particulates and suspended solids.

The Intelligent Programmable Pump from Fluid Metering is designed for those applications. It combines the company's precision valveless STH Stepper Pump with an integral programmable driver in a compact design ideal for integration with OEM instrumentation. The driver provides precision servo control of the STH pump's stepper motor for resonance-free, quite operation.

With five programmable inputs and two outputs, the pump is compatible with multiple programming platforms, including Visual Basic, C/ C++, Delphi and LabVIEW. Analog 0-5-volt DC, RS-232, and CANopen protocol are supported with an optional EtherCAT communication module available. Designed for analytical and process instrumentation, the pump has a minimum flow rate of 25 uL/min (H00) and a maximum of 240 mL/min (H200). Speed ranges from 10 to 1,200 rpm at 40 psi.

The programmable driver and stepper provide precision control of the CeramPump integral valveless piston pump. CeramPump technology features only one moving part — a sapphire-hard ceramic piston — in contact with fluid. The rotating and reciprocating piston accomplishes



Intelligent Programmable Pump from Fluid Metering

both the pumping and valve functions, effectively eliminating check valves present in conventional reciprocating piston and diaphragm pump designs. One complete piston revolution is required for each suction/discharge cycle.

The technology offers easy flow rate adjustment, as moving the pump head position changes the piston stroke length and, in turn, the flow rate. It offers infinite fine flow adjustments between 0 and 100 percent flow rate, and a flow rate indicator provides for accurate and simple linear calibration. The flow rate can be changed while the pump is operating or at rest.

Adjustments are made by turning the flow control knob, which moves the flow rate indicator along a fixed 20-unit scale that's linearly calibrated "10-0-10." The "10" equals 100 percent flow rate in that direction, and "0" equals zero flow. To improve the fine adjustment of the flow rates on pumps, an optional Q485 dial indicator kit provides for 1,000 discrete settings. 800-223-3388; www.fluidmetering.com

# product spotlight

## **Automate your metering infrastructure**

By Craig Mandli

Some say that predictability is boring. However, in the water industry, operators are constantly on the search for any tool that can make their daily work more predictable.

Kamstrup Water Metering is excited to launch their latest meter reading system, designed to capitalize off predictability. The new system called Kamstrup AMI is an automated metering infrastructure that achieves a high reading performance with minimal hardware investment.

"We developed Kamstrup AMI to challenge the status quo of existing meter reading systems," says Senior Vice President Lars Bo Kristensen, North America with Kamstrup.

Budget planning is made more predictable with Kamstrup AMI by offering a low total cost of ownership. One way this is accomplished is by the water meter having no external wires, as the communication unit is housed inside the meter. This eliminates the risk of disconnected wires and unplanned maintenance costs down the road.

It supplies hourly consumption data and analytics to water utilities, enabling water professionals to work more proactively with data. With that data, water professionals can make informed decisions about budget planning and ways to enhance customer service as well as take charge in proactively repairing mains and pipes in the distribution network before they become catastrophic incidents. Meters have built-in 915 MHz and 450-470 MHz radio bands for a seamless migration from AMR to AMI with the meter. They also automatically dial down radio transmission power when in close proximity to the data collector.



from the network, operators can handle customer service calls more efficiently because current and updated meter data is already available at the utility. Customers also benefit by having their data readily available with a consumer portal.

With frequent data from an automated meter infrastructure, utilities are able to detect leaks in the water distribution network by making daily water balances and breaking down the volume of water that leaves the utility into smaller parts and comparing that with the actual consumption. Smart meter data also includes water temperature to assess the risk of leaks related to frost damages so that operators can prevent them from happening.

"With Kamstrup AMI, water utilities gain the benefits of more frequent data with the added confidence of being backed by our global company," Kristensen says. **404-835-6716**; www.kamstrup.com

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## people/awards

**Dawn McGrath,** a Canim Lake Band member, received a Women in Technology Award from Applied Science Technologists & Technicians of British Columbia. McGrath is the highest certified First Nation woman in municipal water/wastewater operations in British Columbia.

The city of **Minden, Nebraska,** received the 2017 Scott Wilber Outstanding Facility Award and a Silver Rating Safety Award from the Nebraska Water Environment Association.

The Alaska Rural Water Association presented the city of **Homer** with a Source Water System of the Year award (population of more than 1,000). Todd Cook, water and sewer superintendent, was named Wastewater Operator of the Year.

The **Pine Bluff (Arkansas) Wastewater Utility** received a 2018 National Environmental Achievement Award in the Operations & Environmental Performance category from the National Association of Clean Water Agencies.

**Craig Brymer** was named superintendent of water and wastewater for the Athens (Tennessee) Utilities Board. Previously, he was responsible for regulatory compliance in the water and wastewater divisions.

Three team members at the Cranston (Rhode Island) Water Pollution Control Facility have passed licensing exams: **Jason Trenholm**, Grade 3 wastewater operator, as well as **Tyler Ippi** and **Ronald Anderson**, Grade 2 wastewater operator.

The **Glasgow** (**Kentucky**) Water's wastewater treatment plant received the Central Chapter of the Kentucky Water and Wastewater Operators Association 2017 Wastewater Treatment Plant of the Year Award. The plant's recently retired superintendent, **Ronnie Poynter**, was named 2017 Wastewater Operator of the Year.

The North Platte (Nebraska) Wastewater Treatment Plant received the 2017 Scott Wilber Outstanding Facility Award and Best-in-Class and Bronze Safety awards from the Nebraska Water Environment Association. The Fremont Wastewater Treatment Facility earned the Scott Wilber Award for the 13th year in a row.

The **Bainbridge Island (Washington) Wastewater Treatment Plant** received its third consecutive award for exceptional performance from the Washington Department of Ecology Northwest Regional Office.

The **Stony Brook-Millstone Watershed Association** was recognized for innovative water practices at the inaugural New Jersey One Water Awards for its Natural Wetlands Wastewater Treatment System, which serves the organization's Watershed Center for Environmental Advocacy, Science and Education.

**Middlesex Water,** providing water and wastewater services in New Jersey and Delaware, received a New Jersey One Water Award.

The **Riverhead (New York) Sewer District's** upgraded wastewater treatment plant received an award for project excellence from the Water Environment Federation. With the upgrade, the plant, built in the 1930s, became Long Island's first water resource recovery facility. It can divert up to 500,000

## events

#### March 5-6

Virginia Water Environment Association Industrial Waste and Pretreatment Conference, Omni Charlottesville Hotel, Charlottesville, Virginia. Visit www.vwea.org.

#### March 10-14

South Carolina Section of the American Water Works Association Annual Conference, Sheraton Myrtle Beach Convention Center, Myrtle Beach, South Carolina. Visit www. scwaters.org.

#### March 10-14

WEF Water Resource Recovery Modeling Seminar 2018, Entourage Resort, Lac-Beauport, Quebec. Visit www.wef.org.

#### March 12

WEF Membrane Technology Conference, Palm Beach Convention Center, West Palm Beach, Florida. Visit www.wef.org.

#### March 12-13

New England Water Works Association Customer Service Seminar, Holliston, Massachusetts. Visit www.awwa.org.

#### **March 12-16**

AWWA Membrane Technology Conference & Exposition, Palm Beach County Convention Center, West Palm Beach, Florida. Visit www.awwa.org.

## March 13-14

Quebec Section AWWA Annual Conference, Quebec City. Visit www.reseauenvironnement.com.

#### March 13-14

Michigan Water Environment Association Biosolids Conference, FireKeepers Casino Hotel, Battle Creek, Michigan. Visit www. mi-wea.org.

## March 14-15

AWWA Effective Utility Management Seminar, New England Water Works Association, Holliston, Massachusetts. Visit www.awwa.org.

#### March 19-22

Illinois Section AWWA 2018 WATERCON, Crowne Plaza Hotel, Springfield, Illinois. Visit www.isawwa.org.

## March 20-23

New Jersey Section AWWA Annual Conference, Borgata Hotel Casino & Spa, Atlantic City, New Jersey. Visit www. njawwa.org.

#### **March 22-23**

WEF Resource Recovery & Laboratory Joint Seminar, Grand Wayne Center, Fort Wayne, Indiana. Visit www.wef.org.

## **March 24-28**

Missouri Water Environment Association

Annual Conference, Tan-Tar-A Resort, Osage Beach, Missouri. Visit www.mwea.org.

#### March 25-28

AWWA Sustainable Water Management Conference, Renaissance Seattle Hotel, Seattle. Visit www.awwa.org.

#### March 25-28

Missouri Section AWWA Annual Conference, Osage Beach, Missouri. Visit www. awwa-mo.org.

#### March 25-28

WEF Odors and Air Pollutants Conference 2018, Oregon Convention Center, Portland, Oregon. Visit www.wef.org.

#### **March 26-28**

AWWA Financial Management: Cost of Service Rate-Making Seminar, Grand Hyatt Seattle, Seattle. Visit www.awwa.org.

## **March 27-28**

WEF Spring Symposium, The Omni Grove Park Inn, Asheville, North Carolina. Visit www.wef.org.

## March 27-29

Kansas Rural Water Association Annual Conference, Century II Convention Center, Wichita, Kansas. Visit www.krwa.net. gpd of effluent from the Peconic River to instead irrigate a county-owned golf course and district property.

The Warren (Maine) Sanitary District received an Outstanding Operations Award from the Maine Rural Water Association.

Danette Gonsalves stepped down after 22 years as a water commissioner for the Harwich (Massachusetts) Water Department.

The Muskogee (Oklahoma) Water Treatment Plant received a Water Fluoridation Quality Award from the U.S. Centers for Disease Control and Prevention.

The Anne Arundel County (Maryland) Department of Public Works, **Bureau of Utility Operations,** was one of 14 public drinking water systems in the U.S. to receive a top utility management award from the Association of Metropolitan Water Agencies.

University of Idaho researcher **Greg Moller** was elected as a fellow of the National Academy of Inventors. An environmental chemist and toxicologist, Moller works to lessen the environmental footprint of communities and businesses by developing filters to remove pollutants, including phosphorus and nitrogen, from wastewater.

The city of Cayce (South Carolina) Water Treatment Plant received a 2016 South Carolina Area-Wide Optimization Program Award.

The Environmental Health and Water Quality Technology program at Milwaukee (Wisconsin) Area Technical College will celebrate its 50th anniversary on March 20 in an event on the college's Mequon campus. The event will also recognize **Jerry Ortiz**, instructor, for 45 years of service. From 1967-86, the college offered separate programs in Environmental Health and Water and Wastewater Technology. The program was called Environmental and Pollution Control Technology from 1986 until 2010 when it assumed its current name.

TPO welcomes your contributions to Worth Noting. Email editor@tpomag.com. tpo





By Ron Trygar

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**

## Effluent quality improves in lagoon systems that are operated in which configuration?

- A. Parallel arrangement
- B. Series arrangement
- C. Anaerobic only
- D. Aerobic only

ANSWER: B. Lagoons operated in series tend to produce higher-quality effluent as the waste stream passes from lagoon to lagoon. Series operation means the lagoon system piping is configured so that the influent of the second lagoon is the treated effluent of the first lagoon; the influent of the third lagoon is the treated effluent of the second lagoon, and so on. Lagoons operated in parallel essentially run side by side, and the influent wastewater is split equally to two or three lagoons; the outlets of all three are combined into one effluent. Series configuration allows for improved treatment because the influent of each downstream lagoon has considerably less BOD and TSS loading. Lagoons can be operated in combinations of anaerobic, aerobic, or facultative modes, but they will still produce higher-quality effluent if operated in series.

## **DRINKING WATER**

The Langelier Index (LI), sometimes referred to as the Langelier Saturation Index (LSI), is a valuable tool to determine the corrosivity of potable water in a distribution system. The formula for Langelier Index is LI = pH

#### What factors are used to determine the pHs?

- A. Temperature, alkalinity, dissolved oxygen, free chlorine residual
- B. Temperature, total dissolved solids, calcium hardness, alkalinity
- C. Chlorine demand, total dissolved solids, dissolved oxygen, total hardness
- D. Temperature, alkalinity, velocity, total hardness

**ANSWER**: B. The calculation of the pHs portion of Langelier Index is based off T.E. Larson's method of determining calcium and bicarbonate concentrations. A table of values used in determining the pHs was developed. They include the water temperature, the total dissolved solids (TDS) in mg/L, the logarithmic value (Log10) of the calcium hardness, and alkalinity, both of these last two as mg/L CaCO<sub>3</sub>. These factors play a part in how saturated the water is with respect to its ability to form a protective scale on the water distribution mains.

Once the pHs is determined, the calculation is performed to produce a number that is either negative, positive or neutral. A positive Langelier Index, for example +0.5, indicates that the water is slightly scale forming (noncorrosive). A negative Langelier Index, such as -0.5, indicates that the water is corrosive, or aggressive. A neutral result (neither positive nor negative) indicates a stable water that will neither form a scale inside the waterlines nor be corrosive. The pH portion of the Langelier Index calculation is just as it seems — the water's pH value.

## ABOUT THE AUTHOR

Ron Trygar, a certified environmental trainer, is the senior training specialist for water and wastewater programs at the University of Florida TREEO Center. He has worked in the wastewater industry for more than 30 years and holds Class A Wastewater Treatment Operator and Class B Drinking Water Operator licenses in Florida. tpo

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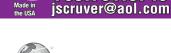
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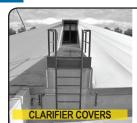
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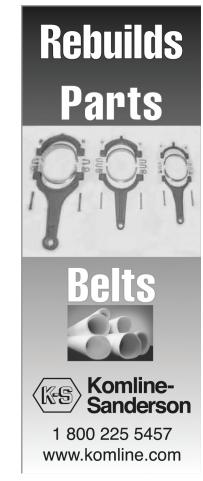


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