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Sustainable Operations: Hydroturbines in Portland, Oregon

PAGE 42

In My Words: Wipes issues from the producers' side

PAGE 34

Butch Barger
Wastewater Treatment
Plant Lab Manager
Brownsburg, Ind.

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BROWNSBURG TREATMENT PLANT EXCELS IN PERMIT COMPLIANCE, TEAM SAFETY AND CSO REDUCTION

PAGE 20

Technology Deep Dive: Multiparameter hand-held analyzer

PAGE 46

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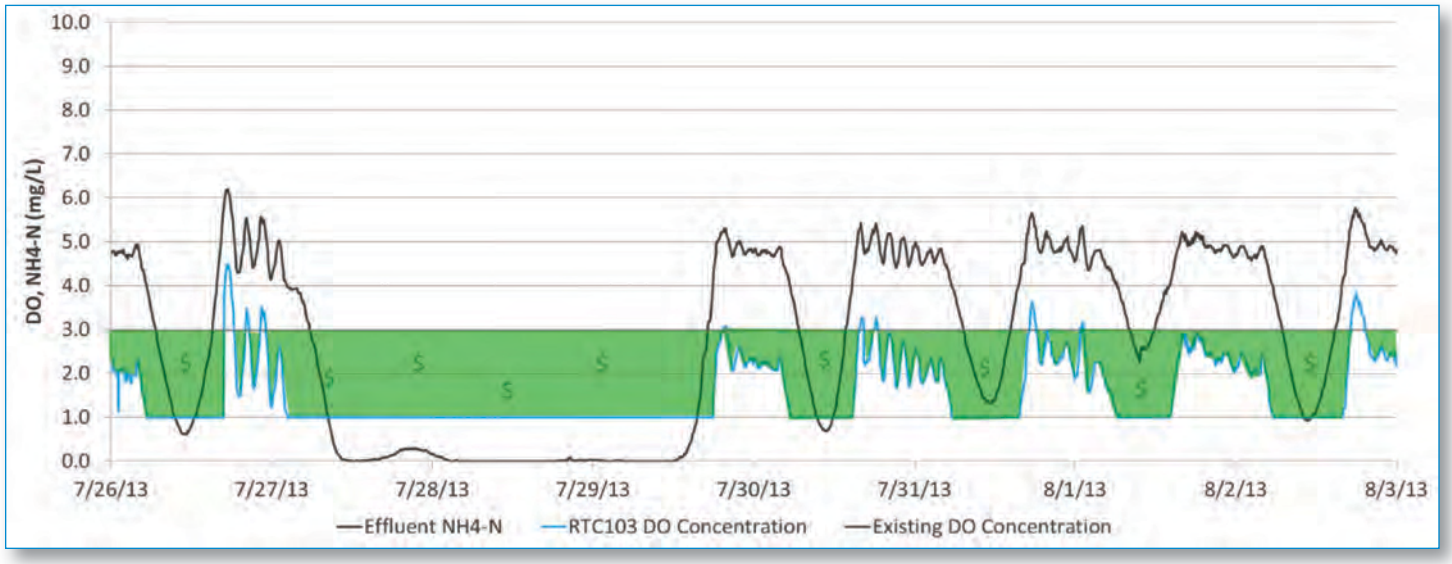

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contents

November 2015

on the cover

The Brownsburg (Indiana) Wastewater Treatment Department keeps the sewer system and 3.5 mgd treatment plant operating at peak efficiency. Leaders and team members including Butch Barger, lab manager, have helped the plant earn multiple awards. (Photography by Marc Lebryk)

top performers:

coming next month: December 2015

FOCUS: Energy Management and Sustainability

- Let's Be Clear: What's the real wipes solution?
- Top Performers:
  - Wastewater Plant: Santa Cruz (California) Wastewater Treatment Facility
  - Wastewater Biosolids: Essex Junction, Vermont
  - Water/Wastewater Operator: Steve McTarnaghan, Geneseo (New York) Water and Sewage
  - Water Operator: Lynn Campbell, Columbus (Georgia) Water Works
- How We Do It: Fine-tuning aeration in Fredericksburg, Iowa
- How We Do It: Wet waste separation in Anne Arundel County, Maryland
- Hearts and Minds: The "Rain to Drain" Experience in San Antonio
- Sustainable Operations: Biogas fuel cells in Cheyenne, Wyoming
- In My Words: Microbeads and the regulatory regime
- PlantScapes: Constructed wetland in southern Ontario
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When a Colleague Cuts a Corner

HE'S A PERSONAL FRIEND. SHE'S A LONGTIME CO-WORKER. YOU'VE SEEN THEM PLAYING FAST AND LOOSE WITH WORK RULES OR GOVERNMENT REGULATIONS. WHAT DO YOU DO NOW?

By Ted J. Rulseh, Editor

While on orientation for a job with an electric utility, I spent time in the field watching crews do various work. Once, my escort (a supervisor) and I encountered two laborers in a trench about 8 feet deep; along one side of it on the surface the sod was cracking.

The supervisor clearly should have written the men up for working in such a trench without shoring, a violation of company (and OSHA) rules. At the bare minimum, he should have ordered them out of the trench — after all, a cave-in could have killed them. Instead, he basically shook his head in disgust and we moved on.

My point here isn't about safety, although in this instance that was an essential concern. Instead, my point is to raise a question: What responsibility does a supervisor or any team member have upon seeing a colleague violate a work rule, break a law or cut a corner in some way? I raise this because from time to time we unfortunately read news of a water or wastewater operator being prosecuted for violations.

CLEARLY A MINORITY

As in any profession you care to name, the vast majority of operators in the water sector are competent, conscientious and honest. Of course, a scant few are not. But then misconduct on the job generally stops well short of criminality. What sorts of misbehavior call for confronting a person directly? Or reporting him or her to a superior?

To illustrate, there's the hypothetical question: If your best friend robbed a bank, would you turn him in? Most of us likely would — who needs such a "friend" anyway? But have you ever looked the other way when a good friend got in a car to drive home drunk? Not that you should have called the police, but you could have offered a ride or to call a cab.

Now let's look at the work world. Assume that you are a rank-and-file operator, not a supervisor or manager. Where would you draw the line on making some kind of statement or taking action when you observe someone doing something that is clearly outside the rules?

Suppose a colleague is working bare-headed in a hard hat area or without eye protection on a task that clearly warrants it? Do you let it slide? Or do you say something? And if you say something, what if the person shrugs it off and keeps working? Do you tell a supervisor? On one hand, she's putting herself at risk and you don't want to see her injured. On the other, it's a small job, she'll be done in a few minutes and you don't want to be a snitch.

Assume that you are a rank-and-file operator, not a supervisor or manager. Where would you draw the line on making some kind of statement or taking action when you observe someone doing something that is clearly outside the rules?

Now suppose you see a colleague in the lab entering results from some tests he didn't perform. The plant has been running perfectly for days. It's Friday afternoon and you know he wants to leave on time to start a vacation. On one hand, what's the difference? Most likely the real results would be just like yesterday's. What's the harm, just this once? On the other, he's breaking the law and risking his livelihood if discovered. Do you confront him? Report him?

WHAT ARE YOUR THOUGHTS?

Have you ever encountered situations at all similar to these? Maybe not, but in the event you did someday, how would you respond? You're invited to share your perspectives. Send me a note to editor@tpomag.com. I promise to respond, and we'll publish selected comments in a future issue of *TPO*.

Now let's turn the hypotheticals back onto me. I'm on an orientation tour with a supervisor who ignores the fact two guys are violating OSHA rules. On one hand, I'm brand-new and don't need to earn an instant reputation as a troublemaker. And surely those two guys, veteran laborers, know their jobs better than I do. On the other hand, the guys were putting their lives at risk.

What should I have done? Report the laborers? Report the supervisor to his superior? Report them all using the anonymous company hotline? Say nothing and forget it? What do you think I did? tpo

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MUSSEL MADNESS

Are Shellfish Our New Water-Quality Detectives?

Along the Mississippi River, two water treatment plants are experimenting with mussels to detect contaminants in water. Could these mollusks become our best early-warning system? Learn how operators are monitoring water quality by watching the opening and closing motion of freshwater mussels.

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OVERHEARD ONLINE

"We are part of a new movement that water utilities have begun — one that is providing customers a higher level of service, better protecting the environment and reducing the impact on future generations."

Todd Danielson, Changing Times: We Are the New Face of Water

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OPERATOR PARADISE

Vacationing At a Bermuda Treatment Plant

During February 2015, Jeff Kalmes, a plant supervisor in Massachusetts, had the opportunity to take his wastewater skills to Bermuda where he worked as a substitute operator for two and a half weeks. Call it a working vacation, if you will, but it gave Kalmes the chance to get back to the basics and experience wastewater treatment in a new way.

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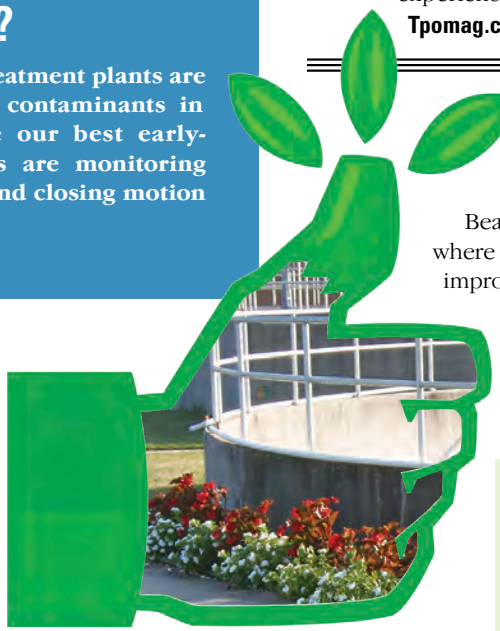

GREEN THUMB

How Gardens Make a Difference

Beauty is in the details at a Pennsylvania treatment plant where operator Jim Lehman uses his passion for gardening to improve the facility's aesthetics. Take a look at the flowerbeds he's incorporated into the facility grounds, and find out how the flowers and perennials make a difference to the community.

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WINNING FORMULA

LESLIE CARREIRO'S DUTIES SPAN THREE WATER PLANTS AND A 1,671-MILE DISTRIBUTION SYSTEM. SHE HANDLES IT ALL WITH COMMITMENT AND ENERGY.

STORY: **Scottie Dayton**
PHOTOGRAPHY: **Kristin Fellows**

BAKING AND COOKING ARE THE CORNERSTONES behind Leslie Carreiro's career as a chemist. Working first for a pharmaceutical company, then in the laboratory of the North Fork Water Treatment Plant in Asheville, North Carolina, Carreiro nurtured her love of combining ingredients to achieve product purity and consistency.

After 14 years in the laboratory, Carreiro was promoted to the plant superintendent role in 2005. That included managing seven work groups with 41 employees, three water treatment plants, two laboratories, 37 pump stations and 32 above-ground storage tanks.

She oversaw plant upgrades and developed monitoring and sampling programs for lead and copper, *Cryptosporidium* and *Giardia*, total organic carbon, compliance bacteria site planning, and the U.S. EPA unregulated contaminant-monitoring rule.

As a section leader of the all-volunteer North Carolina Waterworks Operators Association (NCWOA), Carreiro served on nearly every committee and chaired many of them while working toward the 2010-11 presidency. Her leadership in developing a plan to reorganize the group earned her the 2007 Special Award of Merit. She now chairs the nomination committee and serves on the state's Water Treatment Facility Operators Certification Board. In 2014, NCWOA named Carreiro the Outstanding Operator of the Year.

Leslie Carreiro, superintendent of the North Fork Water Treatment Plant, at the dam at Burnett Reservoir.

MANAGING TRIPLETS

The city's three water treatment plants supply a combined 20 mgd through 1,671 miles of distribution lines, serving more than 124,000 people in Asheville, plus parts of Buncombe and Henderson counties.

Pure mountain springwater flows from the North Fork Reservoir to the 31 mgd (design) North Fork Water Treatment Plant. There, raw water is chlorinated, mixed with aluminum sulfate and filtered. After operators adjust the pH, they add fluoride and corrosion inhibitors, zinc orthophosphate, and sodium bicarbonate. Finished water is chlorinated and distributed to storage tanks through 24-inch cast iron pipes and 36-inch steel pipes.

The 5 mgd (design) William DeBruhl Water Treatment Plant below the Bee Tree Reservoir also uses direct filtration. The 7 mgd (design) Mills River Water Treatment Plant pumps from the Mills River to a reservoir in which suspended materials settle out. Decanted water is pumped through an ozone system, flows to rapid mixers, moves to settling basins and travels back to ozonation. After granular activated carbon filtration, operators adjust the pH and add fluoride, corrosion inhibitors and chlorine.

"One of my biggest organizational challenges has been managing seven work groups spread out in three different towns," says Carreiro. "Even com-

Carreiro's leadership style is built on effective communication.

Leslie Carreiro, Water Resources Department, Asheville, North Carolina

POSITION: | **Water production superintendent**

EXPERIENCE: | **24 years**

EDUCATION: | **Warren Wilson College, B.A. Chemistry**

CERTIFICATIONS: | **Surface Water Treatment, Grade I (highest) Physical/ Chemical Wastewater, Grade I (lowest) Biological Wastewater Treatment, C Water Distribution**

MEMBERSHIPS: | **North Carolina Waterworks Operators Association (NCWOA); North Carolina AWWA/WEA**

GOALS: | **Improve collection, integration and data analysis via new technologies; mentor and develop staff; promote the industry**

WEBSITE: | **www.ashevillenc.gov**

GPS COORDINATES: | **Latitude: 35°35'43.81"N; Longitude: 82°32'54.42"W**

ABOVE: While leading the North Fork team, Carreiro has found time to serve the North Carolina Waterworks Operators Association as a chair of several committees and as president in 2010-11. LEFT: In the chlorine feed system room, Carreiro monitors the pressure gauge of a chemical pump's discharge line (sodium hypochlorite).

munication between groups wasn't efficient." She campaigned for a laboratory supervisor and to designate laboratory personnel a separate work group. In response, the city hired Brenna Cook, whose duties include handling new distribution system regulations.

Cook has expanded communication among her three technicians and the plant supervisors and operators. "She established monthly meetings, enabling technicians to know what is on next month's agenda, who is responsible for what, and to ask questions," says Carreiro. "Brenna also is transferring certain responsibilities to them through a monthly review of standard operating procedures."

SURROUNDED BY THE BEST

As the plants moved to a work order system and management of 72 assets, the city put Terry Harris, SCADA technician, in charge of the program. "My Water Resources Department staff had no electronic skills," Carreiro says. "It was a breath of fresh air when Terry joined us in 2007 as our water information systems technician."

Harris took charge of fixing things before problems arose. He works closely with the IT department and is learning the software so that he can help troubleshoot it. Another major improvement came when Carreiro hired Russell Edwards, her "rock-star electrician," for the Trades Worker Group. Edwards had been a 20-year career electrician with one of the plant's contractors.

"Hiring people from the private sector usually doesn't work because they're accustomed to earning a lot more money," says Carreiro. "When Russell applied, he was the perfect

KEEPING FIT

In high school, Leslie Carreiro realized that running enabled her to eat multiple chocolate chip cookies. Since then she has run half marathons, two marathons and other events, including two "cycle to farm" races. "Competitors bike to a local farm, munch on whatever produce is set out for them, then pedal to the next farm and eat again," she says.

Carreiro typically runs 45 minutes to an hour a day, swims and rides trail and road bikes. In bad weather she exercises in spin classes or on elliptical trainers. Because healthy people feel better and work better, she and Bob Fay, operator III, were instrumental in putting exercise equipment in the city's three water treatment plants. "They each chose an elliptical trainer, and two also wanted weight benches," says Carreiro. "Operators can workout while they monitor washing filters, during breaks or before and after shifts."

The exercise bug has caught on. In June the Water Production/Water Quality Division entered three four-member teams in the annual Chamber Challenge, a 5K race. One group runs, another runs and walks, and the third walks. Carreiro finished in 26 minutes, 13 seconds.

"It's not quite as fast as I'd like, but this year I had my fastest time up the long hill in the last mile," she says. "As teams, we came in first in the City of Asheville, second in the government division, eighth in the men's division, and 13th overall. I'm very proud and excited that about a third of my division competed and did so well."

candidate because he'd serviced every pump station." Edwards occasionally teams with Harris when pump stations have interface problems between the incoming signal and the mechanical response. "Russell has a bulldog attitude," says Carreiro. "If he doesn't know something, he'll open manuals and call manufacturers until he has solved the problem."

HIGH EXPECTATIONS

Carreiro's work groups include the three treatment plants and the North Fork laboratory, and Watershed, Water Information Systems, and Pumps and Reservoirs groups. "I feel like a juggler with all these balls in the air," she says. "I'd really like to give some of them away." She has campaigned for a facilities maintenance person to oversee the distribution assets and the Watershed and Trades Worker groups.

"I want to spend more time in the lab and working with the plants on another corrosion study to update the one we did in the early 1990s," she says. "I believe we can change the type of coagulant we use, but that is never a random decision."

Occasionally, weather throws a monkey wrench into Carreiro's schedule. Asheville was hit by back-to-back hurricanes in 2004. Officials had closed the DeBruhl plant in 1999 to repair the spillway and part of the dam, then saw no reason to reopen the facility. The storms made them realize how important it

> "I feel like a juggler with all these balls in the air. I'd really like to give some of them away."
> **LESLIE CARREIRO**

was to have a redundant water source. Four years later the refurbished plant went online.

"After all the hard work, it was exciting to see water come out," says Carreiro. "Then the phone rang before noon the next day. Four homes below the plant on Bee Tree Road were without water. Being told to shut down operations brought me to tears." Until the problem was isolated, Water Maintenance opened DeBruhl's distribution line and connected a temporary pump, which boosted pressure and supplied water to the homes for a month.

The homes, built while DeBruhl was closed, received water from one of North Fork's pressurized lines or a 150,000-gallon Grove Stone tank. "No one realized this, or that the tank was slightly higher than the plant's clearwell," says Carreiro. When the tank became part of DeBruhl's distribution system, there was just enough pressure for water to reach the customers' meters, but not the houses 1/10 of a mile up the mountain. The city partnered with homeowners, and each received a private pump and storage tank.

WINTER CHALLENGES

While Asheville temperatures dip slightly below freezing from December through February, the winter of 2014-15 broke many records. Lows held in the single digits or high teens for much of January and February, and the same homes were without water again. The Pumps and Reservoirs Group (three mechanics and an electrician) responded.

A day later the same customers awoke to no water again. This time the crew reached the holding tank to find it overflowing. The cycle continued every few days, especially after nights in the single digits. "We eventually figured out that water at the bottom of the tank froze overnight along with the water in the customers' lines, which were less than 12 inches deep," says Carreiro. "Then the ice would melt during warmer daytime temperatures."

Last summer workers insulated the inlet and outlet lines on the tank and wrapped them in heat tape. They will also strap a solar blanket over the tank in November.

LEADING BY EXAMPLE

Carreiro's contributions extend beyond the city to NCWOA. Members credit her leadership and communication skills for the organization's rejuvenation, which included two re-evaluations of the strategic plan. As part of her dedication to mentoring junior operators and training tomorrow's leaders, Carreiro works with the group's School Committee on a program to assist

(continued)

The staff at North Fork includes, from left, Terry Pate, watershed technician; Lee Hensley, water production maintenance supervisor; Steve Turner, operator III; Andy Whitener, operator II; Stephanie Williams, operator I; Karen Good, administrative assistant; Bill Hart, North Fork plant supervisor; and Leslie Carreiro, water production superintendent.

students in the weeklong annual training schools in Morganton and Raleigh.

"The goal is to test enrollees, send them to class, then test them afterward to see where they need improvement," says Carreiro. "The committee also wants to post tutorials of difficult subjects such as math, pumps and flocculation on our website." Another goal is to film the blackboard as an instructor solves math problems and include voice-overs explaining the process. "The program has been very slow getting off the ground because we're a small organization with limited resources," she says.

> "We're like the 'silent service.' We do our jobs so well young people don't know we exist. Consequently, they don't apply for jobs or choose water treatment as a career."
> **LESLIE CARREIRO**

Concerned about the lack of operators to replace those who retire, Carreiro was on the frontlines to help reach a joint agreement among the NCWOA, the North Carolina Rural Water Association, and the North Carolina AWWA/WEA. In 2007, a joint committee began a coordinated public outreach program. "We're like the 'silent service,'" she says. "We do our jobs so well young people don't know we exist. Consequently, they don't apply for jobs or choose water treatment as a career."

Carreiro was also instrumental in initiating MyWaterMatters.org. The website educates the public on the importance of safe drinking water and offers a single source for information and training throughout the industry.

"Her leadership, knowledge, commitment and enthusiasm are the key ingredients for the continued success of NCWOA and the ultimate goal of providing safe water to the public," says Julius Patrick, water plant superintendent for the Greenville Utilities Commission. "Leslie is the voice for operators across the state and an unsung hero for the industry." tpo

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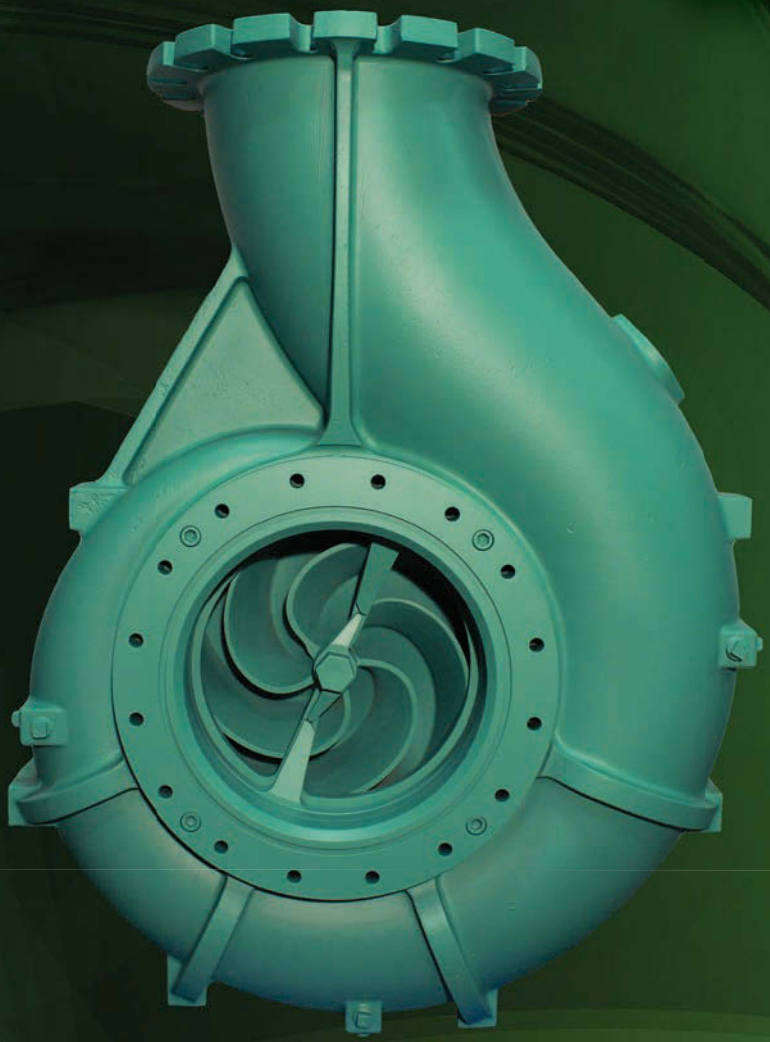

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An interactive poster used in the district's public education program.

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Smart Education

A MAINE SEWER DISTRICT LEVERAGES SMART AND INTERACTIVE TECHNOLOGY TO EDUCATE RESIDENTS ABOUT TREATMENT AND BUILD UNDERSTANDING FOR RATE INCREASES

By Craig Mandli

With one swipe of a smartphone, customers at the Brunswick (Maine) Sewer District can enter the world of wastewater and learn about an expensive upgrade project.

It's part of a proactive public education approach that started as the brainchild of a tech-savvy employee. But let's start at the beginning.

The Brunswick district is preparing for a $22 million upgrade to a wastewater treatment plant built in the late 1960s and last upgraded in 1991. Funds have been secured from the Maine Department of Environmental Protection's Clean Water Revolving Loan Fund, but the district needs to repay it over 20 years. That means rates will go up by as much as 40 percent over the next four years.

> "I guess you can consider it our attempt to not surprise people with rate increases. If we educate people, it helps justify those taxes and fees going up. If we don't, it will mean dealing with negativity and fallout later on."
> **LEONARD BLANCHETTE**

NEED FOR KNOWLEDGE

"We have a huge need to let people know what we're doing," says Leonard Blanchette, general manager. "If rates stay consistent, people are indifferent. But if they go up, they start asking questions. Knowing this upgrade was on the horizon, we took steps to head that off."

A 13-minute video produced by district staff illustrates the journey of household wastewater as it travels through the water treatment cycle. The video highlights each step of the process, from clean water entering a home, to wastewater leaving through the collections system to the district's 3.85 mgd trickling filter treatment plant, and finally as effluent discharged to the Androscoggin River.

On a related poster, each treatment step is accompanied by a QR code that residents can scan with a smartphone. The scan directs viewers to the corresponding segment of the video. The poster has been placed at new kiosks on the Androscoggin River bike path and at the entrance to the district's pumping facility at Mill Creek.

MAKING THE CASE

"I guess you can consider it our attempt to not surprise people with rate increases," Blanchette says. "If we educate people, it helps justify those taxes and fees going up. If we don't, it will mean dealing with negativity and fallout later on." The district hopes to distribute the poster to schools and municipal buildings.

"The days of 'out of sight, out of mind' don't apply," Blanchette says. "We're a key component of the town. We want town ratepayers and the community to know what we're doing and what we're all about, and the impact and importance we have. It's ratepayers' money, and we're just the stewards." Rates went up 14 percent last year, and annual increases will continue.

GOAL ORIENTED

Robert Pontau Jr., assistant general manager, conceived the education project as part of an employee goals program. He managed the project, giving staff the tools, equipment and software to plan it, script the message, film the episodes, and edit and narrate the video. The creativity of the staff soon became apparent.

District employee Mike Jouver films fellow employee Aaron Temple while creating an interactive video about the collections system.

Brunswick Sewer District employees construct a new kiosk at the entrance to the town's Water Street pump station.

"Robert is a young man, and he catered this program toward people of his generation," says Blanchette. "Using the smart technology gets the message out to the public in a quick and effective way. He made the technology that's out there work for us."

Blanchette says the incentive-based employee goals program is a way to encourage employees to create and accomplish three annual goals. The far-reaching objective is to increase workplace pride. "Employees who meet their goals receive a bonus check of 1 percent of salary for each goal met," he says. "Some of the goals were personal in nature while some were department goals, such as Robert's kiosks and video. I feel that if the employees have set goals, we see more buy-in on their part."

QUALITY TEAM

The kiosk and video project earned the full support of the district's board of trustees as part of ongoing public education, especially important as the district prepares for the 2016 upgrade. According to Blanchette, the project also showcases the quality of district staff and the daily work they do to operate and maintain the system.

"It really gave us the opportunity to highlight the great people we have working here," he says. "I was actually surprised by how easy the project went once they got going on it. Robert took people with no background in video production or marketing and empowered them to create something brand-new."

The project also highlights the industry's shift into 21st-century technology, which will only continue as more young professionals join the wastewater workforce. "I really believe that 25 years from now treatment will be completely automated and plants will be able to be run from anywhere via the cloud," Blanchette says. "That's what's so exciting about outreach projects like Robert's. It empowers our people to think outside their comfort zones, and it highlights the important roles they play in the community." tpo

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Ranked *With the Best*

ACCOMPLISHMENTS FOR THE TEAM IN BROWNSBURG, INDIANA, INCLUDE CONSISTENT PERMIT COMPLIANCE, AN AWARD-WINNING SAFETY PROGRAM AND CSO REDUCTION

STORY: **Jim Force**
PHOTOGRAPHY: **Marc Lebryk**

LOW CRIME, GOOD SCHOOLS AND ECONOMIC GROWTH

make Brownsburg one of the best places to live in Indiana — it ranks 33rd in the United States, according to *Money* magazine.

If wastewater treatment had been part of the evaluation, the town might have placed even higher. Under Kathy Dillon, superintendent, and a hard-working and dedicated collections and treatment team, the Brownsburg Wastewater Treatment Department keeps its sewer system and 3.5 mgd (design) treatment facility operating at peak efficiency.

"We do the best we can to serve our community," says Dillon. Their efforts have been recognized with multiple awards for safety, laboratory performance and collections system operation and maintenance.

TWO MAJOR STATIONS

Living near Indianapolis, Brownsburg residents enjoy the amenities of a small town with the attractions of the metro area. The population is young (median age 36) and growing, and public schools' achievement scores all top the state averages. The unemployment rate is below the national average.

To help support this quality of life, the Wastewater Treatment Department operates a 100-mile sanitary sewer system. The staff also maintains 120 miles of separated storm sewers and several miles of combined sewers, significantly less than a few years ago as Dillon's team works steadily to reduce combined sewer overflows (CSOs).

Two large pumping stations deliver wastewater to the treatment plant. The West Regional Lift Station serves an area with no combined sewers and pumps wastewater directly to the plant headworks. The Main Pumping Station receives a portion of its flow from combined sewers and contains its own headworks. It includes two swirl concentrators to remove large objects and debris, a Muffin Monster auger grinder (JWC Environmental), a Hycor mechanically cleaned bar screen (Parkson Corp.) and a Hydrogritter grit removal system (WEMCO).

At the treatment plant, the flow from the West Regional Lift Station passes through a Muffin Monster and a Hycor mechanically cleaned bar screen. The flows from the two pumping stations are then divided equally between the plant's north and south processes. Each process contains a Parshall flume, a conditioner equipped with mixers (Philadelphia Mixing Solutions) that begins treating wastewater to prevent sludge bulking and minimize filamentous growth, and a pair of oval closed-loop reactor oxidation ditches (Lakeside Equipment Corporation).

Each ditch is aerated by three 40 hp horizontal-bladed Magna Rotors (Lakeside Equipment Corporation). At the end of each process, flow from the ditches settles in two perimeter-feed Envirex circular clarifiers (Evoqua Water Technologies), each 55 feet in diameter.

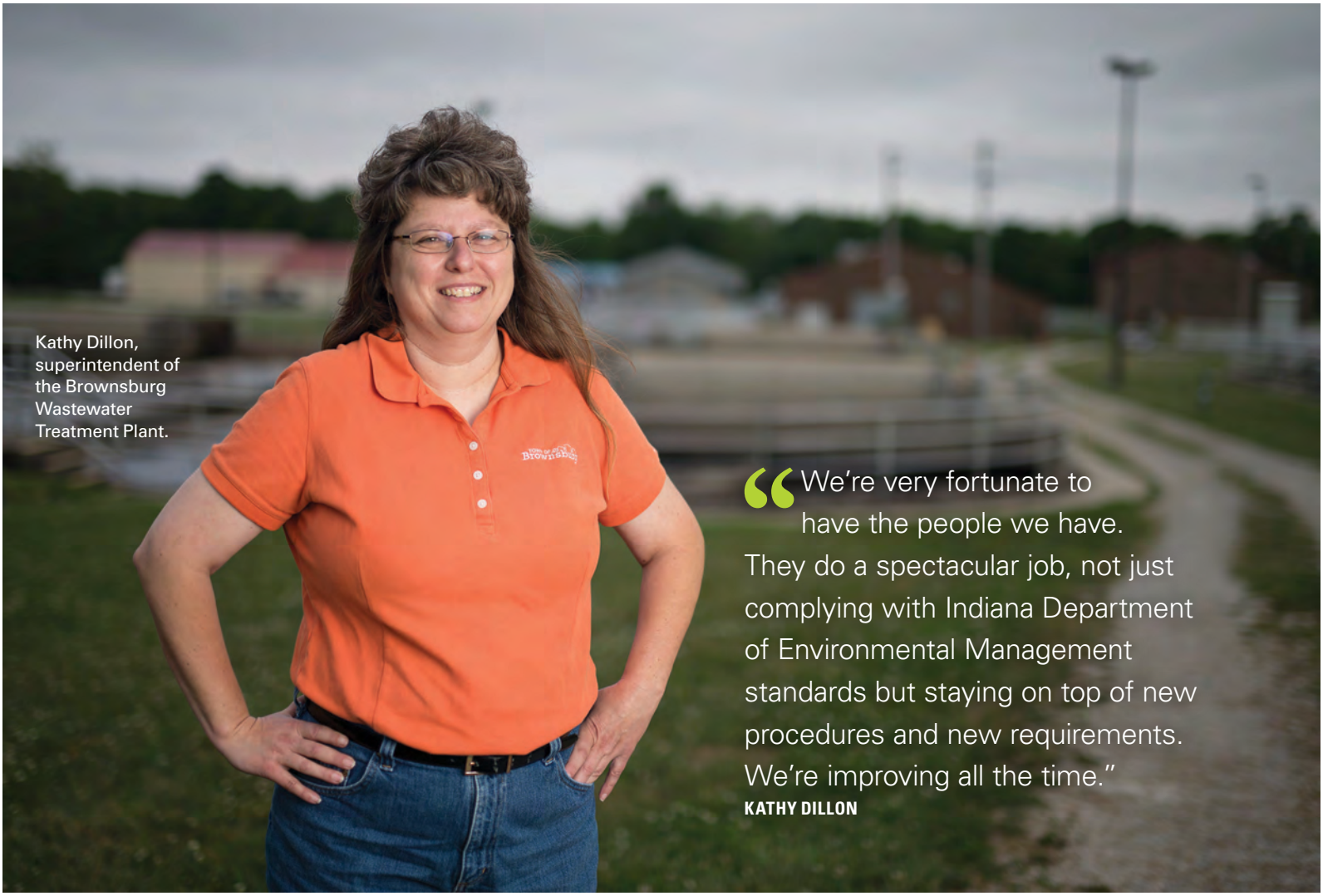
Return activated sludge is discharged to the influent channel before the conditioners. Clarifier effluent flows into one of two junction boxes. All belt press wash water is effluent, and a small amount of effluent is used for chlorination and clarifier hosing. "Without tertiary filtration, the solids content of the effluent prevents more reuse," Dillon explains.

Final effluent is chlorinated in a 1.25 mgd chlorine contact pond, then dechlorinated with liquid sodium bisulfite. In summer the flow to the pond is pre-dosed with gaseous chlorine.

TOUGH STANDARDS

The disinfected effluent travels through a flowmeter and then a 24-inch pipe to a series of two-step concrete cascades that further oxygenate the

Bill Shaw Jr. (left) and Steve Wyland of the Brownsburg Wastewater Treatment Plant empty the facility's Vac-Con combination truck after servicing area sewer systems.



Brownsburg (Indiana) Wastewater Treatment Plant

BUILT: | **1987 (upgraded 2000)**

POPULATION SERVED: | **21,000 (8,500 sewer connections)**

FLOWS: | **3.5 mgd design, 2.2 mgd average**

TREATMENT LEVEL: | **Secondary**

TREATMENT PROCESS | **Oxidation ditch**

RECEIVING WATER: | **White Lick Creek**

BIOSOLIDS: | **Dewatered, land-applied**

ANNUAL BUDGET: | **$3.4 million (operations)**

WEBSITE: | **www.brownsburg.org**

GPS COORDINATES: | **Latitude: 39°50′49.49″N; longitude: 86°24′35.57″W**

water before discharge to White Lick Creek. Effluent standards are tight — 10 mg/L BOD and 12 mg/L TSS in summer — because the creek is a zero-discharge stream.

It's an efficient process that continues to get more so. David Humpal, assistant superintendent, says the department acquired a grant to replace all existing plant motors (12 40 hp units, four 50 hp and one 60 hp) with high-efficiency models.

Most of Brownsburg's Class B biosolids are land-applied. Solids from the final clarifiers are wasted into two 450,000-gallon aerated holding tanks equipped with Roots blowers (GE Energy) and Universal Blower Pac blowers. The decant liquid is returned to the treatment works while solids are transferred to a pair of aerobic digesters. After that, the material can be dewatered or thickened on a belt press (Komline-Sanderson).

Thickened material is pumped back into the digester. Dewatered biosolids (13 percent solids) are stored on drying beds or on a covered storage pad, then hauled by a contractor to cropland or to a landfill.

STRESSING SAFETY

For the Brownsburg team, it's not enough to meet treatment requirements. Besides Dillon and Humpal, the team includes Shawn Pabst, field supervisor; Pat Duncan and Shane Russell, operators; Lisa Christie, stormwater coordinator; Butch Barger, laboratory manager; and Matt Huckstep, Steve Wyland, Richard Keeton, Bill Shaw Jr. and Nick Sparks, laborers.

The Wastewater Department has gone the extra mile to ensure the safety of its employees and has set the standard for laboratory excellence. The Indiana Water Environment Association has recognized those efforts with its Safety Award for the past 15 consecutive years and the Laboratory Excellence Award seven times in the last 10 years. Dillon is proud that the awards are based on peer review — the judgment of other professionals in the field.

Safety is always top-of-mind. The town has an extensive safety program, but rather than simply accept that as the standard, Dillon and her crew have used the plan as a base and modified it for the treatment plant. "We understand the work conditions here — lockout/tagout and confined-space entry, for example," says Dillon. "We build safety into our own standard operating procedures. It's a team effort. We watch each other and try to keep everyone safe."

The approach helps new employees know what to expect and what to be aware of. Knowledge gets shared. "Not everybody knows everything you know," Dillon says. "We concentrate on what employees need to think about

Pat Duncan, plant operator, shows off his Cycle Riders for Aquatic Protection shirt and motorcycle.

TUMBLE BUG AWARD WINNER HELPS KIDS

The award may not sound very flattering, but the activity that won the honors for Pat Duncan is top shelf. Duncan, head operator at the Brownsburg Wastewater Treatment Plant, earned the 2014 Tumble Bug Award from the Indiana Water Environment Association for raising money for the Hoosier Burn Camp for Kids in Brookston. The tumble bug is a dung beetle.

Each September Duncan organizes a motorcycle ride that raises $7,000 to $10,000 for kids at the camp. His group, which he founded several years ago, is Cycle Riders for Aquatic Protection (CRAP).

"We get as many as 30 or 40 riders," he says. "I set up a 50- to 70-mile route that starts and ends at the Texas Roadhouse restaurant in Avon, which is a major sponsor of the ride. We have a police escort — it's a big deal."

Funds are raised through a rider's fee and from corporate sponsorships and donations. It costs about $1,000 per kid to attend the Burn Camp. That means the ride enables seven to 10 kids to attend every year. "These kids live with their burn scars every day, but at camp they're the normal ones," says Duncan. "It's an awesome experience to go there. Between my prior experience as an EMT and an emergency firefighter, it's close to my heart."

He has strong feelings for his bike, as well. "It's a Harley-Davidson Electra Glide touring bike. When I retire, I'm taking the bike and heading south."

and what might happen as they go about their tasks. We have bimonthly safety meetings with all departments. The meetings involve employees, not management. We bring back suggestions that are then followed up on by managers."

Laboratory operations follow a similar route: People are the key. "We're very fortunate to have the people we have," says Dillon. "They do a spectacular job, not just complying with Indiana Department of Environmental Management standards but staying on top of new procedures and new requirements. We're improving all the time."

One example is quality assurance/quality control testing. Barger, lab manager, does the tests quarterly even though they are required just once a year. "By doing them quarterly we can better track proper methods and the status of our equipment," says Dillon. "We cross-train our people in lab procedures so we can cover during holiday breaks or other situations."

COLLECTIONS EXCELLENCE

The collections system gets the same high-quality attention as the treatment plant and its lab. Brownsburg has won the Indiana WEA's Small Facility Collections Award. That's partly for its success in reducing CSOs.

In the past, Brownsburg might have seen as many as 40 CSOs per year, but Dillon's department has significantly reduced that number: "It's now less than 10 a year, and our goal is zero." Part of the solution is a million-gallon overflow tank, constructed in 2010 near the Main Pumping Station as part of the town's long-term control plan.

Before the tank was built, wet-weather flows could exceed the pumping stations' capacity and overflow to White Lick Creek. Now excess flows are directed to the tank, held there and routed back through the pumping station to the treatment plant when the storm ends.

A truck-mounted Rovver camera system (Envirosight) purchased in 2010 is another improvement, enabling personnel to inspect the sewers and determine the condition of the system. A new portable camera (UEMSI Procam) helps the team troubleshoot lateral lines and settle issues with property owners.

"Before, we might have to make several trips and calls to try to determine if a blockage was on our property or private property," Dillon says. "The camera has saved us a lot of time and expense. We shoot it, locate the blockage and that's it." The Wastewater Department has also added a new combination sewer cleaning truck (Vac-Con) and relegated its 1999 model to backup duty and especially dirty jobs.

MANAGING DATA

In addition, the team has improved data management through a series

> "We build safety into our own standard operating procedures. It's a team effort. We watch each other and try to keep everyone safe."
> **KATHY DILLON**

Butch Barger, lab manager, goes well beyond the minimum in performing required tests. His team members are cross-trained in lab procedures.

Brownsburg Wastewater Treatment Plant
PERMIT AND PERFORMANCE

	INFLUENT (mg/L)	EFFLUENT (mg/L)	PERMIT (monthly)
BOD	163 mg/L	3.8 mg/L	10 mg/L summer 15 mg/L winter
TSS	182 mg/L	8.9 mg/L	12 mg/L summer 18 mg/L winter
Ammonia	23.2 mg/L	0.09 mg/L	1.5 mg/L summer 2.2 mg/L winter

of spreadsheets developed by Pabst, field supervisor. "Shawn has done a great job of organizing our data," Dillon says. "It enables us to do a better job of sending out our crews and interacting with the homeowners."

More precise location of force main relief valves is another benefit of the data management system. "We've captured that data," Dillon explains. "We know the precise location and the standard operating procedures for repair or changeout. We're not relying on memory."

Brownsburg is not sitting on its laurels (or award plaques, if you will). Major challenges lie ahead. "We'll be very busy in the next three years with a 44-acre sewer separation project," says Dillon. "It will include new sidewalks, curbs, stormwater lines and widening of the street. Several departments will work together to minimize traffic disruptions while accomplishing everyone's goals."

The treatment plant will see some action, too. In addition to anticipated new phosphorus requirements, a replacement of the disinfection system and the contact pond is under design for construction two to three years out. "We will use a cloth-style filter followed by UV disinfection," Dillon says. "This will be a modern, more reliable and safer approach to achieving compliance.

"We are also adding screening to the sanitary flows coming from the west side of the community" because, at present, there is no way to remove items such as baby wipes from that part of town. "We anticipate a reduction in pump clogging and possibly regaining plant capacity as a result of adding the screening process," says Dillon.

It's just another in a long line of improvements that help protect the environment and sustain a high quality of life for Brownsburg residents. **tpo**

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Perfect Fit

SCREENING EQUIPMENT DESIGNED FOR NARROW, DEEP VAULTS INCREASES EFFICIENCY AT AN ARIZONA LIFT STATION AND TREATMENT PLANT

By Scottie Dayton

An antiquated 2-inch manual bar screen allowed some objects almost as large as a bed sheet to enter the Bell Road Lift Station in Sun City West, Arizona. Materials routinely clogged the four 250 hp horizontal slurry pumps.

At the headworks 5 miles away, the flow split over two 1/4-inch bar screens. Smaller material slipping through them clogged the in-basin mixers. "We fought this problem for years," says Jesse Black, senior operator for owner/operator Epcor Water. "The station was built in 1979 and is one of the oldest in the area."

Replacing the 30-foot-deep bar screen would be expensive. The prep work alone included saw-cutting the road around the existing unit, demolishing it, excavating and widening the 39-inch-wide channel, and pouring concrete.

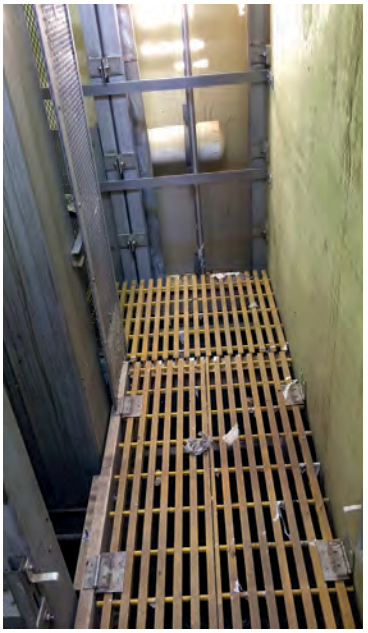
Then Operations Manager Douglas Griffith saw Aqualitec Corp. demonstrate its Screentec automated bar screen at the 2012 Arizona Water Association conference. He measured the unit and realized it would slide unaltered into the lift station's existing flow channel. "Not having to chip concrete or dig dirt made the purchase much more cost-effective," says Black. "Even when compared with competitive screening systems, this unit was a good option and it solved our ragging problems."

PHOTO COURTESY OF AQUALITEC

Jesse Black (left), senior operator for Epcor Water, meets with staff and Aqualitec engineers at the completed Screentec installation.

PHOTOS COURTESY OF EPCOR WATER

Rags clogging a basin's aeration system.



PHOTOS COURTESY OF EPCOR WATER

The new ladder and grating inside the lift station vault enables safe entry for workers.

BEST EFFORTS

The 5 mgd (design) lift station has a peak flow of 4 mgd. The pumps, derated to 235 hp for variable-frequency drive, clogged in no particular order. De-ragging them took two workers four or five hours.

Lacking a mechanical joint in nearby pipes as access points, the crew needed a boom truck topside to lift the unbolted spool piece from the front of the pump to expose the impeller. To reduce frequent ragging, they trimmed the impeller vanes, enabling larger solids to slip past.

That reduced clogging to quarterly events. "However, they always seemed to happen around 2 in the morning when the pumps slowed down in response to decreased flows," says Black.

To avoid ruining the boom truck driver's sleep, workers used a blowtorch to cut a hatch in each pipe spool. Now access to the impellers was as easy as pulling off the hatch, but sealing it was a different situation. "The men made their own gaskets, but they still leaked a little," says Black. "In the end, they sealed the hatches using multiple tubes of silicone."

ADDITIONAL WOES

The old bar screen needed cleaning once or twice a day. Operators would descend a ladder across from the screen, rake off the material and carry it

topside. In 2013, the metal grating directly above the flow gave way as a worker stepped off the ladder. "His foot went straight through the flooring, but he wasn't injured," says Black. "We immediately banned all operators from entering the vault and hired a contractor with a combination cleaning truck to clean the screen. Those weekly visits became extremely costly."

Material from the lift station also affected the treatment plant. The headworks split the flow over two 1/4-inch bar screens that caught much of the larger debris, but smaller matter still reached the in-basin mixers. It took two workers two hours to raise a clogged mixer, then de-rag and repair it. "Repeated cloggings overloaded the motors and eventually fried them," says Black. "We lost five mixers in a short period."

GIVING A FACELIFT

Epcor hired Felix Construction Co. for the preparatory work and to install the one-piece, 30-foot-tall bar screen. That took 2 1/2 months.

"We bypassed the flow from an upstream manhole and pumped it around the screening area into the wet well," says Black. "Then the contractor removed the metal housing over the top of the old bar screen and the unit." The concrete in the wet well was showing its age. Another contractor ground down the walls, sandblasted them, then rolled on 98 percent acid-resistant Novolac epoxy resin (Sewer Shield Composite).

> "The ease with which we retrofitted the lift station without major demolition and excavation and the money we saved through decreased maintenance made this unit a cost-effective solution."
> **JESSE BLACK**

Meanwhile, Felix workers poured a concrete structure with guide rails to accommodate the 10-cubic-yard trash bin. The bin hooks to winches that move it back and forth to distribute solid waste evenly as it pours from the enclosed auger. Workers also put a structure over the bin for odor control and built a frame for the bar screen and trash bin control panels.

"The most critical part of the installation was ensuring that all the holes and mounting hardware in the vault aligned perfectly to accept the bar screen frame," says Black. "It took more than half a day for the crane operator to lower the 1,430-pound unit, but it fit perfectly."

HOW IT WORKS

After the retrofit, the bypass was disassembled and wastewater flowed through the new 1/2-inch bar screen. A rake on a belt follows two guide rails on each side of the frame. The downstroke collects trapped material and the upstroke delivers it to an auger with internal spray bars that remove organics. Inorganics drop out a chute into the trash bin, which is emptied weekly. The screen has no moving parts under grade level.

After a shakedown period, the results of the modification were evident. Plant operators noticed a 75 percent reduction in inorganic solids at the headworks. That enabled them to take down and clean the basins for the first time in years.

Because the lift station pumps no longer had to pass solids, workers replaced three of them with more economical 135 hp pumps (Fairbanks Nijhuis). They left one larger old pump for maintenance activities. Says Black, "The ease with which we retrofitted the lift station without major demolition and excavation and the money we saved through decreased maintenance made this unit a cost-effective solution." **tpo**

Share Your Ideas

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

WELL-TRAVELED ROOKIES

JOHN POTTENGER AND ROSS CAMPBELL ENTERED THE WATER BUSINESS LATER IN LIFE. THEY EMBRACED THEIR CAREERS WITH A YOUTHFUL BRAND OF ENTHUSIASM.

STORY: **Jack Powell**
PHOTOGRAPHY: **Frank Mignerey**

AT AGES 40 AND 50, JOHN POTTENGER AND ROSS Campbell don't fit the classic definition of "rookie." Yet, with little more than four years' experience, they are making names for themselves protecting the environment and supplying clean water to the 410 residents of Riggins, Idaho.

Their efforts to learn the water and wastewater business have earned them kudos from city officials and colleagues, who cite their perseverance, teamwork and can-do attitude. In March 2014, the Idaho Rural Water Association (IRWA) presented them with Rookie of the Year awards, recognizing their contribution to the community early in their industry careers.

Ross Campbell, left, and John Pottenger earned Idaho Rural Water Association Rookie of the Year awards.

STEEP LEARNING CURVE

"When I first met John and Ross, they were very green in terms of plant operations," observes Jason Wereley, a consultant and trainer who serves as a part-time operator at the City of Riggins Water & Sewer Department. "But they've grown so much since they started, it's like 180-degree difference. I've found it a pure honor and joy to work with them over these last few years and see what they've accomplished."

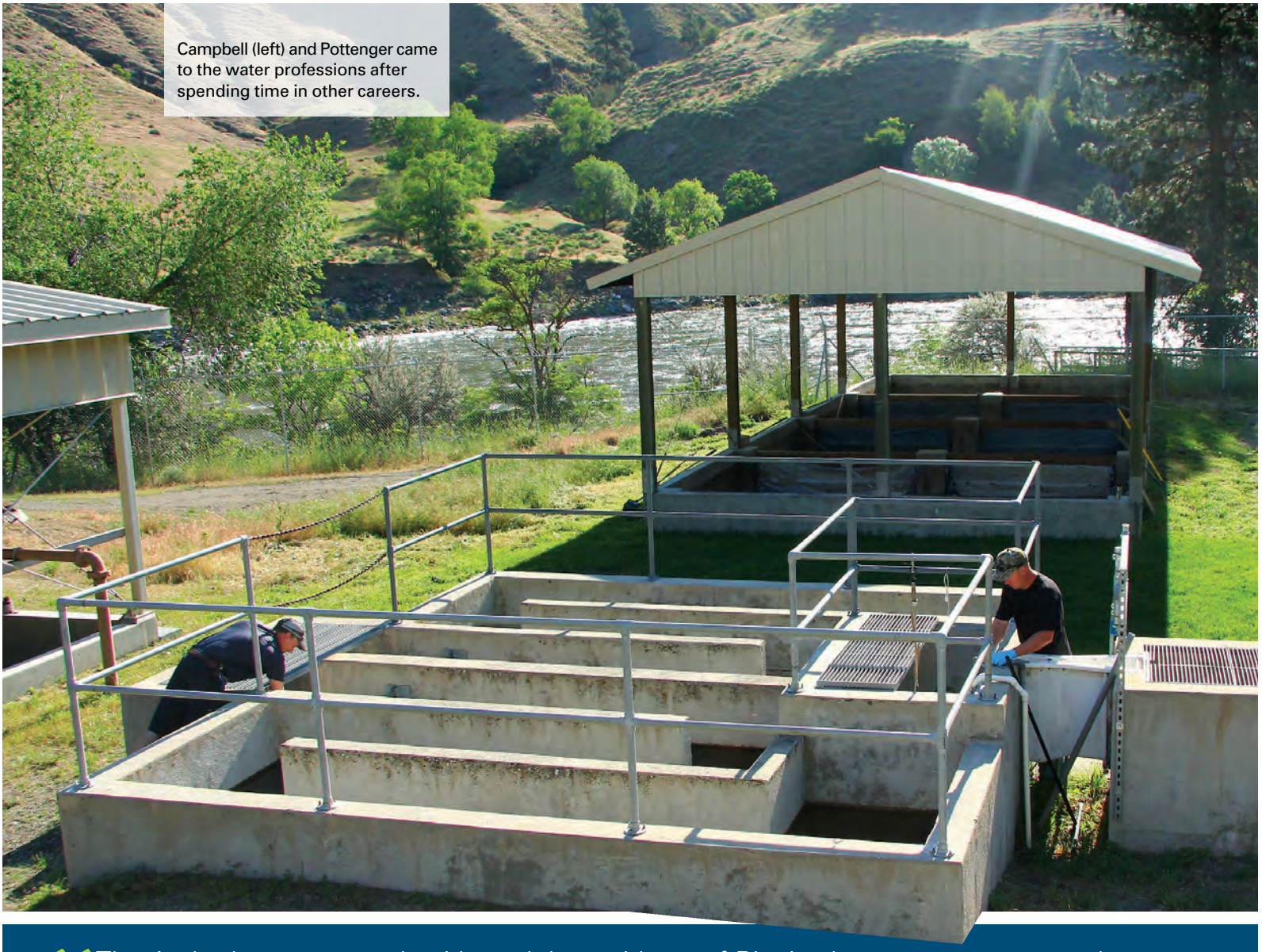
While the two shrug off such compliments and express surprise at winning the award, it's clear they've come a long way in a hurry. Pottenger, sewer supervisor, is a Riggins native who grew up in a logging family. He started cutting trees as soon as he graduated from Salmon River High School and spent about 10 years in that profession. He then became a heavy-construction-equipment operator at 4-T Construction, where he worked seven years as an underground utilities foreman.

"When the recession hit, I wanted to keep my family in Riggins so I decided to get a job here," says Pottenger, whose parents, wife, two daughters and infant son live in this west-central Idaho city, nestled deep in a canyon at the confluence of the Big Salmon and Little Salmon rivers. "I'd been around water pipes and such in construction, but I had never dealt with treatment plants. It was all Greek to me."

COMPLEXITIES ABOUND

In 2011, Pottenger began an internship/on-the-job training program at the wastewater plant through the Workforce Investment Act, managed by the Idaho Department of Labor. For a novice operator, handling the Riggins Wastewater Treatment Plant seemed a pretty big task. It's a Class II activated sludge plant on the north side of town that handles about 60,000 gpd, and up to 80,000 gpd during the peak summer tourist season, with attractions that include salmon and trout fishing, rafting and hunting.

Designed in 1972, the facility underwent a $2.8 million renovation in 2010, after an upgrade in 2009 that added a bar screen, de-ragging equipment, an aeration basin, digester, clarifier, chlorine contact tank and Geotube containers (TenCate) for cold-weather dewatering of biosolids, with help from



Campbell (left) and Pottenger came to the water professions after spending time in other careers.

"They're both great to work with, and the residents of Riggins have come to accept them as dedicated employees who make a positive contribution by providing wastewater and water services efficiently and cost-effectively."

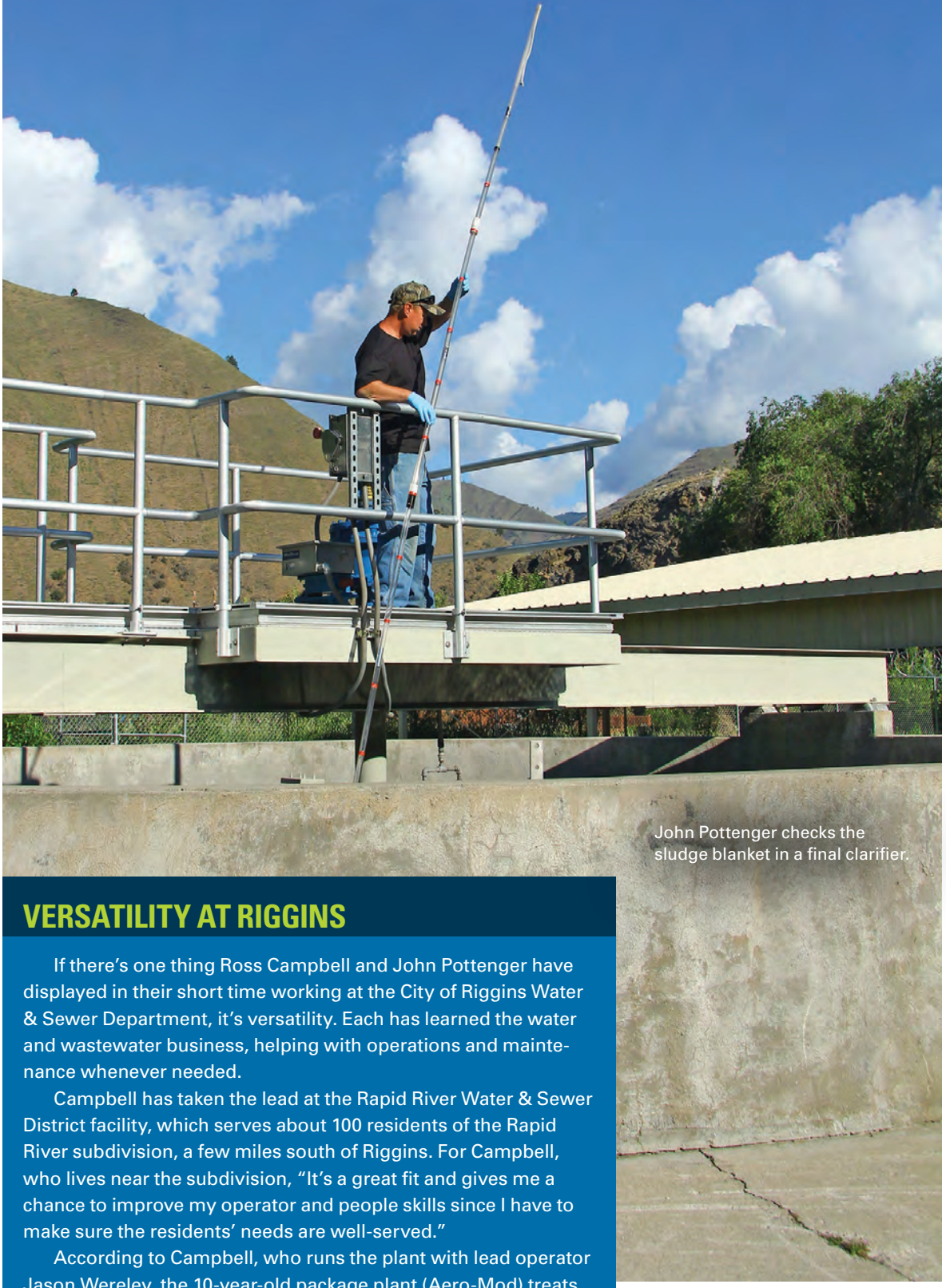
GLENNA McCLURE

John Pottenger, Riggins (Idaho) Water & Sewer Department

POSITION:	**Sewer supervisor**
EXPERIENCE:	**4 years in water/wastewater industry**
DUTIES:	**Oversee wastewater and sewer system and assist in water treatment**
EDUCATION:	**Salmon River High School, Sacramento State University courses**
CERTIFICATIONS:	**Drinking Water Distribution Operator Very Small Water System, Collection I, Wastewater Treatment I**
MEMBERSHIPS:	**Idaho Rural Water Association**
GOALS:	**Continue to learn the wastewater treatment business and improve skills**
GPS COORDINATES:	**Latitude: 45°22'19.60"N; longitude: 116°21'49.46"W**

Ross Campbell, Riggins (Idaho) Water & Sewer Department

POSITION:	**Water supervisor**
EXPERIENCE:	**4 years in water/wastewater industry**
DUTIES:	**Oversee water treatment plant, support wastewater operations, manage Rapid River Wastewater Treatment Plant**
EDUCATION:	**Davis (Utah) High School, Sacramento State University courses**
CERTIFICATIONS:	**Drinking Water Distribution Operator Very Small Water System, Wastewater Treatment II, Collection I**
MEMBERSHIPS:	**Idaho Rural Water Association**
GOALS:	**Build knowledge of water/wastewater operations to serve the community**
GPS COORDINATES:	**Latitude: 45°22'19.60"N; longitude: 116°21'49.46"W**



John Pottenger checks the sludge blanket in a final clarifier.

VERSATILITY AT RIGGINS

If there's one thing Ross Campbell and John Pottenger have displayed in their short time working at the City of Riggins Water & Sewer Department, it's versatility. Each has learned the water and wastewater business, helping with operations and maintenance whenever needed.

Campbell has taken the lead at the Rapid River Water & Sewer District facility, which serves about 100 residents of the Rapid River subdivision, a few miles south of Riggins. For Campbell, who lives near the subdivision, "It's a great fit and gives me a chance to improve my operator and people skills since I have to make sure the residents' needs are well-served."

According to Campbell, who runs the plant with lead operator Jason Wereley, the 10-year-old package plant (Aero-Mod) treats both water and wastewater. Water comes from two nearby wells and, like the Riggins city water, it is disinfected with chlorine. The wastewater facility discharges effluent to a soil-based leachfield.

Jason Wereley, who consults at 20 to 25 water/wastewater facilities in mostly small, rural communities throughout Idaho, has been impressed with Campbell's ability to handle both plants. He praises Campbell and Pottenger for "always wanting to learn" and for taking what they've learned to the next level: "When I work with them, they always want to know why something works and why it doesn't, and I love that attitude."

polymer addition. During warmer weather, the solids are wasted into four sand beds. The plant discharges effluent to the Big Salmon River.

Six months after Pottenger came on board, Campbell was hired to manage the water treatment plant, which processes 40,000 to 90,000 gpd. As water supervisor, his job includes delivering drinking water drawn from two wells near the Big Salmon River and taking care of the city's 380,000-gallon reservoir, a 10-inch transmission main, and 4- and 6-inch lines that support 461 service connections. He is also responsible for 2.4 miles of irrigation ditch, city parks and city streets.

Campbell, a native of Farmington, Utah, had been in Riggins for only a couple of years, after spending 15 years in Boise as a painting contractor. He sought a new career when the economy slowed down. Before that, he worked as a baker for about 18 years.

LEARNING ON THE RUN

"As a learning opportunity, the Riggins water plant and treatment plant were perfect, challenges and all," says Campbell, whose wife is from the Riggins area and wanted to raise their 4-year-old daughter there. "I learned that the city had recently redone its wells and some distribution, so I knew there was a strong commitment to clean water. And with the current superintendent planning to retire, it seemed as if there was a chance for advancement."

Pottenger and Campbell wasted no time getting up to speed. They contacted the College of Continuing Education at Sacramento State University, which shipped them a 700-page textbook on water and wastewater. Their relentless studying paid off: Pottenger, who "never read so much in my life," earned Drinking Water Distribution Operator Very Small Water System, Collection I and Wastewater Treatment I licenses, and Campbell has Drinking Water Distribution Operator Very Small Water System and Wastewater Treatment II and Collection I certifications.

They also became friends with people from the IRWA, who put them in touch with Wereley, a 20-year water and wastewater veteran whom the city quickly hired as an operator, troubleshooter and mentor. With help from Wereley, whose E3 Consulting business provides training, support and operating help throughout Idaho, they do it all – tending to the treatment plants, sewers, irrigation ditch, waterlines and five lift stations.

TEAMWORK AND CREATIVITY

Such diligence isn't lost on city officials. Brenda Tilley, city clerk/trea-

> "As a learning opportunity, the Riggins water plant and treatment plant were perfect, challenges and all. I learned that the city had recently redone its wells and some distribution, so I knew there was a strong commitment to clean water."
>
> **ROSS CAMPBELL**

surer, observes, "John and Ross are good at their jobs. They've faced challenges head on and are implementing programs and processes to benefit the city." She also praises their "willingness to help whenever asked, checking in throughout the day to see if anything needs to be done."

One example of their joint efforts is the 2014 Cemetery Hill Water Replacement Project. Campbell researched ways to reduce costs to replace 1,880 linear feet of 6-inch steel waterline, which at $180,000 the city couldn't afford. He got the Idaho Department of Environmental Quality (DEQ) to classify the job as an emergency because of numerous water leaks. As a result, Riggins didn't need to hire an engineer to oversee the work; it was completed with regular work crews for $28,000.

"Projects like this typify the collaboration John and Ross demonstrate on a daily basis," observes Mayor Glenna McClure. "They're both great to work with, and the residents of Riggins have come to accept them as dedicated employees who make a positive contribution by providing wastewater and water services efficiently and cost-effectively."

Ross Campbell, with the facility's Salsnes Filter system for liquid-solids separation.

JOBS PARAMOUNT

Pottenger and Campbell remain focused on their jobs. They work from 8 a.m. to 5 p.m., 10 days on and four days off. Pottenger starts by doing mixed-liquor tests, then checks the lift stations and water tank, and does "what needs to be done around the city, such as fixing broken water or sewer lines." His job is fairly straightforward: Incoming wastewater flows to an aeration basin, clarifier and chlorine contact chamber, and out it goes.

The Riggins wastewater plant is one of only a few facilities in the state

The plant uses Geotube technology (TenCate) for biosolids dewatering.

> "I'm very happy here, and as long as I make a good living, learn things and get ahead, I consider this a worthwhile career."
> **JOHN POTTENGER**

that use biosolids drying beds. Perforated pipes at the bottom of a 12-inch sand bed drain filtrate; the process reduces water content by about 35 percent.

At the water plant in the center of town, Campbell does a daily log. He maintains water treatment equipment, adds chlorine and makes sure the plant meets permit requirements established by the DEQ.

FOR THE LONG TERM

With Rookie of the Year awards under their belts, Pottenger and Campbell are pleased with their jobs and see water and wastewater as viable careers, especially as the "old guard" from the inception of the Clean Water Act of the 1970s begins to retire.

Says Pottenger, "I'm very happy here, and as long as I make a good living, learn things and get ahead, I consider this a worthwhile career. The demand for operators is really high because the older guys are retiring and things are getting much more technical."

Campbell observes, "Most plants pay well, and there's usually a lot of room for advancement. I believe one of our goals should be to start educating the high school students that there are opportunities in water and wastewater." **tpo**

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Innovation and Education

THE PRESIDENT OF THE NONWOVEN FABRICS INDUSTRY GROUP SEES SUBSTANTIAL PROGRESS IN ADDRESSING ISSUES CAUSED BY WIPES PRODUCTS IN WASTEWATER SYSTEMS

By Ted J. Rulseh

Much has been written about problems caused by wipes and paper products flushed down toilets and into sewer systems. Less has been written about the solutions.

Clean-water agencies are deploying education programs to encourage their customers to flush only materials that readily break down in the wastewater stream. Meanwhile, INDA, the association that represents the nonwoven fabrics industry, is collaborating with major clean-water associations to improve flushability assessment for wipes. At the same time, producers are working to make the wipes they market as flushable disintegrate faster.

Dave Rousse, president of INDA, believes his industry has taken major steps to improve flushable products and to encourage the proper disposal of the many wipes that are neither designed nor marketed as flushable. He talked about the industry's efforts in an interview with *Treatment Plant Operator.*

tpo: Who exactly does INDA represent?

Rousse: We are an association of member companies that represent the entire supply chain of the nonwoven fabrics industry: the suppliers of raw materials, the roll goods producers who make the fabrics, the converters who add treatments and slice and dice the material, the equipment makers, and the product brand owners. The nonwovens industry is a $30 billion business in terms of end-use products sold. INDA has about 325 members. Wipes comprise about 14 percent of the nonwovens industry.

tpo: How long has INDA been involved in dealing with the challenges faced by the wastewater community handling wipes products?

Rousse: I've only been in my position for about three years, but the issue has existed for a while. INDA began creating guidelines to determine flushability back in 2003, with a framework that was submitted to the Water Environment Research Foundation (WERF). That framework was reviewed by WERF experts and determined to be reasonable.

The first edition of flushability guidelines was introduced in 2007; it was modified about a year and a half later in a second edition. Then, because technology improves and our ability to make things safer for wastewater systems continuously evolves, we published a third edition in 2013. We are now meeting with representatives from the wastewater sector to work on a fourth edition, based on new knowledge and further advances in technologies.

tpo: As you see it, what is the key issue with wipes in wastewater systems?

Rousse: There are many kinds of wipes, and only 7 percent of those manufactured are made and labeled to be flushed. The other 93 percent are not designed or marketed to be flushed. Most have label instructions saying they are to be disposed in the trash can — not flushed. We believe it's that 93 percent of wipes, some of which are inappropriately flushed, that cause the problems in the wastewater sector.

Dave Rousse

tpo: Is there any evidence pointing in that direction?

Rousse: We've done forensic studies with wastewater agencies where we take what's collected on pump station inlet screens, dump it on a tarp and dissect the pile piece by piece. We've done this in Portland, Maine, and in Malaga, California. When you combine the results, you find that almost half of what's found in these piles is paper towels, which are not designed to be flushed. The second most common item, at close to 20 percent, is baby wipes, which are designed to be rolled up in a diaper and put in the trash.

After that comes feminine hygiene items, along with other wipes — hard-surface cleaning wipes, disinfecting wipes, facial wipes, skin care wipes. These are not designed or marketed to be flushed, but people sometimes flush them, probably because they aren't aware of the harm that causes.

tpo: What are the flushable wipes used for? Why is there a need for them at all?

Rousse: The flushable wipes are sometimes called moist toilet tissue. They're designed to supplement toilet paper in the cleansing process and then be disposed of down the toilet. The category was developed to meet a need. Our society is always looking for cleaner and purer.

If flushable wipes were banned tomorrow, the problem in wastewater systems would get worse, not better. That's because people would still fulfill their need, but they'd fulfill it with wipes that aren't compatible with wastewater systems.

tpo: Isn't public education the real key to resolving these issues?

> "Only 7 percent of (wipes) manufactured are made and labeled to be flushed. The other 93 percent are not designed or marketed to be flushed. ... We believe it's that 93 percent of wipes, some of which are inappropriately flushed, that cause the problems in the wastewater sector."
> **DAVE ROUSSE**

Rousse: We believe education is important. We believe consumers will do the right thing when they know what the right thing to do is. We acknowledge that we haven't done as good a job as we need to in conveying proper disposal instructions on non-flushables. So we've developed a symbol that is easily recognized — 95 percent of the people who see it for the first time know exactly what it means. It's a stick figure of a person dropping something in a toilet, inside a circle with crossbar through it. People recognize instantly that it means "do not flush."

tpo: What makes this type of symbol effective?

Rousse: A symbol can be visually recognized and prominently displayed on packaging. Words can be minimized in size and hidden in large paragraphs, and people either don't read them or can't read them. Words are not going to do it.

tpo: How widely is this symbol being used today?

Rousse: The larger retailers such as Wal-Mart, Costco and Target are using it on their store brands. We need more of the national brands and store brands to embrace this code of practice for labeling, but it takes time to get labels approved. If a product touches the skin, the label has to be approved by the U.S. Food and Drug Administration. If it contains a cleaning solvent, there is an approval process through the U.S. EPA. Those approval processes take about nine months.

tpo: What makes it challenging to manufacture a product that is flushable to the degree the wastewater industry would like to see?

Rousse: These products need to have enough strength to hold together during transport and packaging and at the point of use, but then quickly lose that strength when flushed. Flushable wipes are highly engineered materials. They're made from natural cellulose fibers so the fabric will break down as it travels through the system. After flushing, a combination of full saturation, constant temperatures in the low to mid-50s F and the pH change associated with wastewater combine to release the strength of the material.

tpo: What is INDA doing to help clean-water agencies educate consumers?

Rousse: We are in discussions with them about a public outreach program to educate consumers about proper disposal paths. In Maine, we conducted a pilot education campaign program with the Maine Wastewater Control Association focused on teaching people not to flush baby wipes. We did a forensic analysis of material caught on screens at the pump stations in Portland before the campaign and after. The baby wipes presence on those screens was reduced by 60 percent. INDA and the MWWCA won an Environmental Stewardship Award for that project from U.S. EPA Region 1.

tpo: What is happening with the flushability assessment guidelines? What does the 2013 edition look like and how will the next edition be different?

Rousse: The 2013 edition was a breakthrough in simplification, from 21 test methods and multiple tracks down to seven tests, all of which a product has to pass before it can be sold as flushable. Everyone agreed to the seven methods as a reasonable framework, but there was concern in the wastewa-

ter sector that some of the pass/fail thresholds could be strengthened. The current effort involves reviewing those thresholds and the test methods and developing a testing protocol where everyone can agree that if a product passes, it is safe to be flushed.

tpo: Can you cite a couple examples of the test methods and the pass-fail criteria?

Rousse: There is a slosh box test to screen out high-wet-strength materials that would have no chance of breaking down. You put the wipes in a slosh box and slosh it around for a couple of hours. Afterward, a certain percentage of the material must pass through 12 mm holes.

Then there's a municipal pump test where we measure the energy increase in a pump as wipes are passed through. High-strength wipes would cause a pump to work harder; lower-strength wipes would be broken apart by the pump and would not cause the pump to consume more energy. In a pass-fail threshold there is an average of a 15 percent pump energy increase. Above that level, the product fails. There's discussion on re-evaluating this test procedure to make sure first that it represents real-life wastewater system conditions, and second that the pass-fail threshold has a scientific basis.

tpo: When would you expect work on this new edition to be complete?

Rousse: We've been at the table since January. We have a self-imposed deadline of June 30, 2016, and it looks like we will finish the fourth edition by then, if not before.

tpo: Do you see any breakthroughs on the horizon in making flushable wipes act more like toilet paper in terms of rapid breakdown?

Rousse: I wouldn't talk about breakthrough so much as continuous evolution. Companies are applying proprietary innovation. Some achieve the release of strength through the bonding process, the way the fibers are formed. Others use chemical binders that release on exposure to the wastewater environment. All use cellulosic fibers that biodegrade. There's a lot of attention being paid to this issue and a lot of money being invested.

tpo: How would you characterize INDA's relationship with the wastewater industry representatives now versus three to five years ago?

Rousse: I would say there is a significant improvement. We have a very constructive relationship. We are working collaboratively with them, sharing data and information, and discussing the true essence of the problems. I think we both better understand and appreciate the challenges each side has.

We acknowledge that there's a problem in wastewater systems and that wipes are a significant contributor — but they're not the only contributor. Paper towels, feminine hygiene products and other items are flushed inappropriately. Seven percent of our products are designed and marketed as flushable, but they get 99 percent of the attention. We're trying to focus attention on the 93 percent of wipes that are sometimes inappropriately flushed. We want to educate people that the toilet is not a trash can.

tpo: How would you characterize the outlook for progress in your dealings with the clean-water industry?

Rousse: There is strong collaboration between my association and the major wastewater associations — NACWA, WEF, the American Public Works Association, and the Canadian Water and Wastewater Association. We think working together is the best way to solve this problem. We've made significant progress and expect that will continue. tpo

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Water From the Sky

A DRINKING WATER SYSTEM ON HAWAII'S 'BIG ISLAND' DRAWS MOSTLY FROM RAINWATER. IT WILL SOON ADD MEMBRANE FILTRATION TO EXPAND CAPACITY AND BLOCK OUT PATHOGENS.

STORY: **Jim Force**
PHOTOGRAPHY: **Anna Pacheco**

The Waimea Water Treatment Plant has a 4.0 mgd design capacity and delivers 2.0 to 2.5 mgd on average.

ANCIENT CIVILIZATIONS COLLECTED RAINWATER for drinking. That practice continues even today on the Big Island of Hawaii, where rainwater is a major source of drinking water for more than 10,000 people on the island's northern tip.

At the Waimea Water Treatment Plant, water from streams fed by rainfall is collected in reservoirs and fed by gravity to the plant, where it is treated and distributed to residents of the Waimea, South Kohala and Hamakua areas. Production capacity is 4.0 mgd; daily production averages 2.0 to 2.5 mgd. Two groundwater wells are available to supplement the streamflow.

There are plans to increase capacity and add microfiltration to provide an extra barrier against *Cryptosporidium* and guard against turbidity spikes during heavy rainstorms.

FOLLOWING THE FLOW

Surface water is collected from the Waikoloa and Kohakohau streams in the mountains 5 miles above the treatment plant. The water flows to the Waikoloa reservoirs — four open, concrete-lined basins, three with 50 million gallons capacity and the fourth with 8.5 million gallons. All lie about a 1/2 mile from the treatment plant.

"Intake pretty much follows the rainfall pattern," says Kawika Uyehara, water engineer with the County of Hawaii Department of Water Supply. Normally all four reservoirs are in operation. Rainfall averages 30 to 50 inches a year; dry periods are common from September through November. If necessary, the Waimea plant can draw on two groundwater wells near the plant to supplement the flow.

From the reservoirs, water flows by gravity to the plant where it is rapid-mixed, then coagulated and flocculated and settled in tube settlers. Caustic soda and C-9 orthophosphate are added for corrosion control, and the water passes through deep-bed gravity sand filters and disinfection with chloramines to guard against DBPs while maintaining the necessary chlorine residual. The collected solids are pumped to a lagoon and then to drying beds. Clarified effluent is returned to the treatment plant.

AUTOMATED PROCESS

Two operators certified by the State of Hawaii Department of Health run the plant, assisted by a Motorola MOSCAD SCADA system that interfaces with Wonderware software (Schneider Electric, Telemetry & Remote SCADA Solutions). "The system is primarily used for data acquisition such as plant effluent flow, turbidity levels and chlorine residual levels," says Uyehara. Hach Company supplied the flow monitoring instrumentation.

Turbidity control is a major goal. Uyehara reports that turbidity levels coming into the plant can range from 1.0 to 6.0 NTU; spikes occur after rainstorms. The turbidity in the product water averages 0.05 NTU.

A covered reservoir stores the water before it is gravity fed to the Waimea

The Waimea plant is located on the slopes of Waimea.

The treatment process includes coagulation, flocculation, pH adjustment for corrosion control, and deep-bed gravity sand filtration.

> "Although the Waimea system as a surface water system can be affected by long-term drought, quantity in general is more than adequate for our systems islandwide."
> **KEITH OKAMOTO**

distribution system, which consists of about 100 miles of pipe, generally cast iron, ductile iron and galvanized steel. The system includes four booster pump stations and 20 finished water reservoirs, also covered.

The staff maintains a full-time acoustic listening leak detection program, monitoring the distribution system regularly and investigating, identifying and repairing leaks. Based on historical results, less than 10 percent of the flow is identified as non-revenue water.

RESOURCE RECOVERY

In a land of abundant sunshine and water, the treatment operation uses both to reduce power needs and cut greenhouse gases. As the water flows from the raw water reservoirs to the treatment plant, it drives a hydrogenerator, which converts its kinetic energy to electricity.

The workhorse of the system, designed by SOAR Technologies and dedicated in 2009, is a Pelton turbine. As the turbine spins, energy is released to the shaft of a generator, creating a maximum of 40 kW, enough power to operate the treatment plant. Any surplus can be fed to the local utility.

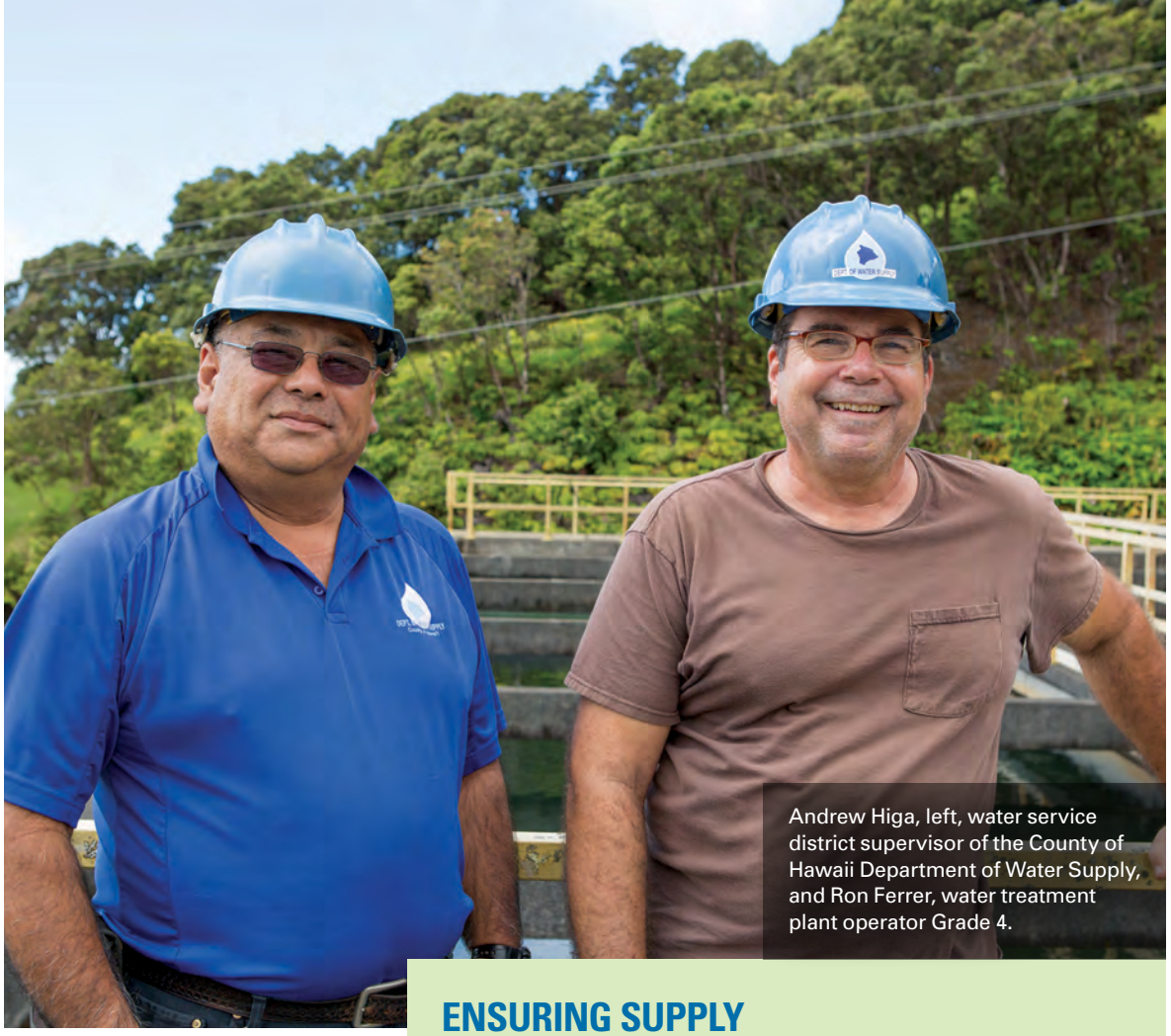
Since the amount of electricity generated depends on water flow and hydraulic head — the vertical distance between the water level in the reservoirs and the turbine — power generation is not constant and the hydrogenerator operates intermittently.

The sun's rays are put to use in the plant's solids drying beds, which lie beneath a facility with transparent walls and ceilings that trap and concentrate heat, allowing the material to dry with no need for gas heaters or centrifuges.

Waimea (Hawaii) Water Treatment Plant, County of Hawaii Department of Water Supply

BUILT: |	**1970s**
POPULATION SERVED: |	**10,000**
RAW WATER: |	**Mountain streams, groundwater supplement**
TREATMENT PROCESS: |	**Conventional**
PRODUCTION CAPACITY: |	**4.0 mgd design, 2.0-2.5 mgd average**
SYSTEM STORAGE: |	**158 million gallons**
ANNUAL BUDGET: |	**$50 million (operations)**
WEBSITE: |	**www.hawaiidws.org**
GPS COORDINATES: |	**Latitude: 21°57′35.59″N; longitude: 159°40′32.69″W**

Finished water in the clearwell typically has 0.05 NTU turbidity.



Andrew Higa, left, water service district supervisor of the County of Hawaii Department of Water Supply, and Ron Ferrer, water treatment plant operator Grade 4.

CONSTANT THREATS

As idyllic as the Hawaiian Islands sometimes seem, the Waimea plant faces challenges from earthquakes and volcanoes. An earthquake in October 2006 damaged one of the concrete storage reservoirs; the utility spent about $1.9 million to repair cracks and holes and to place geotextile fabric and Hypalon polymer liner (DuPont Water Technologies) inside the basin. The perimeter of the reservoir was also excavated and rehabilitated to prevent buildup of water against the walls.

Uyehara says no special precautions are taken against the possibility of future quakes, except that all new structures are built to current seismic and wind velocity standards. Lava flow from active volcanoes can pose an additional threat, although the most recent eruption and lava flow on the far east portion of the island did not affect the Waimea system.

Meanwhile, plans for membrane filtration are proceeding. Bids have been let for the microfiltration system. The membrane facility will also expand plant capacity, as the deep-bed sand filters limit production of finished water.

The addition will address what Uyehara says are the biggest challenges facing the Waimea team. "Our efforts will be focused on continued compliance with the requirements of the Surface Water Treatment Rule," he says.

tpo

ENSURING SUPPLY

The planned expansion of the Waimea Water Treatment Plant to include membrane filtration is one of the largest water supply capital improvement projects in the County of Hawaii (Big Island) and aligns with state and county plans to ensure a continued supply of high-quality water to meet future demands.

"We are updating our water use and development plan (WUDP), which is a component of the state water plan," says Keith Okamoto, deputy in the Department of Water Supply. "This plan will serve as a tool to integrate land use planning and adequacy of water supply."

Water planning has been part of Hawaiian culture from the earliest island inhabitants, and water as a public resource has long been part of Hawaiian law. "From the first constitution of the Kingdom of Hawaii in 1840 to Chapter 11 of the Hawaii State Constitution to the Water Code in the late 1980s, water has been held for the citizens," states the website www.civilbeat.com.

Current planning aims to track water demands, making sure there is adequate supply to meet projected needs. "The WUDPs should set forth the allocation of water to land use in that county and maintain consistency with county zoning and land use policies," says the website of the State of Hawaii Department of Land and Natural Resources. "The WUDPs serve to inform future land use planning and provide guidance for decision-making on water allocations and water reservation requests."

Okamoto says raw-water quality is generally excellent. "The Waimea system has the only surface water source for the department," he says. "Other sources are groundwater. Although the Waimea system as a surface water system can be affected by long-term drought, quantity in general is more than adequate for our systems islandwide."

Power in the Pipes

A SYSTEM OF FOUR HYDROTURBINES INSIDE A LARGE SOURCE WATER PIPE GENERATES SUBSTANTIAL ELECTRICITY AND FILLS THE FUNCTION OF A PRESSURE-REDUCING VALVE

By Doug Day

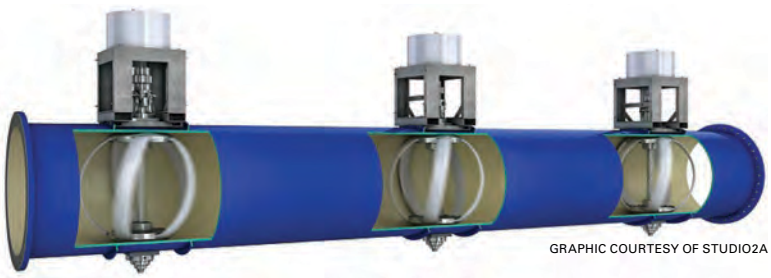
The Portland (Oregon) Water Bureau is using a different kind of hydropower to generate electricity, tapping the energy of water flowing through its pipes. Online since January 2015, four 50 kW hydrogenerators make enough electricity to power up to 150 homes for a year.

The bureau installed a turbine system from Lucid Energy, also of Portland, as part of a $150 million upgrade to its system. The 200 kW LucidPipe Power System will generate an average of 1,100 MWh per year.

DUAL FUNCTION

Gregg Semler, former Lucid president and CEO, says the four turbines are installed across 50 feet of a 42-inch gravity-fed pipe that delivers 57 mgd from a new reservoir. "We were willing to finance it and take on the operation and maintenance, and we negotiated with Portland General Electric to buy the energy," he says.

Each turbine has five blades with a stainless steel shaft inside the pipe. The power components (Siemens) are outside the pipe. The minimum flow requirements are 20 cubic feet per second at 40 psi. Each turbine reduces head pressure by just 1 to 5 psi. That allows them to be installed in series



GRAPHIC COURTESY OF STUDIO2A

Illustration of a LucidPipe installation. The Portland system includes four turbines across 50 feet of 42-inch pipe.

four diameters apart. With the proper flow and pressure, 1 mile of 42-inch pipe filled with the generators could have a capacity of about 3 MW.

For the water utility, the turbine system serves the same function as a pressure-reducing valve. "It operates upstream of the valve to take that energy they're otherwise burning off through the valve and turning a turbine to produce electricity," says Semler. The utility also benefits from sensors in the turbine system that continuously monitor metrics such as pressure, temperature, chlorine, pH and turbidity.

PHOTO BY SHERRI KAVEN

The LucidPipe electrical generating systems were part of a Portland Water Bureau $150 million upgrade. Lucid Energy financed the installation and sells the electricity to the local utility, Portland General Electric

FIRST OF ITS KIND

The Western Municipal Water District in Riverside, California, has also installed a LucidPipe system, but the Portland project is the first in-pipe hydropower installation to have a 20-year power purchase agreement, according to Semler. In that time, it will generate about $2.5 million worth of renewable energy to pay for development, installation and operations.

"We welcomed the opportunity to explore the innovative use of a pipe delivering water to create hydroelectric power as well," says David Shaff, Portland Water Bureau administrator. "Water and energy are closely linked. The LucidPipe system enables us to contribute to generating electricity for our community in a clean, low-cost and renewable way."

The entire project was funded by Harbourton Alternative Energy and cost the city nothing. All the electricity is sold to the local utility, Portland General Electric, at 7 cents per kWh, with a 4 percent annual escalation. Profits are shared by Harbourton and the Portland Water Bureau.

After 20 years, the utility will have the right to own the system, which has a life expectancy of 40 years. At that time, the bureau could continue to

sell the electricity or use it to power its own equipment.

"Water agencies are very interested in what we're doing," says Semler. "They don't have a lot of capital. They're just trying to keep their infrastructure functional. That's why we've had to innovate on the business model. There is a lot of private capital available that water agencies haven't tapped.

"Water agencies need to figure out how to monetize their single biggest asset, which is their pipes. We see LucidPipe as a tool they can use to work with large energy companies that have the know-how and also good balance sheets. Everybody wants to be greener and cleaner, but how do you afford it?"

PROVING THE TECHNOLOGY

Lucid is not the first company to develop such small hydroturbine products. Its in-pipe comes from an effort by three scientists to develop an efficient turbine to place in a river or stream. "What they found is that it's very difficult to predict the flow of water in a river or stream," Semler says.

"The head of our engineering group got the insight that if you took the turbine and put it inside a pipe, you'd be able to control the conditions, predict the energy output and do it without any environmental impact. It's not weather-dependent. It's a very predictable source of low-cost electricity."

> "We welcomed the opportunity to explore the innovative use of a pipe delivering water to create hydroelectric power as well. ... The LucidPipe system enables us to contribute to generating electricity for our community in a clean, low-cost and renewable way."
>
> **DAVID SHAFF**

Lucid took the idea to Northwest Pipe of Vancouver, Washington, about five years ago. The two developed LucidPipe, which has systems for pipes 24 inches and up. "The challenge when you're introducing a new product is that it's hard to find people who want to be the first," Semler says. "Now we have two installations in the United States and are overwhelmed with the interest from around the world. In the future, we believe this will become a standard way that people manage water infrastructure."

WHY NOT MORE?

The company is working on turbines for use in small distribution pipes that could power local monitoring systems and distributed sensor networks. "Water agencies could have early warning systems about what is happening inside their infrastructure and get real-time information about the quality of the water, where the water is going," Semler says. "We can help home in on where water is being lost so they can attack that problem directly."

Lucid Energy recently appointed Bill Kelly as new president and CEO. Their LucidPipe products meet NSF/ANSI Standard 61 for use in potable water systems and are suitable for wastewater utilities and other large water users, such as industrial facilities and farm irrigation systems. "The potential for the technology, I think, is quite large," Semler says. "There's going to be an enormous investment in water infrastructure over the next 20 years, and using a system like this will enable water agencies to be more efficient about how they manage their pipelines." tpo

PHOTO BY CATHY CHENEY, PORTLAND BUSINESS JOURNAL

The turbine system from Lucid Energy meets international standards for use in potable water systems.

What's Your Story?

***TPO* welcomes news** about environmental improvements at your facility for the Sustainable Operations column. **Send your ideas to editor@tpomag.com or call 877/953-3301.**

PHOTO BY CRAIG MANDLI

Tim Smith of Pentair Flow Technologies, talks about the ECOPOD-D advanced wastewater treatment system at the 2015 WWETT Show. The system can be configured to treat 1,500 to 100,000 gpd.

Complete Treatment in One Package

VERSATILE, SUBMERGED FIXED FILM TREATMENT SYSTEM SUITS A WIDE RANGE OF FLOWS

By Craig Mandli

The ECOPOD-D advanced wastewater treatment system is versatile. The staff from Pentair Flow Technologies wanted attendees at the 2015 Water & Wastewater Equipment, Treatment & Transport (WWETT) Show to take that idea away.

The unit is a fit for anything from duplexes to large schools, subdivisions and even communities, according to Tim Smith, regional sales manager. "This is a system that can treat anywhere from 1,500 all the way up to 100,000 gpd," says Smith. "It's a great fit for an application that doesn't have an operator looking it over daily. It only requires periodic attention."

The ECOPOD-D is simple in design, requires minimal maintenance and is effective in treating BOD, TSS and nitrogen, according to the company. It is a larger, commercial version of Delta Environmental's NSF-certified ECOPOD single-family residential unit.

"It basically takes a proven system for residential wastewater treatment and expands the technology into larger applications," says Smith. "It's an all-in-one system that can be installed quickly and easily. It's designed as a replacement for standard package plants."

> "It basically takes a proven system for residential wastewater treatment and expands the technology into larger applications."
> **TIM SMITH**

It reduces nutrients, BOD and TSS in a single tank. The intra-tank bioreactor can be integrated into typical wastewater tanks, including steel, stainless steel or concrete structures. Its submerged fixed film process is marketed as stable, reliable and sturdy.

It has an efficient removal process and is simple to operate, with no valves or controls to manage. It produces low sludge volume, helping reduce removal costs. It produces no mixed liquor suspended solids, eliminating washouts. One unit can handle smaller, intermittent flows, while units can be installed in succession to handle large flows.

"Because we're talking about a modular unit, operating multiple ECOPOD-D units in succession can be a nice solution for larger flows," says Smith. "Pentair feels that the decentralized wastewater treatment market has large growth potential, so our goal is to provide products that fit the largest need."

Smith says customers asked for a product requiring little operator oversight and equipped to meet changing discharge requirements. "Basically, as the laws change, a lot of people are looking for other options to adapt wastewater treatment," he says. "This unit is great for them because of its high removal rate of BOD, TSS and nitrogen. When the company built this product, it not only looked at where the regulations are now, but where they're predicted to go in the future."

Smith was enthused by the traffic Pentair's display received. "We've had a lot of great questions this week, which tells me that this crowd likes to keep their fingers on the pulse of the industry," he says.

Smith says Pentair is already working on new products to tackle more stringent regulations. "Lately we are seeing a huge increase in the importance of phosphorus reduction in addition to increased nitrogen reduction," he says. "I think that's the direction everyone is headed." **800/219-9183; www.deltaenvironmental.com.** tpo

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1) The SL1000 is a ruggedized hand-held unit.

2) The device is available in a kit that includes test reagents.

3) The SL1000 works with seven Chemkey colorimetric tests.

Out of One, Many

A HAND-HELD ANALYZER FROM HACH COMPANY LETS USERS MEASURE MULTIPLE WATER PARAMETERS AT ONCE, SAVE TIME AND GET ACCURATE RESULTS

By Ted J. Rulseh

Analysis of water samples can consume substantial time and expense. Water utilities are on the lookout for ways to simplify tests while maintaining or improving accuracy.

Now Hach Company has developed a hand-held analyzer that can perform tests for several parameters at once, in less time than by conventional testing methods. While designed mainly for use in the field, it has seen applications in water treatment plants and in the lab.

The SL1000 Portable Parallel Analyzer (PPA) can perform two probe-based and four colorimetric measurements simultaneously. The colorimetric tests use the new Chemkey reagent delivery device, which uses the same chemistry Hach users are familiar with. Tom Siller, global product manager for hand-held instruments, talked about the device in an interview with *Treatment Plant Operator.*

tpo: What market demand drove the development of this product?

Siller: In extensive research with water professionals, we found they had three main concerns. First and foremost, they wanted to complete more tests in less time. Second, they wanted more accurate measurements that would eliminate opportunity for variability and errors. Third, they wanted something easier to use with less equipment to juggle.

tpo: How does this offering help satisfy those desires?

Siller: The SL1000, combined with our Chemkey technology, enables users to test six parameters simultaneously with one instrument and one sample. To put that in perspective, consider the nitrification suite of six parameters. That would take at least two pieces of equipment and more than a half hour by conventional methods. Our instrument lets users do those six tests in eight minutes.

tpo: In what settings would water utility personnel use this device?

Siller: It's primarily designed for use in the field for drinking water distribution monitoring, but we have seen customers taking advantage of it in a variety of other settings. We see them using it in the plant to validate their online equipment. We see them using it in their labs because a test for a parameter like nitrite takes 20 to 25 minutes to run with traditional methods, and with our instrument they can do it in seven minutes.

tpo: How is the instrument structured to perform all the different tests?

Siller: At the base of the instrument there are four slots for inserting the Chemkeys. You can insert one, two, three or four, then just dip the unit in the sample and the entire testing process is fully automated. All the Chemkey tests are colorimetric and use the same Hach chemistry customers use today in powder or vial form. At the top of the instrument are two ports for connecting a variety of probes.

tpo: What tests can be performed with this unit?

Siller: Currently, we have seven Chemkey parameters: free chlorine, total chlorine, monochloramine, free ammonia, total ammonia, nitrite and

copper. We will be constantly developing new parameters: Our goal is to roll out at least four or five on a yearly basis. On the probe side, we have pH, conductivity, dissolved oxygen, nitrate, fluoride and chloride. ORP will be available shortly. The device uses the same IntelliCAL probes we offer today. So if, for example, you own one of our HQd meters with an IntelliCAL pH probe, you can use that same probe with the SL1000.

tpo: How would you assess the accuracy of all these tests?

Siller: It is as good as or better than any powder form of testing we have. There are various reasons for that. The easiest to pinpoint is reduction in variability. A typical powder pillow test has a host of opportunities for error.

Take for instance the monochloramine free ammonia vial test. In powder pillow form it requires a dropper. It's very time- and temperature-sensitive, and it requires the operator to follow the method precisely. They have to precisely measure the amount of reagent and the amount of sample. They need to mix the sample properly and make sure the sample cell is clean and free of scratches or smudges. That's all very cumbersome.

With the SL1000, they simply insert the Chemkeys into the bottom of the instrument and dip it in the sample. The testing time and the temperature are controlled automatically. The amount of reagent is predetermined. Any opportunity for user error is eliminated.

> "With the SL1000, they simply insert the Chemkeys into the bottom of the instrument and dip it in the sample. The testing time and the temperature are controlled automatically. The amount of reagent is predetermined. Any opportunity for user error is eliminated."
> **TOM SILLER**

tpo: Can you describe the process of performing a test with the Chemkey reagents?

Siller: When you insert a Chemkey, the device reads the barcode and the screen tells you what parameter you'll be testing. We provide a sample cup that fits perfectly on the bottom of the instrument. You fill that sample cup and dip the instrument in it for two or three seconds. The instrument draws the sample into the Chemkeys. Then you can take the instrument out of the sample cup, set it down and go do something else. On the screen, there's a progress bar with a timer that tells how long until the test is completed.

tpo: How well does the device stand up to life in the field?

Siller: The instrument is drop-proof up to 1 meter. It is also rated IP64, which means it can take a driving rain and if you drop it in water, it will float. You can pick it up and not worry about water getting in.

tpo: What happens to the data once the testing is completed?

Siller: The device eliminates transcription errors inherent in manual, paper-based recording of data. The instrument can store up to 1,000 discrete measurements. You connect the USB cable that comes with the unit, plug it into a computer and the data seamlessly transfers to an XML format. Then you can manipulate that data and export it into a laboratory information management system. **tpo**

Pierce County Sewer Division Maintenance Section team members celebrated Public Works week.

Efficiency by Design

LEAN SIX SIGMA METHODS HELP EMPOWER PIERCE COUNTY SEWER DIVISION TEAM MEMBERS TO EVALUATE PROCESSES AND DEVISE IMPROVEMENTS

By Ann Stawski

Running a department is fundamentally similar to growing a garden, says Brian Ziegler, Public Works director for Pierce County, Washington. It takes the right tools and groundwork to produce beneficial results.

When Ziegler took his position in 2003 he decided that rather than be a graveyard, his department would become a garden. A professional engineer with 26 years' experience in state government, he brought a strong emphasis on total quality management (TQM). The methodology would be new for the Pierce County DPW, which employs more than 650, with the largest group reporting under the Sewer Division.

In his overall assessment, Ziegler saw a need to improve processes and efficiencies. He chose the Lean Six Sigma method. He was realistic about the time it would take for the process to be accepted: "It's what I call patient equity. You can't expect immediate returns. You have to first educate people and then let them get excited with the results. It's an organic growth."

> "When they offer solid ideas that are strategic and based on data ... we can seriously consider them. When we implement changes they have recommended, employees feel validated and justified."
>
> **BRIAN ZIEGLER**

A NEW METHODOLOGY

Having implemented Lean Six Sigma in the past, Ziegler knew the management tools and techniques that could help advance business outcomes and increase operating efficiency. The methodology improves quality by finding and removing the causes of errors and variation (inconsistency).

The concepts were new to county personnel; Ziegler knew he would have to lead the culture change. He brought along three team members from the state government side who knew Lean Six Sigma and were certified TQM facilitators.

At the time, Pierce County was beginning a major expansion at its Chambers Creek Regional Wastewater Treatment Plant. "In that project, we appointed a business case evaluation team to analyze possible process improvements," says Ziegler. "The expansion was a big budget line item and we wanted to find ways to lower costs. They looked at risk factors and developed ideas based on total quality principles."

For the project, the Sewer Division team looked at ways to reduce treatment costs. They reviewed the Anammox process for creating a nitrogen-based fertilizer, testing various effluent strengths before submitting process improvement (PI) recommendations for the Anammox process.

"First the staff reviewed the process and identified possible evaluation stages for improvements," says Ziegler. "Then, together with the manufac-

turer (Paques), our employees and our consulting engineers, we demonstrated the changes. We maintained specifications throughout and could immediately see the benefits." The project led to significant cost-savings, and the PI project and business case evaluation tools proved the fertilizer process could be changed and improved.

EXPANDING OUTWARD

The success of that first Lean Six Sigma project generated awareness and excitement for what TQM methodology could do, and Ziegler knew it was time to expand the knowledge base and apply the tools to processes affecting the entire department. It was challenging to carve time out of employees' schedules for formal training, so he sought out flexible opportunities.

Through a state-funded program, a Lean Six Sigma facilitator from the Washington state auditor's office came on site to work with Sewer Division employees and members from the other five Public Works divisions. The training focused on expanding PI initiatives with the goal to have employees initiate and conduct performance audits for projects.

All PI teams underwent an intensive process to evaluate real projects and apply the findings with the facilitator. One member of the Sewer Division, Karl Imlig, Engineering Section manager, took part in the training. His team looked at contract services and discovered that all divisions operated independently in working with contractors, leading to substantial inefficiency.

"The contract services team collaboratively mapped out situations and worked through even the smallest of details," says Ziegler. "At one point an entire wall was covered with yellow sticky notes." In the end, the team presented a streamlined process for contract services to use across Public Works. The presentation included flowcharts, voice of customer (internal and vendors) and a series of recommendations for new efficiencies in procedures, shorter cycle times and improved customer service.

"Because team members asked for input from all who worked on contract services across the six divisions, there was a high level of acceptance," Ziegler says. "Everyone understood that opinions were vetted and processes evaluated. The final recommendation was the right recommendation for the right reasons."

The Chambers Creek Regional Wastewater Treatment Plant is shown during the recent expansion project.

BOOSTING EDUCATION

With that success in hand, Ziegler and his staff sought to continue building momentum. "Awareness and acceptance of the Lean Six Sigma methodology grew exponentially," he says. "Now we wanted to populate the department with more trained, qualified and empowered people."

The next step was to offer advanced Lean Six Sigma education to employees: "We were still in the learning phase, which can be frustrating because everyone wants to move quickly. However, there are times we have to go slow before we can go fast."

In fall 2014, eight employees enrolled in a one-day-a-week, 14-week accredited Lean Six Sigma course at the University of Washington. As part of the course, they took part in exercises where they re-evaluated actual Pierce County projects that affected the six divisions.

One project focused on the recruitment and interview processes that were bogging down new hires with an extended timeline. They reduced the 120-day process by half and created a new policy procedure and checklist to help expedite hiring. The Sewer Division now benefits as its hiring activities proceed in a timely manner.

ASSESSING THE CHANGES

Beyond process changes, Lean Six Sigma is about employee development and job satisfaction. So far Sewer Division employees Terry Soden, Maintenance and Operations Section manager, and Katherine Brooks, Organizational Development Section manager, have taken the formal training. The county's twice-a-year employee surveys have consistently reported increased job satisfaction. Ziegler correlates the increase with deploying the Lean Six Sigma process: It helps keep the Sewer Division's frontline employees engaged.

"We take pride in encouraging employees to do and be their best," says Ziegler. "When they offer solid ideas that are strategic and based on data, like the Anammox project, we can seriously consider them. When we implement changes they have recommended, employees feel validated and justified."

For Ziegler, allowing staff to make strategic decisions and implement improvements is the best way to grow a team. **tpo**

tell us about your team

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

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Education Day Sessions

Wednesday, February 17, 2016

NAWT
National Association of Wastewater Technicians
Rooms 234-236

8 a.m.	Basics of Septic System Control Panels
9:30 a.m.	Using Septic Control Panels to Troubleshoot Systems
11 a.m.	Inspecting Concrete Sewage Tanks
1:30 p.m.	An Exercise in Septic System Troubleshooting
3 p.m.	The Basics of Inspecting Drip Systems
4:30 p.m.	NAWT Ask the Experts Panel Discussion

SSPMA
Sump and Sewage Pump Manufacturers Association
Rooms 133-135

8 a.m.	Understanding Pumps and Common Pumping Issues
9:30 a.m.	Evaluation and Installation of Backup Pump Systems
11 a.m.	Best Installation Practices for Trouble-Free Pump Controls
1:30 p.m.	Troubleshooting Pumps, Panels and Switches with Digital Multimeters
3 p.m.	Sizing Guidelines for Sump, Sewage and Grinder Pumps
4:30 p.m.	SSPMA Ask the Experts Panel Discussion

Business Strategies
Rooms 140-142

8 a.m.	How Much Should I Charge?
9:30 a.m.	Business Game Changers: Top 5 Secret Strategies for Massive Growth in Your Service Business
11 a.m.	The Un-Business Plan – Making Your Business Less Complicated But More Profitable
1:30 p.m.	How to Use Superior Customer Service to Increase Sales
3 p.m.	Reward the Right Stuff: Finding, Training and Keeping Great Team Members
4:30 p.m.	Is Your Business Prepared for a Crisis?

Industry Safety Track
Rooms 237-239

8 a.m.	Pre-Engineered Shoring Systems for Cross-Trench Utility Challenges
9:30 a.m.	Excavation Safety
11 a.m.	OSHA Confined Space, Air Monitoring and Fall Protection Explained

SSCSC
Southern Section Collection Systems Committee
Rooms 231-233

8 a.m.	Positioning Yourself for Promotion and Succession Planning
9:30 a.m.	Step Up Your Game! Taking Current CCTV Inspection Technology to the Next Level
11 a.m.	Trailer Jetting – Getting the Most Out of Your Equipment
1:30 p.m.	Vacuuming: the Other Half of the Combination Unit
3 p.m.	Sewer System Maintenance – Challenges and Solutions
4:30 p.m.	SSCSC Ask the Experts Panel Discussion

NOWRA
National Onsite Wastewater Recycling Association
Rooms 240-242

8 a.m.	Introduction to Soils
9:30 a.m.	Onsite Septic System Loading Rates and Site Layout
11 a.m.	Making Infiltration Decisions – Understanding Soil Surface Design
1:30 p.m.	Soil Dispersal Comparison
3 p.m.	Introduction to the Elements of Onsite System Design and Regulations
4:30 p.m.	Onsite Septic System Hydraulics and Pump Design

Portable Sanitation Track
Rooms 136-138

1:30 p.m.	Marketing Basics: How to Effectively and Efficiently Grow Your Portable Sanitation Sales
3 p.m.	Portable Sanitation Forum: Current and Future Critical Issues Affecting the Industry Discussion
4:30 p.m.	Trust – How to Build it and Use it to Grow Your Portable Sanitation Business

NASSCO
National Association of Sewer Service Companies
Rooms 130-132

8 a.m.	Cleaning Nozzle Technology
9:30 a.m.	Large vs. Small-Diameter Pipe Cleaning
11 a.m.	The Lower Lateral – The New Frontier in Sewer Rehab
1:30 p.m.	Chemical Grouting Technologies
3 p.m.	The Growth of the UV Cured CIPP Process
4:30 p.m.	NASSCO Ask the Experts Discussion Panel

Treatment Plant Operator Track
Rooms 243-245

8 a.m.	Effective Strategies for Collections System Management
9:30 a.m.	Sustainable Innovation in Biosolids Management
11 a.m.	Pretreatment and Wastewater Lagoon Management
1:30 p.m.	Septage Collection and Treatment
3 p.m.	Large Scale FOG/Septage Receiving Station – Lantern Environmental Project Case History
4:30 p.m.	Progress in Electrochemical Water Treatment in Last Century

WJTA-IMCA
Water Jet Technology Assoc. - Industrial Municipal Cleaning Assoc.
Rooms 237-239

1:30 p.m.	Proper Industrial Truck Maintenance Can More Than Pay for Itself in Productivity and Safety
3 p.m.	Air Conveyance Through an Industrial Vacuum Truck
4:30 p.m.	Vacuum Excavation Applications and Opportunities

Women in Business
Rooms 136-138

8 a.m.	Marketing to Women
9:30 a.m.	Women of Wastewater: Building a Community of Allies
11 a.m.	Women in Wastewater Roundtable

Vacuum Truck Equipment and Operation Training
presented by NAWT National Association of Wastewater Technicians
Rooms 109-110 **8 a.m. - 5 p.m.**

This day-long session will discuss in detail the equipment on vacuum trucks and how to operate them. Pumping terms will be covered, as will safety principles, materials often encountered on the job and government regulations.

WWETT Education Sessions

Thursday, February 18, 2016

Liquid Waste Treatment & Disposal
Rooms 130-132

8 a.m.	Analysis of Drainfield Failures and Restoration Methods
9:30 a.m.	Cash In on Community System Operations and Maintenance
11 a.m.	Ultra-Efficient Inspection Technique to Locate Leaks on Septic Systems

SSCSC Sewer & Drain Cleaning Course
Rooms 231-233

8 a.m.	Hands-On Nozzle Technology
10 a.m.	Hands-On Jetter Hose Maintenance – Care and Repair

Sewer & Pipe Rehabilitation, Relining & Repair
Rooms 234-236

8 a.m.	Take Control of Inflow and Infiltration in Manholes
9:30 a.m.	When Things Go Wrong on a Lining Job
11 a.m.	Taking Small-Diameter Drain Lining Inside Infrastructure

Sewer & Drain Cleaning, Inspection & Repair
Rooms 133-135

8 a.m.	Using the Clean Water Act to Grow Profits
9:30 a.m.	Winning Trench Warfare – Finding Profitability in Sewer/Septic Work
11 a.m.	Your Best Shot at Sewer Success – How to Get the Most From Inspection Technology

Onsite Septic Installation, Repair & Design
Rooms 237-239

8 a.m.	Overview of Application, Design, Installation and Operation of Drip Dispersal Systems
9:30 a.m.	Onsite System Pump Design Made Easy
11 a.m.	The Onsite Wastewater Industry and Our Carbon Footprint

Treatment Plant Operator
Rooms 243-245

8 a.m.	Smart Water Technology in Theory and Practice
9:30 a.m.	Dissolved Ozone in Municipal Collection, Treatment and Disposal
11 a.m.	Municipal Biological Waste Treatment

Business Strategies
Rooms 136-138

8 a.m.	How Self-Employed People Can Make More Money
9:30 a.m.	Growing Your Business in a Tough Economy
11 a.m.	Staying in Front of Your Customer

NOWRA Design Course
Rooms 240-242

8 a.m.	Mound and At-Grade Design
9:30 a.m.	Low-Pressure Pipe in Drainfield Distribution
11 a.m.	Subsurface Drip Irrigation

Municipal Sewer & Water
Rooms 140-142

8 a.m.	How to Recover Non-Revenue Water
9:30 a.m.	Phased Assessment Strategy for Sewers - Understanding Sewer Condition Quicker with Fewer Resources
11 a.m.	The Science of Pipe Cleaning – Flow and Pressure

Many states approve WWETT education sessions toward fulfilling required certified education units or professional development hours.

See wwettshow.com for a list of approved states and courses.

Friday, February 19, 2016

Liquid Waste Treatment & Disposal
Rooms 130-132

8 a.m.	Fact vs. Fiction: The Top Ten Septic Myths
9:30 a.m.	All About Facultative Bacteria
11 a.m.	Brown Grease Recovery From Grease Trap Waste: Science and Economics

Industry Safety
Rooms 140-142

8 a.m.	Identifying and Managing Risk in a Septic or Sewer Business
9:30 a.m.	How Well Do You Know Your Cleaning Hose?
11 a.m.	Pathogen Exposures to Workers in the Onsite Industry

Business Strategies
Rooms 240-242

8 a.m.	Creating a Data-Driven Strategic Marketing Plan
9:30 a.m.	What Every Sewer and Drain Contractor Needs to Know About Asset Protection, Tax Reduction and Estate

Municipal Sewer & Water
Rooms 240-242

11 a.m.	GIS: Empowering Water, Wastewater and Waste Removal Organizations

Sewer & Drain Cleaning, Inspection & Repair
Rooms 133-135

8 a.m.	Advanced Pipe Bursting
9:30 a.m.	Low-Latency, High-Definition Video Over Coaxial Cable for Remote Inspection
11 a.m.	Plumbers vs. Technicians: The Slow Decline of the Tradesman

Municipal Sewer & Water
Rooms 231-233

8 a.m.	Using Acoustic Inspection to Prioritize Sewer Cleaning
9:30 a.m.	Evaluation of Automatic Filters for Nozzle Protection in
11 a.m.	Flow Monitoring – How to Make Your Program Successful

Treatment Plant Operator
Rooms 243-245

8 a.m.	Insights into Ozone Water Treatment Plants
9:30 a.m.	Wastewater Microbiology
11 a.m.	How to Ensure Gold is the Result – Choosing the Right Dewatering Equipment

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Business Software & Technology
Rooms 136-138

8 a.m.	Know the State of Your Business Using Business Charts and Reports
9:30 a.m.	Using Software to Save Time and Increase Profits
11 a.m.	Using Mobile Devices for Business

Sewer & Pipe Rehabilitation, Relining & Repair
Rooms 234-236

8 a.m.	Buying Back Capacity
9:30 a.m.	Successful Reduction of I&I Using the Holistic Approach to Sewer Rehabilitation
11 a.m.	Large Scale Centrifugally Cast Concrete Pipe Culvert Rehab in CO Dept. of Transportation Region 1

COLE Publishing's Onsite Installer Course
Rooms 237-239 8 a.m. - 5 p.m.

This day-long session will walk professionals through an introduction to proper installation practices for the sustainable use of onsite treatment systems

Detailed session information available at:
www.wwettshow.com

Two facilities install Neptune-Benson ETS-UV disinfection system

The County of New Castle, Delaware, awarded a contract to upgrade the UV disinfection system at its wastewater facility to ETS-UV by Neptune-Benson. The upgrade will convert a chlorine-based system to closed-vessel UV. The fully enclosed system uses automatic wipers to keep the lamp sleeves clean and uses fewer lamps. The City of Scottsburg, Indiana, also replaced a chlorine feed system with a closed-vessel ETS-UV system.

Envirogen starts first-of-its-kind hexavalent chromium treatment system

Envirogen Technologies started up a high-efficiency ion exchange system for the treatment of hexavalent chromium in drinking water supplies for California Water Service (Cal Water) in Salinas. It is the first permitted full-scale system to go online for treating hexavalent chromium since the state's Division of Drinking Water released a new maximum contaminant level of 10 μg/L in July 2014. The ion exchange system will treat groundwater sourced from a well in the Cal Water system to be more than 20 percent lower than the MCL.

GE deploys first North American Monsal biosolids system in Idaho

The City of Rexburg, Idaho, selected the GE Monsal process and Monsal 70 technologies to treat biosolids. The project represents the first North American application of Monsal technologies and will allow Rexburg to meet federal standards. The Monsal technology uses an advanced anaerobic digestion process. The Monsal 70 system pasteurizes the material, creating Class A biosolids for beneficial use.

Los Angeles plant selects Xylem advanced oxidation process

Xylem was commissioned to install its WEDECO MiPRO photo advanced oxidation process at the City of Los Angeles Terminal Island Water Reclamation Plant to comply with California groundwater recharge regulations for indirect potable reuse. The technology will be installed as a final barrier against pathogens and contaminants that cannot be removed by other technologies. It will be the first greenfield AOP design using UV light with chlorine for indirect potable reuse.

Kruger to install ACTIFLO system in Warwick, Rhode Island

Kruger will implement two 12.5 mgd ACTIFLO systems for the Warwick (Rhode Island) Advanced Wastewater Treatment Facility's phosphorus removal upgrade. This installation will include two 12.5 mgd Veolia-designed process treatment trains complete with controls, mixers, chemical and microsand feed equipment for a total design capacity of 25 mgd. The system will treat secondary effluent with total phosphorus as high as 1.5 mg/L down to an effluent limit of less than 0.10 mg/L.

HOBAS wins pipe contract in Ontario

HOBAS Pipe USA was chosen as the pipe supplier to the Upper Centennial Trunk Sewer Tunnel Project for the City of Hamilton, Ontario. McNally Construction was awarded the project and plans to purchase more than 17,000 feet of 72-inch HOBAS pipe.

American Water and Orlando Utilities launch home warranty programs

American Water Resources of Florida and Orlando Utilities Commission (OUC) launched a partnership to offer home warranty protection programs to more than 200,000 residential customers in Orlando, St. Cloud and portions of unincorporated Orange and Osceola counties. As the exclusive provider of home warranty protection programs for OUC, American Water Resources of Florida aims to educate homeowners on their responsibilities with exterior water and sewer lines while helping homeowners guard against in-home plumbing problems.

Schwing Bioset completes installation in Florida

The City of Immokalee, Florida, chose Schwing Bioset as the design/build supplier of its Bioset process and reactor that converts raw sludge into Class AA biosolids for land application. Immokalee integrated the company's twin-piston pump and dewatering screw press into the design.

World Water Works uses Landia mixer in North America's first DEMON system

World Water Works used a Landia submersible mixer as part of a DEMON treatment system at the York River Treatment Plant in Seaford, Virginia, the first implementation of DEMON technology in North America, installed in a facility of the Hampton Roads Sanitation District (HRSD). The DEMON system runs a two-step, single-stage process that uses two types of bacteria to first oxidize ammonia in wastewater to nitrite and then convert a combination of this nitrite and remaining ammonia into nitrogen gas. The mixer model POP-I mixes granulated sludge for the process.

City of Fayette hires Alliance Water Resources to manage water plant

Alliance Water Resources and Operations won a contract to manage the water treatment plant in Fayette, Missouri. The firm is providing contract operations and management services to help the facility keep up with regulatory and environmental mandates and deliver quality services at a competitive price.

LA County agency wins multiple awards for ANITA Mox process pilot test

Kruger partnered with the Sanitation Districts of Los Angeles County to compare the effectiveness of de-ammonification from two pilot-scale reactor configurations of ANITA Mox: a moving-bed biofilm reactor and the integrated fixed film activated sludge application. The American Academy of Environmental Engineers & Scientists awarded the 2015 Honor Award for Research to the agency for its pilot work on ANITA Mox. The agency also received the 2014 Engineering Research Achievement of the Year from the California Water Environment Association.

PC Construction wins $20 million contract to upgrade Brunswick plant

PC Construction won a $20 million project with the Brunswick (Maine) Sewer District to upgrade its 50-year-old wastewater treatment facility. The company will replace equipment and systems that are at the end of their useful lives while improving the quality of the water discharged. The upgrades will help the district run the facility more efficiently while reducing operating costs.

American Water Resources wins contract renewal in Burlington, Iowa

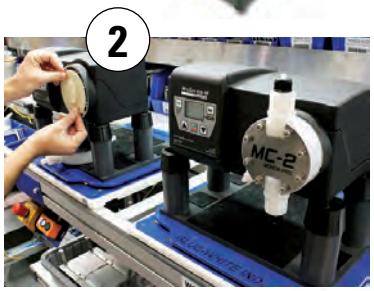
American Water's American Water Resources subsidiary won a five-year contract renewal as the preferred vendor to deliver service line protection in Burlington, Iowa. The protection programs protect homeowners from costs associated with leaks and breaks in waterlines, as well as clogs or blockages in sewer lines running through their property.

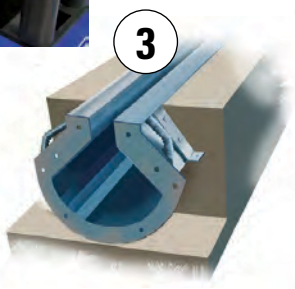
North Las Vegas Wastewater Plant gets GE LEAPmbr technology

GE provided the City of North Las Vegas, Nevada, with its high-performance LEAPmbr membrane bioreactor technology for an upgrade to the city's wastewater treatment plant. By using the system, the city will reduce its energy and maintenance cost. LEAPmbr aeration technology provides optimal energy usage by reducing membrane air scour and essentially eliminating cyclic valve maintenance.

Headworks Bio commissions first IFAS system in Costa Rica

Headworks Bio has completed commissioning of the first integrated fixed film activated sludge (IFAS) installation in Costa Rica. The system, an upgrade for the Ptar El Roble conventional activated sludge treatment facility in Puntarenas, divided the original aeration basins into two basins in each of the existing two trains. The first aeration basin in each train was then retrofitted as an IFAS basin with upgraded aeration, moving-bed bioreactor media, retention screens and new aeration blowers. The upgrade enabled a 45 percent increase in flow. **tpo**





1. ALMATEC SANITARY AIR-OPERATED DOUBLE-DIAPHRAGM PUMPS

The CMX Series of sanitary air-operated double-diaphragm (AODD) pumps from Almatec, part of PSG, a Dover company, are available with seven different connections – four with NPT and three with BSP. The NPT pump sizes (10, 20, 50 and 130) are interchangeable with Almatec's CX and CXR Series. The BSP pumps, available in sizes 25, 55 and 135, feature face-side connections. **www.psgdover.com.**

2. BLUE-WHITE DIAPHRAGM METERING PUMPS

The Chem-Pro M Series of diaphragm metering pumps from Blue-White Industries is designed for precision liquid injection in municipal water treatment applications. Features include NSF 61 listing, 200-1 turndown ratio, LCD screen, 4-20 mA output and stainless steel pump head cover. Communication options include industrial Ethernet, Modbus TCP, ProfiNet, Modbus and Profibus. **714/893-8529; www.blue-white.com.**

3. NORSTAR MANUFACTURING SHOP FLOOR DRAINAGE

The U-Drain shop floor drain from Norstar Manufacturing is a single-slot, non-grated, pre-engineered floor drain designed to withstand heavy-traffic applications. The sloped, self-cleaning drain is available in 10-foot, 30-foot and 150-foot sections. Surface water passes through the 1-inch drain slot and into the pre-sloped trench that brings the water to the drain sump. The drain has a galvanized finish (stainless steel available) and connects to the rebar grid in new construction (retrofits possible). **855/746-8200; www.u-drain.ca.**

4. SINGER VALVE PROCESS CONTROLLER

The SCP-TP process controller from Singer Valve is designed to complement a dual solenoid control valve. It can switch between settings for level control, upstream and downstream pressure management, flow control, and position control. The controller features on/off capability and can be configured with a 4-20 mA control motor. It is equipped with digital input controls and user-selectable digital output alarms. Additional features include data logging, setpoint data and trending graphs. **604/594-5404; www.singervalve.com.**

5. SMITH FLOW CONTROL COUPLING

The Bajolock coupling from Smith Flow Control automatically catches any dangerous residual pressure and safely discharges it away from the worker. When no potentially harmful pressure exists, the coupling can be operated normally with a twist. Designed for use in transfer systems for pressure up to 145 psi, the stainless steel coupling is manufactured according to the European Pressure Equipment Directive and is CE approved. **859/578-2395; www.smithflowcontrol.com.**

6. MPV TECH SLURRY DENSITY INLINE GAUGE

The MassExact slurry density inline continuous gauge from MPV Tech calculates specific gravity by measuring direct mass over a known volume within a canister and does not require licensed and trained staff on site. Accurate up to 99.5 percent with 0.1 percent repeatability, the low-maintenance gauge features single-button calibration. It compensates for vibrations, noise and temperature. Continuous readings occur 100 times per second with a 45-millisecond data response time. **407/337-0110; www.directdensity.com.**

7. KEYENCE CLAMP-ON FLOW MONITORING

The FD-Q Series of clamp-on flow sensors from Keyence Corp. of America are designed to detect and monitor flow from the outside of a pipe. The device can sense the flow of liquid (water, oils, chemicals) through metal or resin pipes from 1/4 to 2 inches in diameter. **888/539-3623; www.keyence.com/usa.**

FREE INFO ON THESE PRODUCTS – RETURN FOLLOWING FORM

8. RENEWABLE NUTRIENTS PHOSPHORUS EXTRACTION, RECOVERY

The Quick Wash process from Renewable Nutrients extracts and recovers phosphorus from either the solid stream or sidestream of a wastewater treatment plant. Quick Wash uses no metals and produces biosolids that are low or free of phosphorus that can typically be land-applied. **888/436-5497; www.renewablenutrients.com.**

9. FRANKLIN MILLER AUTOMATED ROCK REMOVAL SYSTEM

The Spiralift SR automated rock removal system, an option on the Taskmaster TT grinder from Franklin Miller, features an automated gate valve that opens on a pre-planned cycle, enabling rocks to fall into an enclosed screw conveyor and be carried to a bin for disposal without operator assistance. **800/932-0599; www.franklinmiller.com.**

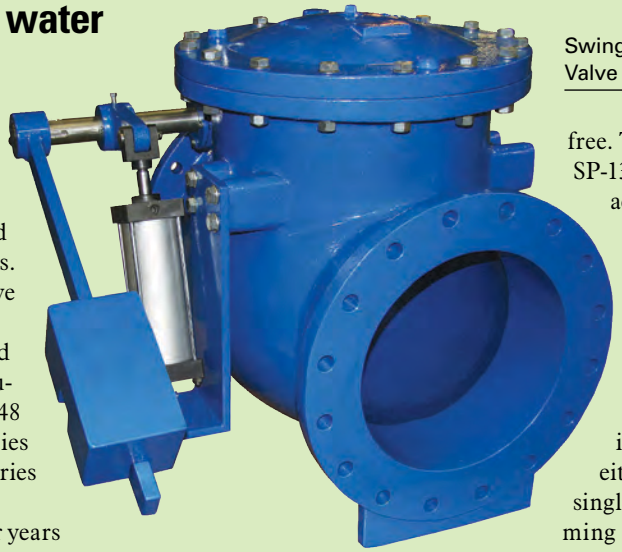
10. FCI PRECISION FLOW/LEVEL/TEMPERATURE SWITCH

The redesigned FLT93 Series FlexSwitch from Fluid Components International (FCI) complies with the European Union's Restriction of Hazardous Substances (RoHS) directive. Featuring surface-mount technology electronics, the switch meets all EU restrictions on lead solder and five other toxic materials found in some electronic devices. The assembly is secured in an aluminum or stainless steel housing for improved vibration immunity in rugged plant environments. **800/854-1993; www.fluidcomponents.com. tpo**

water:
product spotlight

Lead-free, metal-to-metal swing check valves certified for drinking water

By Ed Wodalski


Swing check valves from Val-Matic Valve & Manufacturing

Swing check valves from **Val-Matic Valve & Manufacturing,** offered with either drop-tight resilient seating or aluminum bronze metal, are designed for municipal and industrial water and wastewater applications. The valves are made of ductile iron and have a cold working pressure rating of 250 psi.

Both the removable metal body seat and integral disc seat are made from C95400 aluminum bronze. Valve sizes range from 8 to 48 inches. Metal seating is standard on the Series 7900 oil cushion valves and is an option on Series 7800 air cushion valves.

"The swing check valve has been used for years in both water and wastewater and many industrial applications as well," says Dave Scott, national sales manager, Val-Matic Valve & Manufacturing. "It's a design that's tried and true, and many engineers still specify it. A lot of times it's a customer preference. Some customers just prefer the metal-to-metal seating even though the resilient-seat valve would be fine."

Val-Matic's metal-to-metal seated valves, introduced this year, are built and tested for compliance with ANSI/AWWA C508, as well as NSF/ANSI 61 certified for drinking water and NSF/ANSI 372 certified lead-free. The valves also conform to MSS SP-71/MSS SP-136 standards. End connections are made in accordance with ASME/ANSI B-16.1 Class 125 and ASME B-16.42 for ductile iron flanges.

The Series 7900 oil cushion valves include single- or dual-level arms with weights, and either side or bottom oil cushions. The bottom oil cushion provides adjustable control of the final 10 percent of disc closure. The side oil cushion allows for independent adjustment of closure speeds in either two or three stages. Applications include single- or multiple-pump systems to reduce slamming and pressure surges.

"When you stop the flow you want to prevent anything from back-spinning your pump," Scott says. "A check valve is used to prevent that."

Both Series 7800 and Series 7900 check valves are fully coated with NSF/ANSI 61 certified fusion-bonded epoxy per AWWA C550 for corrosion resistance and extended service life.

Features include a full-domed, easy maintenance access cover that can accommodate a release valve or pressure gauge.

630/941-7600; www.valmatic.com.

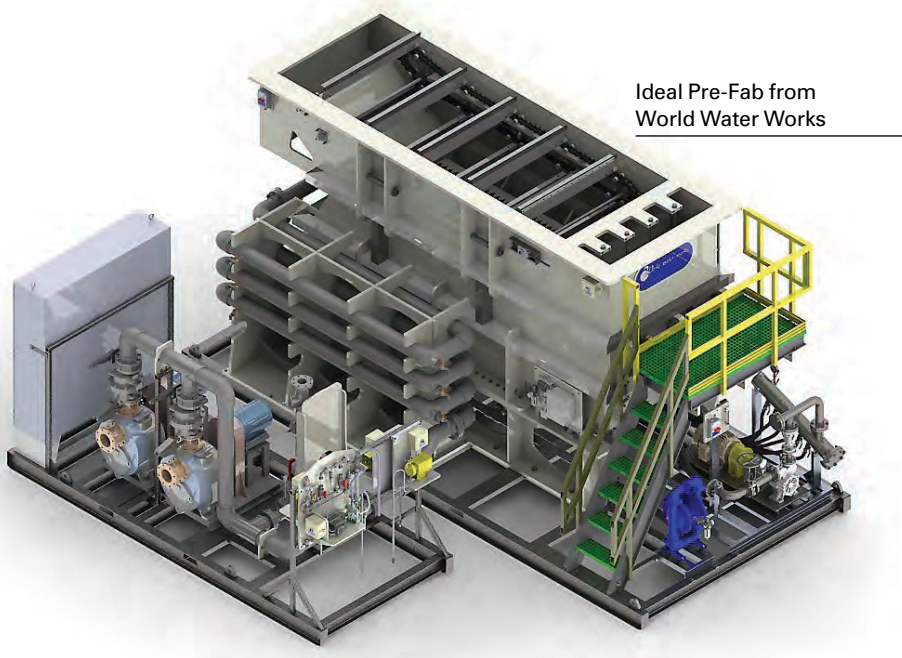
FREE INFO ON THESE PRODUCTS – RETURN FOLLOWING FORM

(continued)

wastewater:
product spotlight

Pre-engineered wastewater systems reduce installation, treatment costs

By Ed Wodalski



Ideal Pre-Fab from World Water Works

The **Ideal Pre-Fab line of pre-engineered wastewater treatment systems** from **World Water Works** (WWW) are designed for permanent industrial applications.

"For many industrial facilities, wastewater is a necessary evil, especially in the food and beverage industry," says Mark Fosshage, founder and president, World Water Works. "Clients want to minimize risks and costs associated with it as much as possible."

Because of the strength of wastewater, many municipalities either can't accept it as is or have to charge more for treatment. This typically means clients must install pretreatment systems.

"The problem is this becomes a major capital project with engineers, contractors and many vendors involved," Fosshage says. "Schedule, cost, time, risk and responsibility make this a difficult process. WWW introduced the Ideal Pre-Fab technology to minimize the problems."

Systems are shipped pre-wired and pre-plumbed, requiring basic tie-ins.

"We dramatically cut the time and on-site costs, while absorbing much of the risk," he says.

Available for equalization, dissolved air flotation, moving bed biofilm reactor and S-Select bulking sludge management technology, the skid-mounted systems have a capacity of 5 to 1,000 gpm or 7,200 to 1.4 million gpd.

Both a physical/chemical and biological process can be used to treat the concentrated wastewater. Systems can remove suspended solids (TSS), fats, oils and grease, phosphorus, ammonia, biochemical oxygen demand (BOD) and chemical oxygen demand. Each unit can be custom-engineered to meet specific needs, achieving up to 99 percent TSS and BOD removal.

"Our technologies are designed to handle a broad range of impurity concentrations," Fosshage says of the treatment systems that feature welded polypropylene rather than stainless steel or epoxy-coated steel. "In the aggressive wastewater applications we deal with, welded polypropylene gives us a lot of flexibility in how we treat the water, reducing total life cycle costs."

Wastewater enters an equalization tank and is pH conditioned. A physical/chemical separation process adds pressurized atmospheric air.

"When we release the air it comes out as a very fine microbubble, almost like the froth in a beer that captures and floats the solids," Fosshage says.

The filtered waste is skimmed off, and the clean water is removed and discharged to a municipal sewer.

"Essentially what we're trying to do is take the wastewater that is being generated and reduce it to concentrations that are equivalent to that of household sewage," he says. "That is still not clean, but compared to what comes out of some of these facilities it's about 90 percent less."

800/607-7973; www.worldwaterworks.com.

FREE INFO ON THIS PRODUCT – RETURN FOLLOWING FORM

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

- ❒ **1.** Almatec, part of PSG, a Dover company, CMX Series of pumps
- ❒ **2.** Blue-White Industries Chem-Pro M Series of diaphragm metering pumps
- ❒ **3.** Norstar Manufacturing U-Drain shop floor drain
- ❒ **4.** Singer Valve SCP-TP process controller
- ❒ **5.** Smith Flow Control Bajolock coupling
- ❒ **6.** MPV Tech MassExact slurry density inline gauge
- ❒ **7.** Keyence Corp. of America FD-Q Series of clamp-on flow sensors
- ❒ **8.** Renewable Nutrients Quick Wash process
- ❒ **9.** Franklin Miller Spiralift SR automated rock removal system
- ❒ **10.** Fluid Components International (FCI) FLT93 Series FlexSwitch
- ❒ Val-Matic Valve & Manufacturing swing check valves
- ❒ World Water Works Ideal Pre-Fab line of wastewater treatment systems

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Treatment and Filtration

By Craig Mandli

Aeration Equipment

AERATION INDUSTRIES INTERNATIONAL AIRE-O2 TRITON

Aire-O2 Triton aerator/mixer from Aeration Industries International

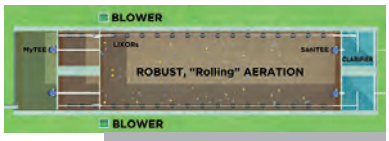
The Aire-O2 Triton process aerator/mixer from Aeration Industries International provides independent control of aeration and mixing, combined with reduced energy consumption and process flexibility. Available in many sizes, it can be used for emergency, backup or supplemental aeration for nearly any application. It provides EPA-defined fine-bubble aeration of less than 2.2 mm in size. Mixing capabilities range from 6 to 33 feet deep. Low-speed operation extends aerator life, improves mixing and ensures quiet operation. There are no aerosols, splashing or released pathogens into the air, eliminating odors. Float, bridge or wall-mount options are available. Units are available in 5 to 75 hp and worldwide voltage, phase and hertz combinations. **800/328-8287; www.aireo2.com.**

AIRMASTER AERATOR TURBO X-TREME MAGNUM

Turbo X-Treme Magnum from Airmaster Aerator

The 50 hp Turbo X-Treme Magnum from Airmaster Aerator is an efficient floating/surface aerator that can pump 12.5 mgd. It incorporates a turbo blower and a double-sided impeller to achieve high-capacity water movement. It can raise the dissolved oxygen level while providing high-capacity water movement. An optional chemical injection port adds enzymes and defoamers. **888/813-3680; www.airmasteraerator.com.**

BIO-MICROBICS ROLLSAIR



RollsAIR aeration method from Bio-Microbics

The RollsAIR from Bio-Microbics offers a cost-effective and versatile aeration method to treat larger flows. It uses the MyTEE Screen in the headworks zone, deflects insoluble solids and settles the grit. The easy maintenance of the MyTEE's Clean-in-Place swab alleviates the need for manual raking of nonbiological solids. The aeration zone uses the non-clogging LIXOR aerators to provide large amounts of oxygen and mixes the wastewater to rapidly grow aerobic bacteria. This mixing action rolls from one or both sides and plug flows through the length of the aeration zone. The submerged effluent clarifier doesn't require regular brushing of scum or algae. **800/753-3278; www.biomicrobics.com.**

EPIC INTERNATIONAL UPDRAFT AERATORS

Updraft aerators from EPIC INTERNATIONAL

EPIC INTERNATIONAL stainless steel, floating updraft aerators have an ultra-low discharge profile, which reduces overspray, protects the motor and increases performance. They use severe-duty, vertical, P-base motors, which are purpose-built for this application with extended 17-4 stainless steel shafts. Sizes range from 2 to 75 hp, with many available electrical options including various motor speeds, single-phase motors, 50 hertz motors, motor heaters, explosion-proof motors, dual-speed motors, various voltages and motor controls. They are available in 304 or 316 stainless steel construction, with modifications that include anti-erosion plates to protect basins, volute extension tubes for deeper applications and several mooring options from radial arms to swivel arms to cable. **804/798-3939; www.epicintl.com.**

KUSTERS WATER FUCHS OXYSTAR

Fuchs Oxystar aerators from Kusters Water

Fuchs Oxystar aerators from Kusters Water are suited for installation in oxidation ditches. The aerators are offered as self-aspirating or blower-assisted and can be easily installed into new or existing oxidation ditches. They are low maintenance and efficient, and eliminate surface spray. Replacement of existing brushes or vertical-style aerators is simple and cost-effective. **205/987-8976; www.kusterswater.com.**

PARKSON CORP. HIOX MESSNER AERATION PANEL

HiOx Messner Aeration Panel from Parkson Corp.

The HiOx Messner Aeration Panel from Parkson Corp. efficiently produces ultra-fine bubbles while maintaining low, sustainable back pressures. It uses thermoplastic polyurethane as a membrane material. The inherent softness and flexibility of the material allows it to produce ultra-fine bubbles in the wastewater in addition to resisting the attachment of biological and mineral deposits. When mounted very close to the basin floor, the panels can provide high efficiency and floor coverage with few components. **888/727-5766; www.parkson.com.**

THERMAL EDGE CS011

CS011 air conditioner from Thermal Edge

The CS011 enclosure air conditioner from Thermal Edge is suited to the environmental conditions of a wastewater treatment facility. It helps protect valuable electrical equipment from corrosive-prone environments and can be customized based on cooling capacity and sizing requirements. Available 2-inch louvered security or sliding filter frames are two options that use stainless steel filters to help the enclosure withstand chlorine exposure. The unit has an ambient operating temperature range of 60 to 125 degrees F and is housed in a NEMA Type 4X enclosure. **888/580-0202; www.thermal-edge.com.**

VICTAULIC AGS STAINLESS STEEL FITTINGS

Advanced Groove System (AGS) fittings from Victaulic

Stainless steel Advanced Groove System (AGS) fittings from Victaulic allow customers to create complete large-diameter grooved mechanical piping systems in stainless steel. Featuring grooved ends, the fittings are available in 90- and 45-degree elbows, tees, reducers, adapters and caps. They are joined to AGS-grooved pipe, valves and accessories with the Style W89 AGS coupling. The system delivers fast, reliable piping system installation. The wedge-shaped groove facilitates

proper coupling positioning and provides increased coupling-to-pipe engagement. The two-piece design of the coupling housing enables quick joint completion. AGS-joined pipe handles high-end loads and a high-pressure rating – up to 350 psi – with a nominal 3-1 safety factor ratio. The fittings are available in 14- to 24-inch sizes and are fabricated from Type 304/316 stainless steel. The Schedule 10S fittings conform to the pressure ratings of Style W89 AGS couplings and support hanger spacing corresponds to ASME B31.1 Power Piping Code and ASME B31.9 Building Services Piping Code. **610/559-3300; www.victaulic.com.**

Blowers

AERZEN USA GM SERIES

GM Series biogas blowers from Aerzen USA

GM Series biogas blowers from Aerzen USA are available in a variety of different sizes with intake volume flows of 35 to 1,500 icfm and positive pressure up to 15 psig. They are used for the compression of biomethane and biogas, landfill gas, and natural gas. **610/380-0244; www.aerzenusa.com.**

ALL-STAR PRODUCTS RBH SERIES


RBH Series regenerative blowers from All-Star Products

RBH Series regenerative blowers from All-Star Products reduce motor and bearing failures due to the high-temperature grease (rated 385 degrees F) and Viton seals (500 degrees F) used. This provides an additional safety margin of protection due to periodic overloads. When combined with existing Class H (358 degree F) motor insulation and straddle-mounted bearing standard design, bearing failures are virtually eliminated. Lubricating the blower bearing is possible without having to disassemble the blower. External Zerk fittings are standard on all large single-stage models and on all two-stage models. They provide flow up to 900 scfm and handle pressures up to 11.5 psi. Chemical and marine-duty blowers with washdown features are available. **800/431-8258; www.all-star-usa.com.**

EURUS BLOWER ZZ SERIES


ZZ Series blowers from Eurus Blower

ZZ Series dual splash lube blowers from Eurus Blower are ISO 2009 certified. They are drop-in replacements for Roots URAI, Sutorbilt Legends and Tuthill Competitor DSL models and come in 3-, 4- and 5-inch gear sizes. The blowers are constructed of heavy-duty cast iron and have high-end brand bearings and precision-machined gears. They can be used for any wastewater treatment plant application requiring 50 to 500 cfm and pressures to 15 psi. **630/221-8282; www.eurusblower.com.**


Centrifugal blower systems from Hoffman & Lamson, Gardner Denver Products

HOFFMAN & LAMSON CENTRIFUGAL BLOWER SYSTEM

Centrifugal blower systems from Hoffman & Lamson, Gardner Denver Products, are designed to meet specific needs. Reliable and durable centrifugal products and energy-saving controls and VFDs create custom-engineered solutions that are smart, safe and sustainable. Technology upgrades can recover an investment through energy savings in as little as one year. **724/239-1500; www.hoffmanandlamson.com.**

SULZER PUMP SOLUTIONS HST TURBOCOMPRESSOR TYPE ABS


HST Turbocompressor Type ABS from Sulzer Pump Solutions

The HST Turbocompressor Type ABS from Sulzer Pump Solutions has no mechanical wearing parts or lubricants, and therefore requires minimal maintenance. This is made possible by electronically controlled magnetic bearing technology, which levitates the integrated rotor/shaft/impeller single-piece assembly. The result is a compressor with no performance deterioration over time. The optimized drive technology controls the machine's rotational speed, achieving optimal operating efficiency and minimizing energy consumption. It can operate either as a single compressor or as a group of compressors via a number of interface choices, enabling remote or local control of both flow and pressure over the full operating range. **203/238-2700; www.sulzer.com.**


Fybroc Series 8500 pump from Met-Pro Global Pump Solutions

Desalination and Water Reuse Equipment

MET-PRO GLOBAL PUMP SOLUTIONS FYBROC SERIES 8500

The Fybroc Series 8500 all-FRP vertical turbine pump from Met-Pro Global Pump Solutions is designed specifically for use with seawater intake, brackish water reverse osmosis, brine, and various recirculation and transfer applications. Four pump sizes are available, with capacities to 1,700 gpm, heads to 70 feet per stage and working pressures to 150 psig. Beta pump installations are currently being pursued. **215/723-8155; www.mp-gps.com.**

SMITH & LOVELESS PACKAGED TREATMENT SYSTEM


Packaged treatment systems from Smith & Loveless

Scalable, packaged and containerized wastewater treatment systems from Smith & Loveless are designed to provide superior effluent quality, including the ability for water reuse. They use a variety of aerobic and biological treatment processes to handle a wide range of flows from 2,000 gpd to 5 mgd. Systems are designed to minimize operational requirements without sacrificing system performance. Containerized and mobile system options offer ease of shipping and plug-and-play operation, making them useful for small and rapid-growing municipalities, temporary work sites and other industrial applications. **800/898-9122; www.smithandloveless.com.**

SWAN ANALYTICAL USA AMU SERIES ANALYZER

The AMU Series of 1/4 DIN panel-mounted pH/ORP/temperature analyzers from SWAN Analytical can be used with inline sensors, flow cells or in situ probe-type sensors. The analyzer includes automatic or manual sensor cleaning systems, analog and digital communications options, proportional control and alarm output relays, and an input relay. It can be used in wastewater treatment

AMU Series of analyzers from SWAN Analytical

tanks, membrane treatment systems, final effluent or potable water source water and clarifiers. It is useful for reports since it records data, calibrations, events and alarms internally. This data can be accessed via PC directly from the analyzer or be captured by the SCADA system using the digital communications options. It compensates for temperature drift of its electronics or errors in the software or hardware. **847/229-1290; www.swan-analytical-usa.com.**

Campbell Manufacturing 1PS-B water filter system from Baker Water Systems

Filtration Systems

BAKER WATER SYSTEMS CAMPBELL MANUFACTURING 1PS-B

The Campbell Manufacturing 1PS-B water filter system from Baker Water Systems provides whole house and point-of-use sediment (rust particles, dirt, sand and algae) removal applications in 3/4-inch cold waterlines. This filter system can be installed in both residential and commercial environments. The clear bowl is made of industrial-strength plastic, making it easy to see when it's time to change the filter cartridge. This filter unit contains a pressure-release button for easy cartridge replacement. It comes with a standard-duty Campbell 1SS (5 micron) sediment filter cartridge, with other cartridges available. It provides flow rates of 2 through 20 gpm, maximum pressure of 125 psi, maximum temperature of 100 degrees F, a 3/4-inch inlet/outlet connection and overall length of 12 3/8 inches. **800/523-0224; www.campbellwaterfilters.com.**

BIOAIR SOLUTIONS ECOFILTER

EcoFilter line of biotrickling filters from BioAir Solutions

The EcoFilter line of biotrickling filters from BioAir Solutions is capable of removing more than 99.9 percent of H_2S and more than 95 percent of total odors from collections system and wastewater treatment plant airstreams in as little as six seconds EBRT. The units have a small footprint yet can be expanded to meet specific facility needs. They use no hazardous chemicals or consumables, incorporating EcoBase structured synthetic media to deliver consistent performance across the media bed throughout the 20-year-plus life of the system. **856/258-6969; www.bioairsolutions.com.**

EATON MCS-500

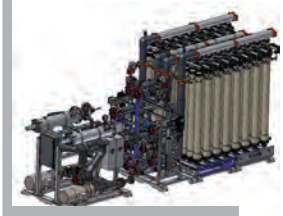
MCS-500 strainer from Eaton

The MCS-500 magnetically coupled strainer from Eaton eliminates the need for dynamic seals. It provides quick and easy access for maintenance, reduces potential leaks and requires few moving parts, while providing a long service life. It helps conserve water while protecting equipment from debris. It offers minimal purge volumes in freshwater applications, allowing utilities to save on the cost of make-up liquids, chemical treatment and heating energy. It has fast-cleaning, magnetically coupled actuation, with an optimized configuration to help improve and reduce maintenance and downtime. This actuation method eliminates the need for cover through-holes and their associated seals. **877/386-2273; www.eaton.com.**

KRUGER USA HYDROTECH DISCFILTER

Hydrotech Discfilter from Kruger USA

The Hydrotech Discfilter from Kruger USA provides high-capacity, low-energy usage and a small footprint. Woven cloth elements are installed on multiple discs, providing a large filtration area with a small footprint. It uses an oscillating backwash spray header to provide efficient media cleaning while reducing water consumption. They are offered in several models including the 1700 Series, the 2200 Series and the 2600 Series, up to 20 mgd per unit. They are ideal for effluent polishing, producing reuse water and achieving low phosphorus concentrations. They can be used for membrane pretreatment, primary wastewater filtration and CSO/SSO treatment. **919/677-8310; www.krugerusa.com.**



Aria Fit system from Pall Corporation

PALL CORPORATION ARIA FIT

The Aria Fit system from Pall Corporation is a preassembled, packaged water system that has a flexible design and small footprint and can produce high-quality water for drinking water and industrial processes, as well as meet stringent environmental discharge limits. It is tailored to specific requirements, can seamlessly add capacity for future expansion, is simple to operate and provides a reliable, high-recovery filtration solution. **516/484-3600; www.pall.com/water.**

PRO-EQUIPMENT CORNCOB-II

CORNCOB-II membrane system from Pro-Equipment

The CORNCOB-II high-velocity crossflow (HVCF) rotating disc membrane system from Pro-Equipment helps eliminate conventional pretreatment, increases the throughput flux (gpd per square foot) and reduces operating energy. Applications include treatment levels from microfiltration to reverse osmosis. It attains a high crossflow velocity across the membrane surface with minimum energy input, achieving high flux rate while accommodating high solids content. It is a meshed rotating disc system with membrane-supporting discs mounted on two or more adjacent shafts where the discs on one shaft fill the space between discs on the adjacent shaft. **262/513-8801; www.proequipment.com.**

SAF (Submerged Aerated Filter) from PWTech

PWTECH SAF (SUBMERGED AERATED FILTER)

The SAF (Submerged Aerated Filter) from PWTech is a modular, portable biological treatment system that fits in a small footprint. The CB100 can be towed by a pickup truck while the largest units can process up to 750,000 gpd with reactivation times of less than a day. It enables full BNR package plants within the footprint of a single shipping container and requires less than an hour of maintenance per week. The low sludge yield, lack of moving parts and ease of transportation and setup make it useful for disaster relief, crew camps or as a temporary solution while permanent facilities are built. **443/648-3300; www.pwtech.us.**

SCHREIBER FUZZY FILTER

The Fuzzy Filter compressible media filter for water and wastewater

treatment systems from Schreiber is very high rate, compact and modular, and is applicable to a wide variety of water and wastewater applications. Operating in an upflow design, it achieves a high rate of solids removal through the use of synthetic fiber spheres. It offers loading rates of 40-plus gpm per square foot. During the wash cycle, influent continues to enter the filter while an external blower supplies air in the bottom of the chamber to agitate the media. The media, which is retained between two perforated plates, is subjected to vigorous air scouring to free captured solids. Freed solids exit the filter by wash water passing up through the vessel. After the washing cycle, media is returned to its compressed state and filtration is resumed. **205/655-7466; www.schreiberwater.com.**

Fuzzy Filter media filter from Schreiber

Automatic filters from Spiral Water Technologies

SPIRAL WATER TECHNOLOGIES AUTOMATIC FILTER

Automatic filters from Spiral Water Technologies have high solids loading capability and can be used for the protection of spray nozzles in recycled municipal wastewater applications. They are able to remove suspended solids concentration of up to 25,000 mg/L and are capable of filtering dirty water while using a small amount of energy in a compact footprint. There is no backwash or crossflow. They allow for multiple levels of filtration and different orifice diameters to develop baseline recommendations for spray nozzle protection in municipal and industrial applications. **844/277-4725; www.spiralwater.com.**

VAF FILTRATION SYSTEMS V-SERIES

V-Series screen filter from VAF Filtration Systems

The V-Series automatic self-cleaning screen filter from VAF Filtration Systems filters suspended solids 10 micron and larger from water. Skid-mounted plug-and-play systems can include a fully integrated pump, filter, controls and valves for ease of installation. The filter's bidirectional design increases cleaning efficiencies and simplifies the self-cleaning process, eliminating pistons, electric motors, gears, limit switches and PLC controls. The self-cleaning process provides a low-flush waste, which is less than 1 percent of total flow. Its 316L stainless steel body construction provides longevity and is NSF certified. Typical applications include pump seal water, process water, washdown water and gray-water filtration. **303/425-4242; www.vafusa.com.**

Gates/Infrastructure

Sure-Grip concrete liners from Agru America

AGRU AMERICA SURE-GRIP CONCRETE LINERS

Sure-Grip concrete liners from Agru America extend the life of tanks, pipes and other structures by combining the flexibility and chemical resistance of thermoplastics with the strength of concrete. They are ideal for new cast-in-place construction, rehabilitation proj-

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ects and prefabricated elements such as concrete pipes and manholes. The V-shaped 13 mm tall Ultra Grip anchors are designed for concrete structures subject to high groundwater back pressure, with 19 mm tall anchors designed for rehabilitation of structures where a thicker layer of grout is required. They are available in a wide variety of resins (including HDPE, PP, PVDF and ECTFE), thicknesses and sheet/roll dimensions. An anti-skid surface is available for floors, a coextruded signal layer for damage detection and a self-cleaning surface for reduced sedimentation in pipe inverts. **800/373-2478; www.agruamerica.com.**

Lagoons

JACOBI CARBONS ACTIVATED CARBON

Activated carbons from Jacobi Carbons

Jacobi Carbons has developed a full range of activated carbons for municipal odor control, covering standard virgin carbons in both granular (EcoSorb CX) and pelletized (EcoSorb GXB) forms, water-washable catalytic carbon (AddSorb KC-Plus), impregnated grades (AddSorb VA3) and high H_2S capacity pellet (AddSorb OX30). Activated carbon can be used as a reliable technology for the control of various odorous compounds, including hydrogen sulfide, mercaptans, methyl sulfide compounds and other VOC at municipal wastewater treatment plants. **215/546-3900; www.jacobi.net.**

MBBRs

RASCHIG USA KONTAKT 500

KONTAKT 500 bed media from Raschig USA

KONTAKT 500 from Raschig USA is lightweight, durable and efficient submerged bed media ideal for MBBR and integrated fixed film/activated sludge systems, or for replacement of media or carrier elements in existing systems. It can be added to aeration tanks and retained by a separation device. Diffused aeration systems and/or low-energy mechanical mixers usually achieve sufficient agitation of the media. Its design allows the media to freely move throughout the bioreactor and provides a high percentage of protected surface area for microorganisms to adhere to. In turn, this allows for an increase in the overall biomass concentration, which can reduce the tank volume required for wastewater treatment. Wastewater can pass freely through the large openings of the media, which helps maintain a healthy and thin biofilm. **540/862-8426; www.raschig-usa.com.**

Cover systems from Geomembrane Technologies

MBRs

GEOMEMBRANE TECHNOLOGIES MBR COVER

Geomembrane Technologies provides structurally supported cover systems for MBR and anaerobic MBR tanks. They keep damaging debris out of the tanks and are custom-designed to allow removal of membrane cassettes. The retractable covers allow easy access for inspection and maintenance of tank internals. They are designed to prevent rainwater and debris from entering tanks, reliably capture odorous off-gases, block sunlight to control algae growth, reduce chlorine loss and disinfectant byproduct production, and disconnect and retract easily. The structurally supported covers can be installed without disrupting plant operation and can yield capital and operational cost-savings. **855/484-4630; www.gticovers.com.**

Membrane/Media Filters

WASTE WATER DEPOT AQUABAY ACTIVATED DISINFECTION UNIT

AquaBay Activated Disinfection Unit from Waste Water Depot

The AquaBay Activated Disinfection Unit from Waste Water Depot offers a high degree of disinfection. It doesn't require power or chemicals since it uses SILECTE media. As the treated wastewater moves through the unit and comes in contact with the media, microorganisms cannot resist or hold their own electrons via internal bond, creating an instantaneous disinfection. **513/732-0129; www.wastewaterdepot.com.**

Mixers

Nozzle Mix System from JDV Equipment Corporation

JDV EQUIPMENT CORPORATION NOZZLE MIX SYSTEM

The Nozzle Mix System from JDV Equipment Corporation is a dual-zone mixing system that provides uniform mixing patterns, producing even distribution and a stable environment. The system is designed with pumps installed outside the tanks to facilitate maintenance. The pumps are typically chopper pumps or pumps incorporating inline grinders that prevent fibrous materials from accumulating and causing plugging problems. The application dictates which type(s) of the many varied pump options can be used. High-velocity nozzles are mounted inside the tank and oriented to discharge in a flow pattern that completely mixes the tank contents. **973/366-6556; www.jdvequipment.com.**

SUMA AMERICA MIXER

Mixers from SUMA America

Developed for thick, fiber-laden materials like dairy manure, mixers from SUMA America are designed to stand up to tough applications in anaerobic digestion, wastewater treatment and sludge mixing. The robust designs provide reliable, long service with minimal maintenance. The use of low-pole motors and rugged gearboxes keeps the drawn current low, avoiding high heat generation in the motor windings. The drive head keeps thrust and radial loads from being transmitted to the drive bearings. **847/427-7880; www.gosuma.com.**

Turbo Mixer from Vaughan Company

VAUGHAN COMPANY TURBO MIXER

The Turbo Mixer from Vaughan Company is a propeller mixer mounted vertically inside an 18-inch elbow. It can mix a pit with only 1 foot of liquid above the floor. It incorporates an upper cutter above the propeller to stop wrapping and fibrous material binding and to protect the mechanical seal. It has been used extensively in dairy manure

mixing but also in municipal treatment plant anoxic zone mixing and in oxidation ditches. An optional add-on turntable allows it to be easily re-aimed in the pit. **888/249-2467; www.chopperpumps.com.**

Nutrient Removal

ANDRITZ SEPARATION SMX QUANTUM

SMX Quantum belt press from Andritz Separation

The SMX Quantum low-profile dewatering belt press from Andritz Separation has SmarTrax technology that lowers the costs of ownership. The Center of Competences of Arlington with collaboration of specialists of the French ANDRITZ facility developed the press, which is engineered with the operator in mind. The low-profile design provides modular flexibility, a smaller footprint, quality of construction and easy maintenance without compromising performance. **800/433-5161; www.andritz.com/separation.**

Belt filter press unit from Bright Technologies

BRIGHT TECHNOLOGIES BELT FILTER PRESS

The 1.7-meter, trailer-mounted belt filter press unit from Bright Technologies has an insulated control room with FRP walls, air conditioning, electric heat, a refrigerator, stainless steel desk, tool storage, locker, closed-circuit TV and remote operator controls. The modular design allows the room to be custom-manufactured to fit most single-drop trailers. Units are made for rapid setup, with folding conveyor and operator walkways. No special lifting equipment is required. **800/253-0532; www.brightbeltpress.com.**

HUBER TECHNOLOGY ROTAMAT RPPS STAR

Rotamat RPPS STAR from Huber Technology

The Rotamat RPPS STAR from Huber Technology addresses increased equipment protection requirements with a 1 or 2 mm pleated perforated plate geometry that significantly increases throughput and allows for a smaller footprint. This results in a reduced capital expenditure for the screen and structure. The fold provides additional stiffness critical to larger drum designs. **704/949-1010; www.huberforum.net.**

Dewatering system from In The Round Dewatering

IN THE ROUND DEWATERING HORIZONTAL DEWATERING DEVICE

The horizontal biosolids dewatering system from In The Round Dewatering has a stainless steel drum with perforated plastic tile lining. The drum is mounted on a roll-off frame for easy transport and unloading. Water trays allow containment of discharge water. An 18,000- to 25,000-gallon batch is mixed with polymer before being filtered in the rotating drum, driven by a 1/2 hp variable-speed electric motor with a heavy-duty chain and sprocket. The turning eliminates crusting and wet pockets to produce uniform, consistent results. The dewatered material dumps easily and the drum is self-cleaning. **317/539-7304; www.itrdewatering.com.**

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LAKESIDE EQUIPMENT CORPORATION CLOSED-LOOP REACTOR

Closed-loop reactor process from Lakeside Equipment Corporation

The closed-loop reactor process from Lakeside Equipment Corporation, a modified form of the extended aeration complete mix process, provides biological nutrient removal using energy-efficient designs. BNR configurations are available with in-basin designs for nitrification and denitrification, as well as external selector configuration for Bio-P and Total N removal. Process monitoring and control systems can be provided to continuously monitor and adjust the operation of the biological reactors to optimize process performance and reduce power costs. The Magna Rotor Aerator provides oxygen and mixing to the basin with reliable operation and high efficiency. The system provides a high level of oxygen transfer. **630/837-5640; www.lakeside-equipment.com.**

SUEZ NORTH AMERICA DEHYDRIS TWIST

Dehydris Twist from Suez North America

The Dehydris Twist from Suez North America is an advanced sludge dewatering process employing Bucher Unipektin hydraulic piston press technology. The automated process consists of a rotating cylinder and moving piston that continuously squeezes the sludge, allowing water to pass through flexible drainage elements. Up to 30 percent reduction in sludge bulk volume can be achieved over conventional dewatering,

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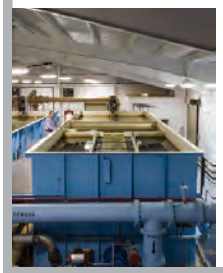
and digested sludge can be dewatered to autothermal conditions before incineration. The versatile process accepts both drinking water and wastewater sludge. **804/756-7600; www.degremont-technologies.com.**



Trident HS package water treatment plant from WesTech Engineering

WESTECH ENGINEERING TRIDENT HS

The Trident HS package water treatment plant from WesTech Engineering provides multi-barrier protection for difficult-to-treat surface water, groundwater, industrial process water and tertiary wastewater. The system consists of packaged high-rate settling, adsorption clarification, mixed-media filtration and optional UV disinfection. This allows it to handle high raw water turbidity and solids loading and achieve TOC reductions of up to 70 percent. All of these benefits can be achieved with a nearly 50 percent reduction in waste production. **801/265-1000; www.westech-inc.com.**

Oxidation Ditches

INDUSTRIAL & ENVIRONMENTAL CONCEPTS HEAT-RETENTION COVERS

Insulated heat-retention covers from Industrial & Environmental Concepts are custom-designed in R-values ranging from R-4 to R-17 to accommodate local conditions. The insulation is protected by an outer shell of high-density polyethylene. The cover reduces heat loss and effectively retains water temperature, which promotes nitrification and BOD removal. The design allows for water elevation fluctuations and removes rainwater without pumps. **952/829-0731; www.ieccovers.com.**

Heat-retention covers from Industrial & Environmental Concepts

Reverse Osmosis

KSB SALINO PRESSURE CENTER

The efficient SALINO Pressure Center from KSB combines four components into a single, compact reverse osmosis system – a high-pressure pump, energy recovery device, booster pump and electric motor. This four-in-one technology with space-saving design makes it suited for decentralized use in small- and medium-sized containerized systems. Few components keep investment and maintenance expenses low. Integrated energy recovery reduces operating costs. Plug-and-desalt design allows fast installation and operation. **804/222-1818; www.ksbusa.com.** tpo

SALINO Pressure Center from KSB

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- ❒ Kusters Water Fuchs Oxystar
- ❒ Parkson Corp. HiOx Messner Aeration Panel
- ❒ Thermal Edge CS010 enclosure air conditioner
- ❒ Victaulic Advanced Groove System (AGS) fittings

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- ❒ Pall Corporation Aria Fit system
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- ❒ PWTech SAF (Submerged Aerated Filter)
- ❒ Schreiber Fuzzy Filter compressible media filter
- ❒ Spiral Water Technologies automatic filter
- ❒ VAF Filtration Systems V-Series screen filter

Gates/Infrastructure
- ❒ Agru America Sure-Grip concrete liners

Lagoons
- ❒ Jacobi Carbons activated carbons

MBBRs
- ❒ Raschig USA KONTAKT 500 bed media

MBRs
- ❒ Geomembrane Technologies MBR cover systems

Membrane/Media Filters
- ❒ Waste Water Depot AquaBay Activated Disinfection Unit

Mixers
- ❒ JDV Equipment Corporation Nozzle Mix System
- ❒ SUMA America mixers
- ❒ Vaughan Company Turbo Mixer

Nutrient Removal
- ❒ Andritz Separation SMX Quantum belt press
- ❒ Bright Technologies belt filter press
- ❒ Huber Technology Rotamat RPPS STAR
- ❒ In The Round Dewatering horizontal dewatering device
- ❒ Lakeside Equipment Corporation closed-loop reactor process
- ❒ Suez North America Dehydris Twist dewatering process
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The wetland was created in an environmentally sensitive area near to tidal marsh estuaries, natural wetlands and the Ogeechee River. It is rich in native vegetation and is home to a wide variety of wildlife.

Still Valuable

A CONSTRUCTED WETLAND IN GEORGIA IS VALUABLE ENOUGH TO KEEP HEALTHY EVEN AFTER ITS WASTEWATER TREATMENT FUNCTION IS DISCONTINUED

By Jeff Smith

When a 200-acre wetland was constructed in 1996 as part of a 1.5 mgd aerated lagoon system in Richmond Hill, Georgia, it served as the final treatment phase before discharge from the Sterling Creek Water Reclamation Facility to the Ogeechee River.

It created a habitat for birds and wildlife and attracted visitors who wanted to watch the birds and view the wildlife. It also created educational opportunities for schools, was the object of research projects for universities and served as an example to other municipalities interested in creating a constructed wetland. It was so popular that the city designated the entire 500-acre treatment site as a wildlife sanctuary.

SUSTAINING A RESOURCE

Since then, population growth and seasonal rainfall variations have led the city to increase the plant's capacity and improve its effluent quality. Today, an Ovivo membrane bioreactor (MBR) is being installed; design capacity will increase to 4.0 mgd. But the Georgia Environmental Protection Division is requiring the new facility to discharge at the outlet of the constructed wetlands.

"With our expansion into MBR treatment, our current overland spray process and aeration pond will cease operation," says Charlie Heino, director of Public Works. "But as a testament to the original vision of a more harmonious and natural process, our wetlands will stay."

Heino, who works for Enviroworx Operations Management, the city's contract operations firm, says the constructed wetlands are an environmental asset to the Richmond Hill community, and the city doesn't want to lose that resource.

BIG FOR BIRDERS

To protect it — even though the normal water source for the wetlands will be eliminated — the wetlands will become the city's first reuse customer. Effluent will be diverted to the wetland system to maintain a water level without the overflow to the outfall. "This will keep the wetlands wet and preserve the natural habitat for the Richmond Hill community," says Heino.

The wetlands had been constructed in an environmentally sensitive area close to tidal marsh estuaries, natural wetlands and the Ogeechee River. Complementary native plant species were added, such as sweetwood reed, eastern gamagrass and a variety of sedges. Marsh grasses like goldenrod, ironwood and bladderwort were added, as were trees such as red maple, river birch, sugar berry and white ash.

Wildlife such as slider turtles, deer, cougars, bobcats, cottonmouth snakes and alligators have moved in and call the wetlands home.

ON TOUR

Plant operators conduct regular tours of the facility. Attracted by a large population of egrets and ducks and migratory birds such as geese and loons, bird-watchers make up the largest share of visitors, and their numbers increase each year. "The most noted bird-watcher to visit so far has been noted ornithologist and author David Allen Sibley," says Heino. "His book, *The Sibley Guide to Birds*, is widely regarded as perhaps the most comprehensive guide and field identification manual to North American birds."

Heino says the promotion of reuse water for applications such as golf courses, parks and industrial applications is the No. 1 priority of the Richmond Hill alternative water resource plan, but preservation of the wetland habitat will continue: "The wetlands will be kept alive with reuse water from the new plant that has been UV treated for pathogens." tpo

By Craig Mandli

Cloth media filters help boost capacity and cut backwash volume

Problem

The Portland (Indiana) Wastewater Treatment Plant had been using six granular media filter units with a design average flow of 2.35 mgd for tertiary treatment since the 1980s. The filters required daily maintenance due to valve issues, broken underdrains and loss of media. They also required excessive backwashing (about 10,000 gallons per cycle). Engineers recommended replacement with more efficient cloth media filters. With a fast-track design-build process to ensure state revolving loan funding, the project had to be completed in just over 12 months.

Solution

Aqua-Aerobic Systems installed two 10-disk **AquaDisk Cloth Media Filters.** Each disk is fitted with OptiFiber media to maximize solids removal with less backwash. Each unit is designed to handle a peak flow of 4.7 mgd; combined capacity is 9.4 mgd.

RESULT: The filters perform efficiently and cost-effectively. Either one can handle the capacity of the six old filters, providing flexibility for routine maintenance and growth. Backwash volume was reduced 97 percent to about 300 gallons. The outside-in filtering makes the disks easier to clean, and energy consumption has dropped because less water is being pumped back through the system. **815/654-2501; www.aqua-aerobic.com.**

Advanced SBR system provides safe, treated effluent for irrigation

Problem

The 1980s-era extended aeration wastewater treatment facilities for the Good Samaritan Community in Kissimmee, Florida, needed frequent repairs, consumed significant energy and had reached end of life. The budget was tight, and space was limited.

Solution

AWT Technologies custom-engineered an **advanced sequencing batch reactor** (SBR) incorporating a bioselector zone and biological nutrient removal. The system requires minimal land, equipment and instrumentation and is fully automated with a SCADA system for remote monitoring. A highly efficient fine-bubble membrane aeration system minimizes air requirements, blower size and energy usage.

RESULT: The new system achieves high levels of BOD, TSS, nitrogen and phosphorus removal without chemicals, producing effluent suitable for landscape irrigation in the community. Power use is 50 percent less than with the old system, and routine maintenance has been reduced significantly. **403/453-2298; www.awt-technologies.com.**

Bioaugmentation helps boost denitrification and bring slaughterhouse effluent into compliance

Problem

A slaughterhouse in South Korea needed to improve its wastewater treatment and increase capacity to accommodate growth in production. Expansion would be costly and take several months; the company needed a cheaper, faster solution.

Solution

Smart Bio Korea implemented a plan dosing **BiOWiSH Aqua FOG** from **BiOWiSH Technologies,** along with aerated reactor mixed liquor suspended solids into upstream chambers to boost denitrification.

RESULT: Within three weeks the plant had achieved a stable effluent total nitrogen value of less than 20 mg/L. BOD, COD, TSS and total phosphorus, all of which had been above permit limits, were reduced by more than 75 percent and were in compliance. Plant operators say the bioaugmentation program greatly improved plant stability. **312/572-6700; www.biowishtechnologies.com.**

Treatment system helps catering company meet discharge requirements

Problem

A large West Coast in-flight catering and commissary terminal needed a more advanced wastewater treatment system to replace a system using dissolved air flotation followed by activated sludge treatment. The company needed an expanded process that allowed reuse of water within the facility.

Solution

Clean Water Technology replaced the DAF with a **GEM System** for TSS and FOG removal. The company then installed a compact membrane bioreactor system for BOD removal. A skid-mounted reverse osmosis unit was installed for total dissolved solids reduction.

RESULT: The system doubled capacity, allowing the facility to upgrade from primary to tertiary treatment within the same footprint. Water reuse saved $300,000 a year in cooling-water costs. BOD was reduced from 1,500 to 3,000 mg/L to less than 1 mg/L, TSS from 1,000 to 2,500 mg/L to no measurable amount, and TDS from 1,000 mg/L to less than 82 mg/L. **310/380-4648; www.cleanwatertech.com.**

Treatment plant achieves bonus from aeration system upgrade

Problem

The City of Newark, Ohio, sought relief from excessive electric bills through significant updates at its Licking River Wastewater Treatment Plant. Funding included a gridSMART grant from AEP Ohio that could be used to cover energy-saving expenditures if the city could show a seven-year return on investment.

Solution

The original intention was to replace two aging blowers with new, high-efficiency units. However, studies demonstrated more could be saved in the long run with **FlexAir Mini-Panel bubble diffusers** from **Environmental Dynamics International** in the three aeration basins, waste activated sludge tanks and a post-aeration tank in combination with the new blowers.

RESULT: Savings from the blower replacement were projected at $168,000 per year. The facility also saw more operating cost savings, and the boost in efficiency enabled the plant to treat all its effluent in two of three basins. This freed up the third basin to treat trucked-in industrial waste and septage, generating revenue. **877/334-2478; www.wastewater.com.**

System removes ammonia in cold temperatures in same lagoon footprint

Problem

A residential development on the south side of Cape Girardeau, Missouri, needed a cost-effective way to meet new ammonia effluent requirements of 1.4 mg/L in summer and 2.8 mg/L in winter in a non-aerated, three-cell lagoon system.

Solution

Development leaders selected the **NitrOx System** from **Triplepoint Water Technologies** to ensure year-round lagoon ammonia removal. The system required no new land and guaranteed controlled results, even in winter. Two 10- by 10-foot tanks were installed sidestream between the secondary and polishing cell, allowing the lagoon system to provide BOD treatment to 20 to 30 mg/L, at which point bacteria begins to nitrify. Influent water from the aerated cell is pumped into the first tank of the reactor. Sensors and a digital controller optimize temperature during the coldest winter months, and an insulated cover retains heat. High-surface-area media are mixed and aerated via a full-floor grid to foster growth of nitrifying bacteria. After eight total hours of retention time, effluent is released to the polishing cell.

RESULT: Ammonia limits were met, avoiding a mechanical plant upgrade and preserving the easy operation and low maintenance of the lagoon. The system saved more than $100,000 in capital costs. **800/654-9307; www.tpenv.com.**

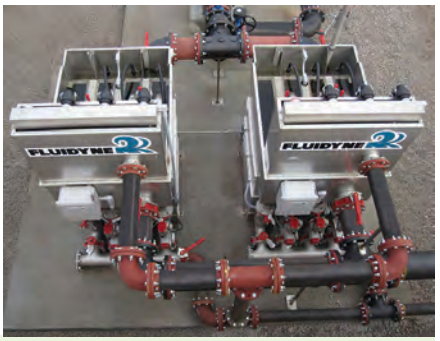
Cloth media filter helps development meet reuse requirements

Problem

A coastal development in eastern North Carolina had aging traveling bridge sand filters that required extensive and sometimes costly maintenance. The plant was also upgrading from chlorination to UV disinfection, requiring consistent low levels of TSS.

Solution

The operating company, regulators and engineers agreed that the **Fluidyne Fixed Plate (FFP) cloth media filter system** would provide reuse-quality treatment along with key mechanical and operational advantages. The systems use open-close pneumatic valves and gravity head to control filtering and backwashing. No pumps are needed to create backwash flow. Media panels can remain in place at all times instead of being rotated past a stationary spray or suction manifold. This eliminates moving parts and wear, and allows the filter elements to be square or rectangular instead of circular, easing manufacture, installation, removal and maintenance, while maximizing treatment area. Media elements can be independently isolated and removed from the flow stream without discontinuing or diverting flow.



RESULT: The system now produces reuse-quality effluent in a tertiary treatment system that is easy to use and maintain and inexpensive to operate. **319/266-9967; www.fluidynecorp.com.**

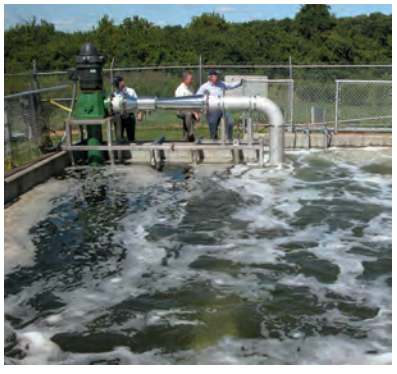
Backup aeration system provides storm coverage

Problem

The LeSourdsville Wastewater Treatment Plant in Butler County, Ohio, must meet dissolved oxygen limits at the outfall on the Miami River. During normal operation, oxygen is added in a cascade basin. However, during storms the river can rise to levels that flood the cascade basin, rendering it useless.

Solution

The plant installed a modular drop-in system incorporating a pump and **AirJection technology** from **Mazzei Injector Company,** consisting of a venturi injector and an MTM nozzle manifold. The system eliminated the need for blowers and diffusers and the space and maintenance they require. The aeration system was designed to raise dissolved oxygen at the outfall from 3.5 to 5.6 mg/L under storm flows up to 26 mgd.



RESULT: The quiet, efficient, reliable aeration system allows the plant to meet outfall dissolved oxygen requirements. After one storm that flooded the cascade, the system maintained dissolved oxygen at 5.6 mg/L at flows up to 31 mgd, 20 percent higher than the system's peak design flow. **661/363-6500; www.mazzei.net.**

(continued)

Dewatering improves solids handling

Problem

The 8 mgd Bluebonnet Water Supply Corp. Water Treatment Plant in Temple, Texas, generated up to 106 million gallons per year of spent backwash water and clarifier sludge, stored in three concrete lagoons. Solids never dried sufficiently to permit effective removal. Paying a hauler to remove the sludge was a major expense.

Solution

The facility added three modified sludge collection basins with vacuum transport units, two lift stations, the **Poly-Mate polymer system** and **Sludge-Mate dewatering containers** from **Flo Trend Systems.** Material now settles in the basins to a depth of no more than 1 foot before the sludge is transferred. When the sludge collection system activates, 19,600 pounds of solids flow by gravity to the first lift station, where the material is dewatered to 15 percent solids cake. Filtrate drains to the second lift station and is returned to the headworks.

RESULT: Chief of Operations Damon Boniface and staff stay ahead of sludge production and control disposal costs. **713/699-0152; www.flotrend.com.**

Modularity brings high-quality sewage treatment to RV park

Problem

Bay Meadows, a year-round RV park on Lake Ontario, relied on subsurface treatment. However, stricter regulations and lack of space for subsurface treatment expansion called for a more sophisticated treatment solution. The park lies next to Pleasant Bay, a lagoon separated from Lake Ontario by a narrow strip of land. That barrier keeps the waters from mixing with Lake Ontario, and without that dilution Pleasant Bay cannot assimilate the park's discharge.

Solution

Gunnell Engineering recommended a self-contained **membrane bioreactor (MBR) system** from **Newterra,** able to meet permit limits of 5.0 mg/L TSS and CBOD. Within 20 weeks, the company engineered, built, installed and commissioned a modular, self-contained system that treats 22,000 gpd.

RESULT: Minimal site work was required for the factory-built system. It arrived pre-plumbed, pre-wired and fully tested. It was installed and has worked without incident. **800/420-4056; www.newterra.com.**

Replacement of aerobic digestion system stops air and nutrient pollution

Problem

The aerobic digestion system in Fort Pierce, Florida, received regular complaints of odors and had high energy costs, greenhouse gas emissions and nutrient pollution. The city sought a solution to protect its coastal environment and robust tourism industry.

Solution

In 2014, **NuTerra** installed a **CleanB system and centrifuge** from **BCR Environmental Corporation** that wastes directly from the clarifier. Eliminating wasting to a DAF unit for thickening and holding sludge in an aerobic holding tank before dewatering and landfilling reduces energy usage, greenhouse gas emissions and nutrient pollution and eliminates odors.

RESULT: The system saved $242,000 in annual biosolids treatment and disposition, and $54,000 in annual energy costs ($37.02 per dry ton). It eliminated a 75 hp aerobic digestion blower, reduced polymer usage by 40 percent and reduced nutrients and biosolids returned via filtrate by 70 percent. Improved nutrient capture in biosolids (182 percent increase in nitrogen and 476 percent increase in phosphorus) created a more valuable soil amendment. Drier cake (21 percent wet weight reduction) resulted in 52 fewer truckloads hauled annually. **904/819-9170; www.nuterra.green.**

Filtration system helps municipality save potable water

Problem

A 100 mgd wastewater treatment in the Midwest has a large demand (nearly 3 mgd) for service water with low suspended solids for equipment cleaning, cooling of biogas-fueled engine/generator sets, and other purposes.

Solution

An automatic self-cleaning **screen filtration system** provided by **Orival Water Filters** now supplies reuse water for in-plant needs, saving enough potable water to supply over 7,000 homes. Operating at up to 2,000 gpm, the system controls initiate a cleaning cycle when a 7 psi loss across the filtration system is reached. A manually set timer in the control panel can also initiate the cleaning cycle. The screens are cleaned by drawing water back through the screen at high velocity.

RESULT: Each filter takes less than 15 seconds to clean without interrupting the filtration process. Less than 1 percent of the flow is sent to a drain. **201/568-3311; www.orival.com.**

Product helps city decrease pond sludge

Problem

Sludge in a pond in an Illinois city was taking up valuable treatment capacity and causing odors. Sludge had accumulated until part of the sludge blanket was exposed to the surface, allowing odors to escape. State regulators were also demanding improvements because BOD5 test results were too high.

Solution

The city de-sludged its lagoons with **BIO ENERGIZER** from **Probiotic Solutions,** a product designed to improve odor control, increase digester capacity, enhance sludge destruction and improve settleability and decants.

RESULT: After 14 months of treatment, 70 percent of the sludge blanket was removed. Before treatment, sludge depth averaged 41 inches. After treatment, the average depth dropped to 12 inches. The results satisfied the Illinois EPA. **800/961-1220; www.probiotic.com.**

Filter nozzle replacement increases filtration capacity

Problem

The Quail Creek Water Treatment Plant in Hurricane, Utah, had 12 twin-cell gravity filters in need of new media. Four of the filters also needed new filter nozzles. There was also an interest in increasing filtration capacity to support population growth, but without having to source complete new filter underdrains.

Solution

Orthos Liquid Systems provided a custom **filter nozzle** configuration that incorporated into the existing filter underdrains to accommodate higher filtration rates and ensure good performance on air scour and backwash cycles. Based on trials, the plant decided to replace all the nozzles in the 12 filters.

RESULT: The contractor removed the media and installed the new filter nozzles a couple weeks ahead of schedule. The project has prolonged the filtration cycle, reduced backwash and air scour cycle times, and increased the filtration rate by 20 percent. **843/987-7200; www.orthosnozzles.com.**

Grease-busting system prevents grease buildup, solves odor issue

Problem

The Mill Creek pumping station operated by the Jeffersonville (Indiana) Wastewater Department created an odor problem. The 30-foot cube-shaped tank accumulated rags and grease up to 2.5 feet thick, interfering

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with pump floats. Vacuuming was subcontracted at a considerable cost.

Solution

The department purchased a **Pulsed Hydraulics grease-busting system.** Upon startup, the odor was gone. "We run it 24/7, pulsing between once every 30 seconds to once a minute," says Josh Boggs, the department's odor control specialist. "We've had the compressor serviced once, but the only other maintenance item has been the regular three-month air filter inspection and cleaning, and I think we've replaced the filter once."

RESULT: "The system solved the grease blanket buildup, which was the No. 1 priority, and knocked out the odor problems as well," says Boggs. **800/641-1726; www.phiwater.com.**

Cheese manufacturer uses biological treatment to reduce odor, BOD

Problem

A Midwest cheese manufacturer with a 3-million-gallon lined lagoon discharged whey onto a meadow. Typically the lagoon established an active green algae population during summer. During winter, the anaerobic whey wastewater was discharged directly into the emptied lagoon system, which retained all whey discharge until February/March. The collection tank in the factory had fluctuating BOD loadings from 3,860 to 10,600. The pH range in the collection tank was from 9.8 to 11.6. At this pH range, no microbiology was present. The periodic discharge from the tank into the lagoon was up to 6,200 gpd. In winter, the lagoon was ice-covered. In spring, aeration started up, dark green algae grew and severe odor occurred. Company owners sought to eliminate odor and reduce BOD.

Solution

The company installed the **TVT-BIO 32 System** from **TVT US Corporation** in the primary treatment lagoon in February 2014. In April bioaugmentation was added after the lagoon temperature increased to 56 degrees F.

RESULT: After 10 months, results indicated increased microbial diversity. Dominant blue-greens (cyanobacteria) were replaced by aerobic microlife forms (bacteria, protists, microcrustaceans). Odor was nearly eliminated. BOD loading was reduced by 73 percent while sludge was reduced within the lagoon system by 50 percent. The pH was reduced to 7.7. There was also significant biological nutrient removal. **585/264-1058; www.tvt-bio.com.**

Packaged wastewater treatment plant handles increased flow

Problem

The 30-year-old packaged wastewater treatment plant in Dillard, Georgia, needed an upgrade to handle growth and address new effluent regulations. The mountainous site offered minimal space for expansion and called for a special design. The terrain also posed challenges for equipment delivery. Off-loading of trucks, laydown space and the sequence of system installation required precise planning and staging.

Solution

Engineers at **RWL Water** designed a 200,000 gpd extended aeration **packaged plant** to treat the city's domestic wastewater. The plant uses a triple-wide tank system to fit the site. The existing plant was converted to a sludge-holding chamber. New mechanical equipment was assembled inside this tank to complete the conversion. The extended aeration system comprises three trains in a parallel, attached configuration.

RESULT: RWL Water created a cost-effective design that works within the space limitations and uses the existing plant as a component. **800/879-3677; www.rwlwater.com.**

Reflective UV system offers nearly maintenance-free operation

Problem

Decentralized treatment systems are increasingly replacing septic systems on Cape Cod, and UV disinfection was needed for a compact 24,000 gpd Aquapoint Bioclere system.

Solution

King's Landing in Brewster, Massachusetts, installed two **UV Pure Technologies Hallett 30 systems** to provide final disinfection. Cross-fire technology reflects UV energy to provide a high UV dose, even at UV transmittance as low as 65 percent, enabling the system to reduce total coliform to less than 200 MPN/100 mL. The systems are connected to the plant's PLC controls, enabling remote monitoring, alarm notifications and data collection.

RESULT: The systems are nearly maintenance-free. Two high-output UV Pure lamps are mounted in air rather than in a quartz sleeve. This design prevents overheating of the lamps and makes lamp changes fast and simple, since the unit does not need to be drained. Each system has an automatic, mechanical wiper that prevents fouling of the quartz sleeve and ensures maximum light intensity, reducing manual cleaning and nuisance alarms due to fouling. **888/407-9997; www.uvpure.com.**

Blowers help wastewater treatment facility save costs

Problem

In 2013, the City of Danbury, Connecticut, upgraded its water pollution control plant to meet a nitrogen limit. The plant treats 9 mgd of wastewater and 12 million gallons per year of septage for a population of 64,000.

Solution

As part of the upgrade, the **Spencer Turbine Company** provided its **AyrJet Series** high-speed, high-efficiency turbo **blowers** with magnetic bearing technology. As the blower shaft is levitated and centered at both ends in a permanent magnetic field, there is no contact and the motor can operate at a very high speed without oil or grease. Continuous monitoring and adjustment of the magnetic fields to maintain the shaft's centered position ensures protection from catastrophic failure.

RESULT: The high-speed magnetic bearing technology reduces energy cost by 10 to 40 percent. The upgraded plant meets the nitrogen limit in the general permit, while saving up to $200 per day in energy costs. **800/232-4321; www.spencerturbine.com.**

Emergency lagoon treatment reduces ammonia, BOD and hydrogen sulfide

Problem

A U.S. poultry processing plant was in danger of violating its discharge permit as its 3.5-million-gallon aerated lagoon could not maintain sufficient dissolved oxygen and could not meet ammonia and BOD discharge limits. These conditions were caused by high seasonal temperatures and elevated BOD loading. The oxygen-depleted lagoon also generated hydrogen sulfide odors. The plant faced fines, a temporary shutdown and lost revenue.

Solution

USP Technologies provided a turnkey, rapid-response solution that included 50 percent hydrogen peroxide, a bulk storage system, a feed skid and field support within 72 hours from the initial phone call. After one day of dosing hydrogen peroxide, lagoon DO levels increased and H_2S odors were eliminated.

RESULT: By week's end, DO levels were in the 2 to 3 mg/L target range and ammonia and BOD levels were trending downward. The plant was out of danger of discharge violation. **877/346-4262; www.usptechnologies.com.** tpo

industry news

Enviro-Care relocates headquarters

Enviro-Care relocated its headquarters to 1570 St. Paul Ave., Gurnee, Illinois. The company, which supplies screening and solids/grit management equipment, had been based in Rockford for 20 years.

Schneider Electric, Applied Instrument form alliance

Schneider Electric formed a strategic alliance with Applied Instrument Technologies, provider of process analyzers for online and real-time process analysis. The partnership enables both companies to provide process automation products to their respective customer base.

Automation Products names director of sales

Automation Products Group named Josh Waters director of sales for developing markets. Based in Utah, he will be responsible for outreach and generating new business to drive brand awareness.

SENSIT receives ATEX compliance certification

SENSIT Technologies' HXG-2d combustible-gas leak detector received ATEX compliance certification, enabling the product to be used in Europe.

Tank Connection names president

Tank Connection named Vince Horton president of the company that became an employee-owned business earlier this year. Horton, former vice president of sales, replaces Bill Neighbors, who remains a member of the board of directors. Horton is a founding partner of the company and has served as an executive staff adviser.

Spirax Sarco releases condensate recovery brochure

Spirax Sarco released a 19-page condensate recovery brochure that includes condensate mechanical fluid pumps, automatic pump traps, electric condensate pumps, pump packages and flash recovery vessels. The publication is available as a PDF at www.spiraxsarco.com/global/us.

Global Pump, Mersino launch used-equipment sites

Global Pump and Mersino, sales distributor for Global Pump, launched used-equipment sites. Availability, model, age, hours and cost of the equipment can be accessed at www.globalpump.com and www.mersino.com. tpo

people/awards

Mantech, based in Guelph, Ontario, received the Wastewater Technology Award at the 2015 Water's Next award program. The award was given for its PeCOD unit. Water's Next celebrates innovators in the water industry at the individual and company level by recognizing leading technology in water resources, conveyance, drinking water and wastewater.

Brad Ault was named the superintendent of water and wastewater treatment for the Village of Yellow Springs, Ohio. Ault, who joined the village in 2007 as a wastewater treatment plant operator, holds Ohio Water Treatment I and Wastewater Treatment II operator's licenses.

Sharon Gillum was named the Water System Operator of the Year by the Louisiana Rural Water Association.

SUEZ Environnement North America subsidiary **United Water** received an award for innovation from the National Council for Public-Private Partnerships for its wastewater operation in Nassau County, New York.

The **City of Braham** received a Minnesota Pollution Control Agency Facility Operational Award for 2015, marking its 11th certification of commendation received since 1993 and the seventh in a row for operator **Mike Piha** from PeopleService.

Matthew J. Worth was named the director of public works for the City of Batavia, New York. He supervises about 50 workers in the bureaus of engineering, inspection, water/wastewater and maintenance.

William Norton was named to lead the wastewater treatment facilities in Fairfield, Connecticut. He had been water pollution control commission administrator in West Haven.

The **City of Windsor** was recognized for the best-tasting water in Ontario by the Ontario Water Works Association at its annual water conference and trade show.

The Russellville (Alabama) Wastewater Treatment Plant was renamed the Radford Joe Murray Wastewater Treatment Plant in honor of **Radford "Joe" Murray,** plant manager for 33 years who died last year.

The **City of Richmond** was recognized by the Virginia Department of Heath with the 2014 Gold Water Treatment Plant Performance Award for excellence in clarification, filtration and backwash.

The Hamilton (Illinois) Water and Sewer Department named **Aron Metternich** superintendent after the retirement of longtime superintendent **Tim Schilson.**

The Georgia Association of Water Professionals presented the **Macon Water Authority** with the best-tasting water honor. Macon's **Dale Moorehead** received the Operator's Meritorious Service Award. **Darryl Macy,** manager of sewer conveyance and water distribution, received the Arthur Sidney Bedell Award for service to the Water Environment Federation. **Jocelyn Hunt,** assistant manager of water operations, was inducted into the 5-S Society. The authority received the U.S. President's Volunteer Service Award.

Clayton County Water Authority's **Shoal Creek Water Reclamation Facility** was named Wastewater Plant of the Year in the category for advanced treatment, 3 to 5 mgd, by the Georgia Association of Water Professionals. **Jim Hill,** plant supervisor at Shoal Creek, was named Top Wastewater Operator for District 3.

More than one-third (127) of **Washington's wastewater treatment plants** received 2014 Outstanding Performance Awards from the state Department of Ecology for perfect permit compliance.

events

Nov. 1
AWWA Mexico Section Annual Conference, Chihuahua. Visit www.awwamexico.com.

Nov. 4
Missouri Water Environment Association Fall Technical Conference, Stoney Creek Inn, Columbia. Visit www.mwea.org.

Nov. 4-5
Alabama Water Environment Association Water and Wastewater Technology Conference, The Hotel at Auburn University, Auburn. Visit www.awea-al.com.

Nov. 4-6
Nebraska Water Environment Association Fall Conference, Younes Convention Center, Kearney. Visit www.ne-wea.org.

Nov. 9-11
European Biosolids and Organic Resources Conference, Seminar and Exhibition, Manchester Town Hall, Albert Square, Manchester, England. Visit www.european-biosolids.com.

Nov. 11-12
Quebec Section AWWA Annual Conference, Riviere-du-Loup. Visit www.reseau-environnement.com.

Nov. 15-18
North Carolina Section AWWA Annual Conference, Raleigh Convention Center. Visit www.ncsafewater.org.

Nov. 15-19
AWWA 2015 Water Quality Technology Conference, The Grand America Hotel, Salt Lake City, Utah. Visit www.awwa.org.

Nov. 15-19
International Water Conference, Hilton in the Walt Disney World Resort, Orlando, Florida. Visit www.eswp.com.

Nov. 17-18
Water 2015, Radisson Blu Portman, London, England. Visit www.marketforce.eu.com.

Nov. 18-20
Indiana Water Environment Association Annual Conference, The Westin, Indianapolis. Visit www.indianawea.org.

Nov. 29-Dec. 3
Florida Section AWWA Annual Conference, Renaissance Orlando at SeaWorld. Visit www.fsawwa.org.

The **Bergen County (New Jersey) Utilities Authority's** Little Ferry Water Pollution Control Facility and Edgewater Water Pollution Control Facility received the Gold Peak Performance Award for 2014 from the National Association of Clean Water Agencies.

California American Water hired **Chris Cook** as an assistant engineering manager in Monterey.

Public Water Supply District No. 6 of Clay County, Missouri, hired **Alliance Water Resources** to provide operation and management services.

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

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