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APRIL 2015

**Building the Team:  
From worker to leader  
in Vicksburg, Miss.**

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# Powered by *Passion*

**SUSTAINABILITY DIRECTOR DUYEN TRAN:  
'GREEN BEFORE GREEN WAS COOL'**

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Effluent heating/cooling  
in Lincoln, Neb.**

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Good-neighbor  
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CH2M HILL

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Always

Duyen Tran  
CH2M HILL's Director of  
Sustainable Operations  
Fayetteville, Ark.

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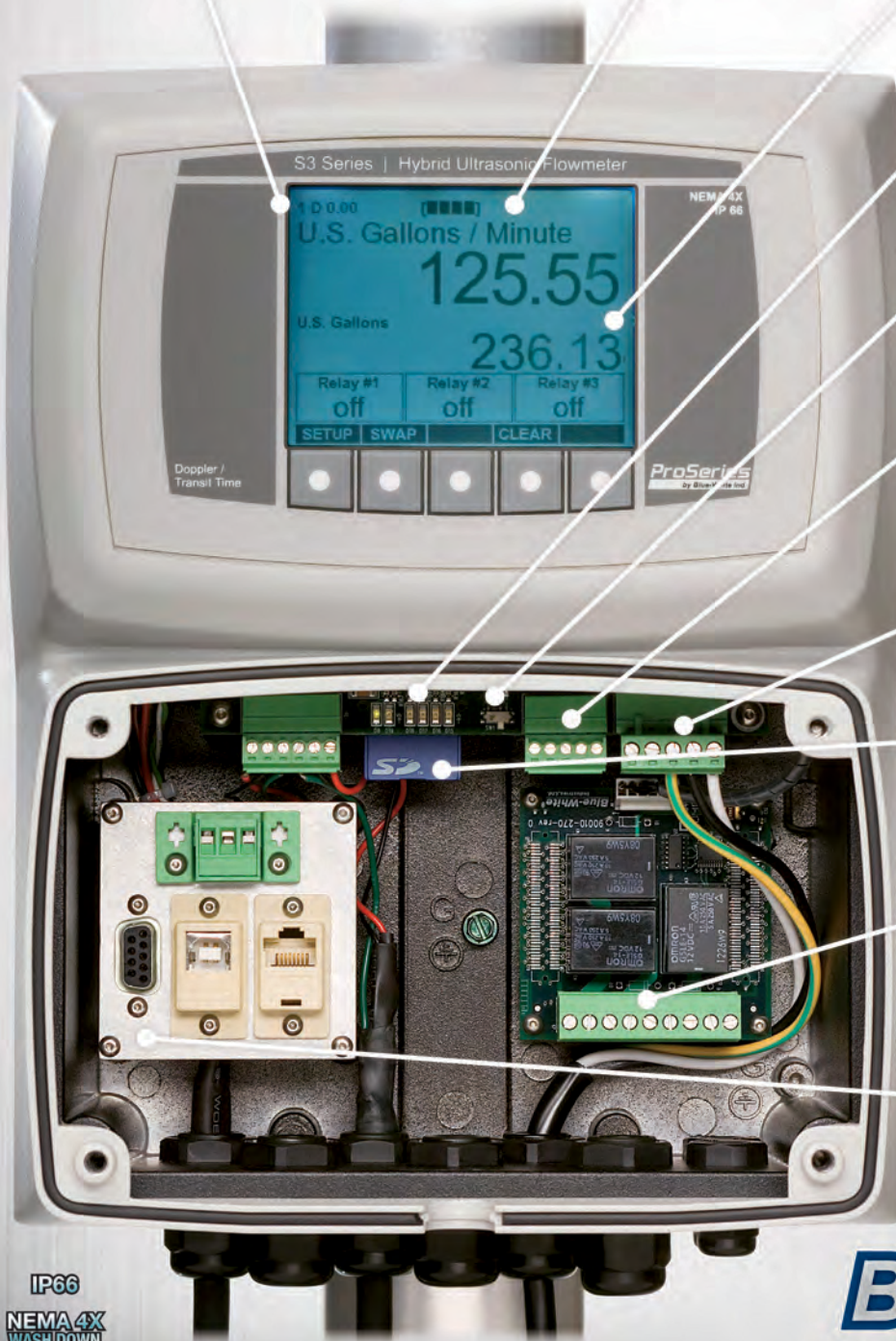
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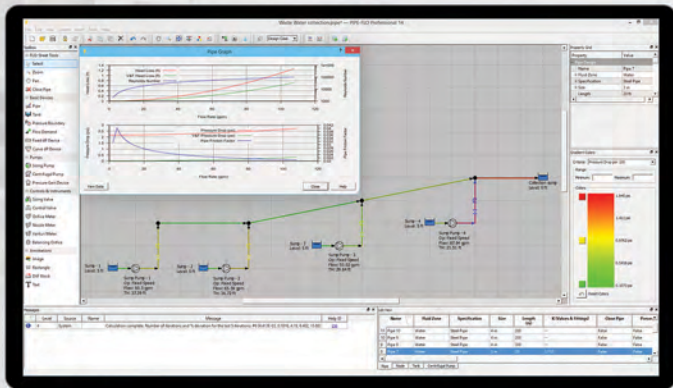
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### on the cover

Vietnamese immigrant Duyen Tran has spent most of her career with CH2M HILL, working for the Fayetteville (Ark.) Wastewater Division. Last year she became CH2M HILL's director of sustainable operations. (Photography by Stephen B. Thornton)

## top performers:

### WASTEWATER: PLANT Page 12

#### Excellence Downriver

An award-winning Michigan plant succeeds with hard work and strong community ties despite significant wet-weather flow, staff reductions and ongoing construction.

By Trude Witham

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#### Making the Most of Wastes

GreenWhey Energy stands on the leading edge of an industry niche for turning dairying and other food byproducts into electricity and high-quality biosolids.

By Erik Gunn

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#### The Long View

A treatment plant upgrade gives Wisconsin's Ho-Chunk Nation ample capacity for decades of growth and sends high-quality effluent to the Black River.

By Ted J. Rulseh

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#### Powered by Passion

Duyen Tran has come a long way from South Vietnam, to project manager in an Arkansas city, to sustainability director for a major engineering consulting firm.

By Jack Powell

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#### Taking More From the Water

As clean-water plants look to resource recovery, technology innovation addresses greater process efficiency and energy production from the solids side.

By Ted J. Rulseh, Editor

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An east Texas utility district underwrites a spray park that provides heat relief for kids, instills community pride and creates openings to talk about water conservation.

By Craig Mandli

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Tree plantings, odor-control systems, noise abatement and new lighting strategies help a clean-water plant adapt to subdivisions growing up next door.

By Jeff Smith

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#### Once Is Good, Twice Is Better

Keeping a tradition of sustainability, a clean-water plant in Lincoln supplies effluent to heat and cool an Innovation Campus at the University of Nebraska.

By Doug Day

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#### From Worker to Leader

Mark Engdahl took time to learn from an experienced team as part of what can be a

challenging transition to the management ranks.

By Ann Stawski

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#### Two-Pronged Solution

The Memthane anaerobic membrane bioreactor combines digestion with ultrafiltration to enable efficient biogas production from industrial wastewaters.

By Ted J. Rulseh

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A German-engineered solids-processing technology yields Exceptional Quality biosolids pellets in a smaller footprint and at lower cost than composting.

By Scottie Dayton

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Nebraska operators reach halfway across the country for a partnership to deliver high-quality online training that helps participants pass licensing exams.

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Product Spotlight – Water: UV systems disinfect water in large-flow treatment plants

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Water Plant: Award of Excellence in South Blount County, Tennessee

Wastewater Agency: Peak Performance Platinum in Amarillo, Texas

Wastewater Operator: Josh Willison, Missouri Young Professional of the Year

» How We Do It: Brewery wastewater pretreatment in Blanco, Texas

» Hearts and Minds: Brewing up effluent lager

» Building the Team: Managing change in the Town of Hillsborough, North Carolina

» Sustainable Operations: Wide-spectrum efficiency upgrades in Puerto Rico

» In My Words: Training operators in Virginia's prison system

» PlantScapes: Digester mural painted by in-house artist in Port Orchard, Washington

» Technology Deep Dive: Tecon biogas storage system, Inflico Degremont



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let's be clear

## Taking More From the Water

AS CLEAN-WATER PLANTS LOOK TO RESOURCE RECOVERY, TECHNOLOGY INNOVATION ADDRESSES GREATER PROCESS EFFICIENCY AND ENERGY PRODUCTION FROM THE SOLIDS SIDE

By Ted J. Rulseh, Editor

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It is said that outlaw Willie Sutton, when asked why he robbed banks, replied, "Because that's where they keep the money."



When it comes to recovering resources in clean-water plants, the money — and the energy — appear to be mostly in the solids. Water of course is the essential resource being recovered, and in many applications it has commercial value for reuse. But increasingly it's the solids side that gets attention from the industry's innovators.

In particular, facility owners and operators see biogas (digester methane) as an essential resource that can help them on the path toward more energy self-sufficiency, net zero energy or even net positive energy production.

This issue of *TPO* highlights one technology promoted by Pentair as increasing biogas yield by up to

25 percent over traditional anaerobic digestion (see page 38). Called the Memthane anaerobic membrane bioreactor, it combines an enhanced form of anaerobic digestion with ultrafiltration membrane technology.

### INNOVATIONS ON DISPLAY

Other advanced treatment processes that emphasize resource recovery were on display at the 2014 WEFTEC conference last fall in New Orleans. Here's a quick look at a few of them.

- The SolidStream process from Cambi, based in Norway, reduces biosolids volume by degrading extracellular polymeric substances (EPS), which bind up water. The EPS material is broken down at high temperature and pressure, combined with pressure-drop disintegration. The heated solids are then centrifuged and further dried, yielding a Class A product at 60 to 75 percent solids. Heat recovery and increased biogas production can exceed the energy demand of the process, according to the manufacturer.
- Ostara offers the WASSTRIP process designed to reduce biosolids production by 20 percent, increase cake solids content and reduce total biosolids phos-



phorus content by 10 percent, while reducing struvite formation in digesters. The process optimizes efficiency in plants with biological phosphorus removal by releasing phosphorus and magnesium before they reach the digesters. The nutrients are diverted from the solids stream and into the thickening liquor and combined with the dewatering liquor so they can be recovered in the company's Pearl reactor, which yields a marketable fertilizer.

- The TurboTec continuous thermal hydrolysis process from Sustec, based in the Netherlands, is designed to enhance biogas production in anaerobic digestion. The continuous process treats biomass at high pressure and temperature, ensuring sterilization of the final Class A biosolids cake. Steam demand for heating is limited by efficient heat recovery with heat exchangers. Biomass hydrolysis produces up to 35 percent more biogas than in conventional digestion, while dewatering yields material at 30 percent dry solids.

In particular, facility owners and operators see biogas (digester methane) as an essential resource that can help them on the path toward more energy self-sufficiency, net zero energy or even net positive energy production.

#### THINKING FORWARD

Of course, technologies like these aren't like Tinkertoys that any facility can deploy on a whim. They do deserve consideration as clean-water plants, one after another, surpass their useful life and come due for significant upgrades. Resource recovery is the direction the industry is heading, and clean renewable energy in the form of biogas gains importance as agencies aim to join in the prevention of global climate change.

Are you on board? Short of a wholesale plant upgrade, what is your facility doing to improve resource recovery and energy production? Share your stories by sending me an email to [editor@tpomag.com](mailto:editor@tpomag.com). I promise to respond, and we'll report on noteworthy initiatives. **tpo**

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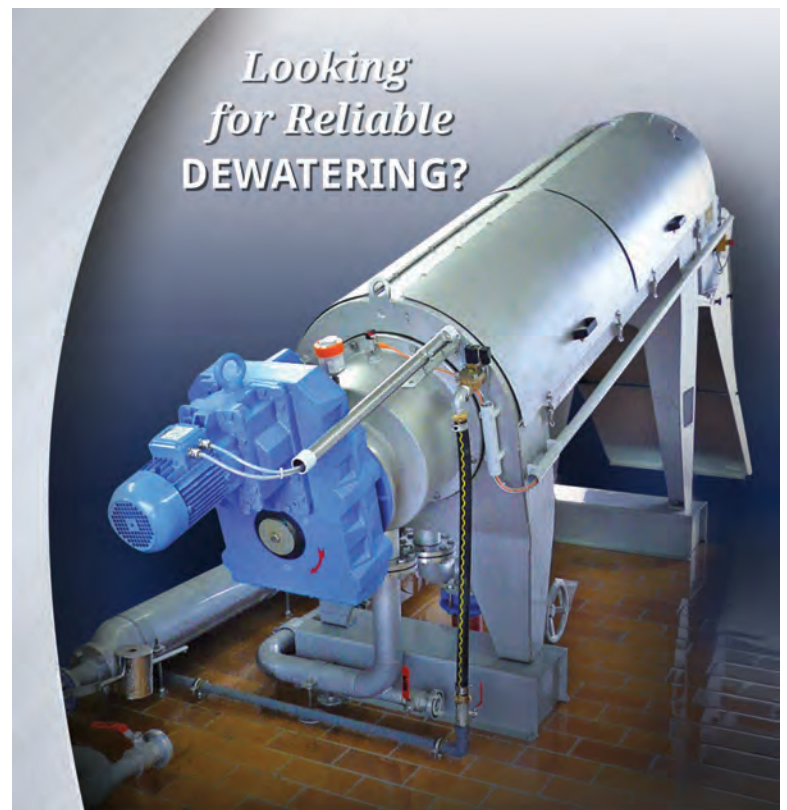
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## CLEVELAND SUSTAINABILITY

### It's the Year of Clean Water

From sweepstakes to family-friendly educational events, the City of Cleveland is primed for a year of celebrating clean water. This "thriving green city on a blue lake," has plenty in store for its residents in 2015. Find out how the Northeast Regional Sewer District will participate, and what the utility hopes to teach the public about clean water, the role of wastewater treatment and more.

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## OVERHEARD ONLINE

"It's estimated that a ton of treated sludge could contain several hundred dollars of metal. In a city of 1 million people, that could add up to \$13 million a year."

*Gold Rush! Could Biosolids Contain Millions in Precious Metals?*  
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## SHOWING APPRECIATION

### All You Need is Love ... And Clean Water

Why should your town or city love its wastewater and water operators? Find out what *TPO* readers had to say on the matter in this blog post. Here, we reveal five reasons why we should all say "thank you" to our operators. After all, your job is critical. Everything upstream, downstream and in between depends on clean water.

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## BURN FREE

### The Fuel Cell Alternative

Could cars one day run on energy produced at your plant? Could your home be powered by biogas? Learn more about fuel cells and how some wastewater treatment plants are using the technology to produce electricity and heat — without relying on combustion. With payback in as little as four to seven years, it's an option worth considering.

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# *Excellence* Downriver

AWARD-WINNING MICHIGAN PLANT SUCCEEDS WITH HARD WORK AND STRONG COMMUNITY TIES DESPITE SIGNIFICANT WET-WEATHER FLOW, STAFF REDUCTIONS AND ONGOING CONSTRUCTION

STORY: **Trude Witham** PHOTOGRAPHY: **Amy Voigt**



Brad Daroci, with the maintenance department, cleans the UV lamp system (TrojanUV4000Plus) in the UV building at the Downriver Wastewater Treatment Facility.

**THE STAFF AT THE DOWNRIVER WASTEWATER** Treatment Facility has faced plenty of challenges. Their collective experience, perseverance, teamwork and loyalty have led to 100 percent permit compliance for seven straight years.

They're proud of that. "We have great employees who are on top of their game," says Dan Alford, superintendent of the plant in Wyandotte, Michigan. "They are our first line of defense to catch and fix any problems that arise."

Built in 1939, the plant has been upgraded numerous times, creating operations and training issues. Designed for 225 mgd maximum rated flow, the plant averages 50 mgd during dry weather. Annual average flow is 65 mgd, but the flow can rise as high as 260 mgd during heavy rain.

The facility has downsized from 100 to 50 employees, saving around \$43 million in personnel costs. Today, a pool of 15 operators keeps things running smoothly around the clock, along with laboratory and maintenance teams. Contributing to their success is strong collaboration between Wayne County and the 13 communities that rely on and invest in the plant.

#### MANY UPGRADES

The Downriver plant serves 284,000 residents in Allen Park, Riverview, Belleville, Romulus, Brownstown Township, Southgate, Dearborn Heights, Taylor, Ecorse, Van Buren Township, Lincoln Park, Wyandotte and River Rouge. A joint management committee of the county and communities, formed in 2005, facilitates input on operation and maintenance. The county invites a representative from each community to review and comment on engineering proposals and construction bids.

Major upgrades have allowed the plant to keep up with treatment regulations. Primary treatment was

“Every day we review our dashboard report, which shows the permit limits and actual results. This report is emailed to plant management, so if we are close to the limits we can quickly get back on track.”

DAN ALFORD



### Downriver Wastewater Treatment Facility Wyandotte, Mich.

BUILT: | 1939

POPULATION SERVED: | 284,000

EMPLOYEES: | 50

FLOWS: | 150 mgd primary treatment design, 125 secondary treatment design, 65 mgd average

TREATMENT LEVEL: | Secondary

TREATMENT PROCESS: | Activated sludge

RECEIVING WATER: | Detroit River

BIOSOLIDS: | Landfilled

ANNUAL BUDGET: | \$17 million (operations)

WEBSITE: | [www.waynecounty.com](http://www.waynecounty.com)

GPS COORDINATES: | Latitude: 42°11'10.59"N; longitude: 83°9'43.28"W



## AWARD-WINNING TEAM

The Downriver Wastewater Treatment Facility has achieved 100 percent permit compliance for the past seven years, earning the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for 2011-13. It was the first large plant in Michigan to win that distinction. The plant won the NACWA gold award in 2007-10.

Superintendent Dan Alford has been with the plant for 12 years and holds a Class A operator's license. Reporting to him are team leaders Duane Russow (27 years), Jason Tapp (Class C, seven years), Ancell Noel (Class D, 23 years) and Matt Best (20 years). They supervise:

- Senior operators Charles Chambers, Ronald Redd, Catlin Nims, Dan Gacioch and Vinay Patel.
- Wastewater specialist/junior operators David Hein, Daniel Swiecki, Jack Miller, Jason Greenlee, Bobby Brown, Mohammed Makled, James Albart, Dennis Frederick, Carlton Greene and David Thomas.
- Mechanics/pump station mechanics Dwight King, Oscar Gomez, Travis Tuma, John Gering, Tony Talbot, Maurice Thompson, Brian Morrow, Brad Daroci, Mike McCloskey, John Frazier, Marty Scozewski, Freeman Adkins, Eric Graze, Charles Murria, Zahi Berry, Jimmy Marshall, Craig Toohey and Mike Crossman.

Alford speaks highly of his team: "It takes dedication to be a wastewater plant operator. The job is similar to a firefighter in that you spend a lot of time training and preparing for the few wet-weather events that really test your abilities. I'm proud to say that our operators have met every challenge before them."

The team at the Downriver plant includes, from left, Firooz Fath-Azam, P.E., outgoing superintendent; Razik Alsaigh; Matt Best and Duane Russow, team leaders; Dan Alford, P.E., incoming superintendent; Shawn O'Day; and Jason Tapp, team leader.

expanded in 1962. In 1975, secondary treatment was augmented with a pure-oxygen-fed activated sludge process. Two clarifiers were added in 1988, and a belt press was added in 1995. From 1997-2001, the plant replaced major equipment and added capacity, including a UV disinfection (TrojanUV) system to replace chlorine gas. Today, all equipment is tied into a SCADA system, upgraded in 2009, with iFIX Proficy software (GE Intelligent Platforms).

The 34-acre plant includes an administration complex with a front office, laboratory, operations service building, maintenance area and repair shop. The plant includes seven primary clarifiers (Evoqua Water Technologies), five aeration trains (Veolia), six secondary clarifiers (Evoqua). Discharge is to the Trenton Channel of the Detroit River.

Biosolids are dewatered and conveyed to roll-off containers, then trucked to landfill. Biosolids processing equipment includes primary sludge and transfer pumps (Vaughan), waste activated sludge booster pumps (WEMCO), polymer feed system (Evoqua), sludge storage tanks (Ovivo), thickened sludge transfer pumps (Penn Valley, Swaby-Lobeline), belt filter presses (Bilfinger Water Technologies) and centrifuges (Alfa Laval).

## STORMY WEATHER

Severe rain storms test the plant's operations. "In August 2014, we got 3 1/2 inches of rain in one day, most of it in just a few hours," Alford recalls. "Plant flow rose from 50 mgd to as high as 260 mgd. In cases of high flow, operators must place all the tanks and processes in service, which involves

opening many valves and monitoring additional plant process equipment and pumps. Thankfully, the actual sewage is a fraction of the high flow, and the excess is rainwater. So, we don't have a problem meeting our permit because the flow is so dilute."

Operators also manage multiple pump stations and retention basins that must be staffed during a storm event. Says Alford, "Because we're in the business of protecting public health, our operators understand and always respond."

Wet or very cold weather can affect landfill access, leading to high solids inventory at the plant. The facility team is considering emergency storage for dewatered biosolids as part of capital improvement planning.

The peak flow for the primary treatment system is 150 mgd, and 125 mgd for the secondary treatment. The system is designed so that any flow that might bypass primary treatment receives secondary treatment and vice versa. No wastewater can bypass both primary and secondary systems.

Wet-weather flows up to 125 mgd are treated like dry-weather flows, passing through preliminary and primary tanks, low-lift pumps, aeration basins, final clarifiers and UV disinfection.

Wet-weather flows above 125 mgd, up to 150 mgd, partially bypass the secondary treatment system.

“We have great employees who are on top of their game. They are our first line of defense to catch and fix any problems that arise.”

**DAN ALFORD**

Wet-weather flows above 150 mgd, up to 225 mgd, bypass the primary system but receive secondary treatment.

Flows greater than 150 mgd are brought into the plant through a tunnel pump station instead of the pump house. All the bypassed flows are combined and disinfected.

### STAYING ON TRACK

The plant team members pay attention to detail and act quickly to correct sudden changes in effluent quality. "Every day we review our dashboard report, which shows the permit limits and actual results," says Alford. "This report is emailed to plant management, so if we are close to the limits we can quickly get back on track. Our lab staff also sees the analysis numbers, and if they don't look good, they will bring this to the operators' attention. That gives us a head start on making changes."

The laboratory team handles sample analysis for the Downriver plant, Detroit Metropolitan Airport, two pump stations, stormwater retention basins and the industrial pretreatment program. Matt Best, lab manager, oversees chemists Don Massie, Tony Azzouz and Trisha Dotson (assistant lab manager and chemist positions were awaiting new hires as of the end of 2014).

They perform about 44,000 tests a year. Besides testing influent, primary effluent, final effluent and sludge and dewatered cake samples, they calibrate and support the UV disinfection system. The assistant manager is responsible for the quality program,

standard operating procedures, metals analysis, methods validation and inventory.

### GREATER EFFICIENCY

Fifteen years ago, the county began looking at how to increase operating efficiency. "The private sector was ramping up, and the county wanted to be more competitive," says Alford. "We didn't want to turn the operations over to a private company, so we made a conscious decision to right-size. When the housing bubble burst, property values dropped and tax revenue fell off a cliff. Even the big industries are doing more with less and are not staffed at the same levels they were."

The county reduced personnel through attrition and by relocating people to other divisions. By 2009, the staff was reduced by half, and the following year every county employee took a 10 percent pay cut.

"Some people took two days off a month without pay, but rotating shifts

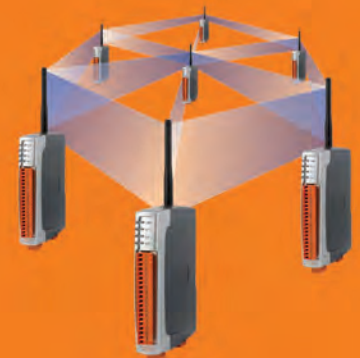


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Lee Hansen heads underground to work on repairs to a primary settling tank.

made this option impossible for operators who took the pay cut and continued to work a full month,” says Alford. “The last raise anyone got was several years ago, and we have lost a half dozen employees since then. Hiring has become difficult because of this.”

Alford says plant management tries to maintain morale by having employee get-togethers when the plant wins compliance awards: “We have a breakfast where we acknowledge their contributions to operations. We also encourage them to take advantage of training opportunities. And, of course, we give kudos when they do a good job.”

### ONGOING TRAINING

The plant’s numerous upgrades have created training challenges. “We’ve spent \$10 million to \$15 million a year for the past 10 years on upgrades, which is a good thing but creates a constant learning curve,” says Alford. A 2012 centrifuge upgrade involved training multiple people and rotating shifts. The plant also upgrades computers and software every five years.

Training is conducted by equipment vendors and the sessions are videotaped. The plant also uses online training programs developed by 360water of Columbus, Ohio. These training modules use a series of interactive Web pages with a test at the end.

Operators are skilled at minor maintenance, such as pump and valve greasing; the maintenance team handles heavier jobs. Operators also get to use their creativity. “One time we had violent shaking in a length of pipe,” says Alford. “You could hear



An aerial view of the plant, showing the Detroit River and the Grosse Ile island.

this strange sound, but it didn’t happen all the time. So, one night, operator Jason Greenlee followed the sound and used his personal cellphone to video record a 10-inch-diameter pipe that was shaking and bouncing around. He posted the video to YouTube so management staff could watch it and determine the best course of corrective action.”

### FUTURE PROJECTS

As part of a \$10 million upgrade, the plant will renovate the laboratory starting in 2015 in two phases to minimize disruption. Renovation of the solids-handling complex is to be completed in mid-2015. “We have already upgraded the solids-handling process by rehabbing two of the four thickened sludge storage tanks, installing new sludge mixers and tank lids, and installing new pumps in the pump gallery,” says Alford. The complex still



A phosphorus test at the Downriver facility. The staff’s dedication has led to 100 percent permit compliance for seven straight years.

“It’s very difficult to add on while operating, so if you have the room, I recommend building a whole new process and then demolishing the old one.”

**DAN ALFORD**





Chemist Trisha Dotson performs a phosphorus test.

**Downriver Wastewater Treatment Facility**  
**PERMIT AND PERFORMANCE (monthly averages)**

	PERMIT	EFFLUENT
<b>BOD</b>	25 mg/L	11 mg/L
<b>TSS</b>	30 mg/L	22 mg/L
<b>Total phosphorus</b>	1 mg/L	0.8 mg/L
<b>Fecal coliform</b>	200/100 mL	72/100 mL
<b>Fats, oils, grease</b>	10 mg/L	1 mg/L

needs new automation and a new roof.

The team is looking at biosolids options that include drying to more than 90 percent solids and pelletizing for sale as fertilizer, and lime stabilization before landfill.

The staff is challenged to run the plant during major construction. “We have not had six months when there was not a contractor on site, and it takes close coordination between our operators and the contractors to make this work,” says Alford.

He advises older plants to rebuild rather than renovate an existing plant: “It’s very difficult to add on while operating, so if you have the room, I recommend building a whole new process and then demolishing the old one.”

Previous upgrades have involved building up rather than out since there is no more land for development. “The plant’s design reminds me of an M.C. Escher drawing,” jokes Alford. “But all those stairs are good exercise for the staff.” **tpo**

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Children cool off in the spray park at Hunters Glen Park. The 3,500-square-foot facility has stainless steel flower showers.



PHOTOS COURTESY OF THE BLUE RIDGE WEST MUNICIPAL UTILITY DISTRICT

# Making a Splash

AN EAST TEXAS UTILITY DISTRICT UNDERWRITES A SPRAY PARK THAT PROVIDES HEAT RELIEF FOR KIDS, INSTILLS COMMUNITY PRIDE AND CREATES OPENINGS TO TALK ABOUT WATER CONSERVATION

By Craig Mandli

Missouri City in eastern Texas is hot. And humid. That's an uncomfortable combination for people in the city of nearly 75,000 people just west of Houston.

So when given a chance to be part of the city's grand-scale revitalization effort in 2009, the Blue Ridge West Municipal Utility District (MUD) chose a spray park as a way to give little ones some relief.

"A spray park was something different," says Llarance Turner, a board member for the district that funded the project and parks board chair for the city. "There wasn't one in Missouri City and we felt like it was a better, ultimately more cost-effective alternative than a swimming pool."

## A BIG PROJECT

The spray park is in the 18-acre Hunters Glen Park, which already had a traditional playground that was a great draw for kids and families.

The \$225,000 project was funded entirely through the MUD. Groundbreaking took place March 16, 2009, and construction took about two months.

The nearly 3,500-square-foot facility features stainless steel flower showers. The splash pad has eight above-ground features and six ground sprays and accommodates 80 to 120 children at a time.

The spray park includes a water retention and reuse system that irrigates surrounding landscaping. The park amenities also include a 0.6-mile walking trail, basketball courts, a play area for kids and two fields for football, soccer and other youth activities.

"The spray park is much more fun than a traditional swimming pool for kids," says Turner. "The municipality doesn't need to employ lifeguards,

which is a money-saver in the long run, and the facility itself requires less maintenance than a swimming pool. That's why you're starting to see many cities steer away from swimming pools to facilities such as this."

## ENGAGING THE POPULATION

"The spray park has been extremely popular. The only negative comments from the public come when we have mechanical problems and the system has to be shut down for repairs. Fortunately, those situations have been rare," says Turner.

The spray park can stay open longer each year than most pools. It's typically open from April through October, depending on the weather.

“The city totally embraced the idea and has been very happy with the result. When partnerships such as this work well, it creates a great sense of camaraderie.”

LLARANCE TURNER

Concerns that the spray park may have only "fad" appeal were unfounded. "The facility isn't regularly staffed, so attendance numbers are more or less an estimation, but use of the park has actually increased every summer since we opened it," says Turner. "We're adding parking to accommodate the traffic."

The spray park has also led to an increase in usage for the park itself. School and community youth organizations regularly make fun trips to the park, centered on use of the spray park.



### What's Your Story?

The spray park has six ground sprays to keep children cool.

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

"If you drive by during the day in May and June, you're almost guaranteed to see at least one school bus along with church and youth group vehicles," says Turner. "A lot of youth sports teams really enjoy cooling off after their games in the park, too. I think having it in the neighborhood has instilled pride in the community."

### COMMUNITY PARTNERSHIP

While the Blue Ridge West MUD designed and funded the project, the property itself is owned and maintained by Missouri City. Turner says the cooperation between the two groups couldn't have been smoother.

"The city totally embraced the idea and has been very happy with the result," he says. "When partnerships such as this work well, it creates a great sense of camaraderie."

Larger groups have also taken notice. The project, specifically the water-retention and reuse system, received the Policy Tool award from the Houston-Galveston Area Council, highlighting best practices and innovative approaches to park planning and implementation.

"The recognition is great because it provides us the opportunity to talk about the importance of water conservation," says Turner. "We also do regular presentations through the schools with our Water Wise program, which gives us the chance to highlight both our conservation efforts and the spray park."

Looking back on the project, Turner says its value is difficult to measure in dollars. "It's really been one of those projects that we initially thought would simply fill a void, but it's been much more than that," he says.

He strongly encourages other municipalities considering similar projects to take the leap. "You'll never go wrong providing cool avenues for family entertainment and enjoyment. The partnership might be a little uncomfortable at the beginning, but you can't be afraid to bite off this sort of thing. In the end, it's something to really be proud of." **tpo**



## VA-12

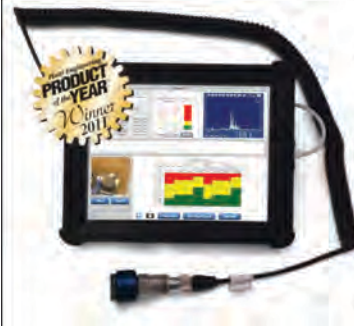
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GreenWhey Energy takes in liquid waste from breweries, a tomato paste canner, a salad dressing distributor and soda bottlers.

# Making the Most of Wastes

GREENWHEY ENERGY STANDS ON THE LEADING EDGE OF AN INDUSTRY NICHE FOR TURNING DAIRYING AND OTHER FOOD BYPRODUCTS INTO ELECTRICITY AND HIGH-QUALITY BIOSOLIDS

STORY: **Erik Gunn**

PHOTOGRAPHY: **Jennifer Raddatz**

TOM LUDY HAS BEEN IN THE DAIRY BUSINESS “SINCE I was in diapers,” and now the industry has taken him in a new direction.

Ludy and two business partners own GreenWhey Energy, a startup company in Turtle Lake, Wisconsin, that uses a pair of anaerobic digesters to produce biogas from dairying waste and other food waste products. That gas is fed to engine-generators that produce electric power for sale to the local utility grid. The digesters also yield a high-quality biosolids product suitable for multiple soil conditioning and fertilizer uses.

Ludy’s business partners are Larry and Tim Peaster, who are father and son. Larry is retired, and Tim owns Northern Liquid Waste Management, a company important to the GreenWhey story.

The company’s story might be a classic example of necessity being the mother of invention. GreenWhey at least partly owes its existence to a shortage of land on which to apply biosolids. That was brought home when Ludy’s Turtle Lake cheese plant exceeded production forecasts by an astonishing amount.

It has been a continuing journey and learning experience, but Ludy is upbeat about the prospects for GreenWhey, and he’s already thinking about new markets for what it produces.

## GreenWhey Energy, Turtle Lake, Wis.



FOUNDED: | **2009**

OWNERS: | **Tom Ludy, Larry Peaster, Tim Peaster**

TREATMENT PROCESS: | **Anaerobic digestion**

INFRASTRUCTURE: | **Two digesters, two biogas fueled engine-generators**

END PRODUCTS: | **Electricity, heat, high-quality biosolids**

WEBSITE: | **www.greenwheyenergy.com**

GPS COORDINATES: | **Latitude: 45°23'26.04"N; longitude: 92°9'44.03"W**

## THIRD GENERATION

Ludy’s grandfather started the family dairy business 85 years ago and later passed it on to Ludy’s father. The family sold the business in 1998, and Tom Ludy built a new cheese plant in Turtle Lake in 2001: Lake Country Dairy, a maker of Italian-style hard cheeses.

Partly to accommodate the new company, the Village of Turtle Lake built a



Josh Peaster, maintenance manager, adjusts the water valves of the degassing tanks on the outside of the plant.

“The whey, permeate and lactose markets in the dairy industry changed. Lactose became valuable. Instead of us getting paid for it, we basically paid for it.”

**TOM LUDY**



Two Caterpillar biogas-fueled generator sets like this one produce electricity at GreenWhey.

new wastewater treatment plant. But the cheese plant got so busy so fast that its wastewater soon overwhelmed the municipal operation. “It wasn’t 6 months old when we had the treatment plant at 140 percent of capacity,” Ludy says.

Regulators from the Wisconsin Department of Natural Resources sent warning letters. Ludy sought to mitigate the problem by hauling liquid waste away from the cheese plant and separating out spreadable solids to take the pressure off the treatment plant. But he soon realized it was becoming more and more difficult to land-apply solids in the area.

“We were running out of fields to spread it on,” Ludy says. A big reason was northern Wisconsin’s tourist trade. As tourism expanded, farmland was bought up for resorts and homes. “The people buying up the land don’t want you spreading biosolids on it,” Ludy says. And changing farming practices also reduced the use of some biosolids.

### HELPFUL CONNECTIONS

Through his years in the dairy industry, Ludy had made friends with waste-hauling contractors. Conversations with those haulers helped him launch a project to find alternative uses for the dairy waste products. Ludy and his business partners ruled out an ethanol plant — one

## ENDLESS RECYCLING

GreenWhey Energy does more than find new uses for dairying byproducts and other food wastes.

The company has started recycling packaged products, too — both the materials inside and the materials in the packaging.

“When we learned that 40 percent of packaged food in this country has been destroyed, we got into that market, too,” says Tom Ludy, GreenWhey co-founder and president. Soda cans, beer bottles, wine bottles and other containers made of glass, aluminum, steel or plastic are depackaged and washed clean with the GreenWhey facility’s effluent water, already hot from the digestion process and thus effective for cleaning.

The packages are flushed through a screen by high-pressure water. Machines then shred the packaging so it can be used as raw material for new products. “This is something that we just started getting into,” Ludy says. “We’re hoping it turns into something big.”

potential use for dairy waste — because some of the waste that process yields “is worse than what you started with,” Ludy says.

Further research led to a company in New York state called Ecovation, founded by a professor at Cornell University in Ithaca. Originally, Ludy and partners were interested in the company’s new digester, designed specifically to generate methane from dairy waste. But even as they explored that, Ecovation was purchased by Ecolab, a multinational corporation with operations in many related areas. In the end, GreenWhey purchased a pair of UAC upflow digesters developed in Belgium; Ecolab has U.S. construction and distribution rights for the product line.

In 2009, Ludy sold the cheese plant and began putting together GreenWhey. As originally designed, the plant would handle only dairy byproducts, including whey, lactose and permeate. Then came another surprise: “The whey, permeate and lactose markets in the dairy industry changed,” Ludy says. “Lactose became valuable. Instead of us getting paid for it, we basically paid for it.”

“The only well water we use in this plant is to flush our toilets and for our drinking fountain. Everything else is hauled in and reused.”

**TOM LUDY**

### BRANCHING OUT

GreenWhey shifted gears. With the help of Northern Liquid Waste Management, the company expanded its feedstock to include other materials. Now GreenWhey takes in liquid waste from breweries and from a tomato paste canner, a salad dressing distributor and soda bottlers. “We are basically a wastewater treatment plant,” says Ludy.

Dairy byproducts still account for about 60 percent of GreenWhey feedstock. Fortunately, the Ecolab digesters could take a wider range of feedstock than the original digesters the company had considered. GreenWhey wants liquid waste that is high in BOD and COD, and the digestion of those materials produces substantial methane.

The digesters are not designed to take on large amounts of fats, oils and greases because the GreenWhey plant has only one pretreatment tank. “We can handle some fat — we just have to monitor what we take in,” Ludy says. “Sugar and protein in the feedstock is what does our digester best. Aside from that, anything that’s pumpable and mixes with water we can take in this plant.” Powdered products such as whey and milk powders are welcome, as they simply need to be rehydrated.

### BIOSOLIDS STRATEGY

The plant doesn’t take in human or animal waste or wastewater that contains quaternary ammonium salts (quat sanitizers). High concentrations of salts aren’t good, either. Chlorides must be monitored the way fats are because the digester “is very sensitive to a high-salt diet,” Ludy says. “It’s similar to a human that way. If you feed it something wrong, it will get sick.”

A full-service lab on site samples the waste materials at 14 points before the digester and another six points afterward. The absence of human and animal waste allows the digested biosolids to be used in gardening. The biosolids from the digester are “top-grade topsoil,” Ludy says. “Employees have worked with it in their gardens, in their yards. It’s beautiful stuff.”

Liquid wastes come in mostly by truck, although some are sent through a pipeline from Ludy’s former company, Lake Country Dairy, next to GreenWhey’s site. Regardless how it is delivered, the first stop for the waste is a series of holding tanks. “We can take in 350,000 gallons a day, seven days a week, of high COD, high BOD wastewater,” Ludy says. When it’s time to process the waste, it is pumped first to a pretreatment tank, then it goes on to the digesters.

When digestion is complete, the biosolids, still in highly liquid form, pass over a belt filter press for dewatering. The result is a storable wet cake, almost

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The GreenWhey Energy team includes, from left, Tim Peaster, co-founder and chief financial officer; Tom Ludy, co-founder and president; Beth Ludy, office manager; Eric Ludy, business development; and Kent Paulson and Jim Arnold, plant operators.

GreenWhey also received a renewable energy grant in lieu of tax credits through the American Recovery and Reinvestment Act of 2009.

The 3.2 MW engine-generators produce enough electricity to power a city of about 3,000 people. Running around the clock, they produce 76.8 MWh per day, or 28,032 MWh per year. They also produce 20 million Btu/hr for digester heating and other purposes, significantly helping project economics.

GreenWhey uses Northern Liquid Waste Management to haul the material from the source to the GreenWhey plant. Transportation costs are built into the overall tipping fees. The fee also is adjusted based on what the material contains; suppliers of wastes high in COD, particularly soluble COD (such as corn syrup), pay less because of the materials' gas generating potential.

### KEEPING IT GREEN

GreenWhey's digestion process yields water at up to 325 gpm. The facility does not have a permit for above-ground discharge but can recycle it for non-potable purposes. "The only well water we use in this plant is to flush our toilets and for our drinking fountain," says Ludy. "Everything else is hauled in and reused."

The digester's plant location near Ludy's former cheese plant and within reach of a number of other dairies is beneficial. There are nearly a dozen dairy plants within 50 miles. Based on current capacity, Ludy believes three more digester plants of the same size strategically placed would accommodate nearly all the liquid waste byproducts from Wisconsin dairy producers. More varied feedstock might create much more room to grow. The company is looking at feedstocks such as spoiled produce from grocery stores and other food wastes.

The company has been studying equipment that "basically purees everything down to a liquid that would go into our digesters," says Ludy. "That's very much in development." As various forms of biofuel enter public awareness, he believes GreenWhey is well positioned for success.

While the engines use all the methane generated for now, the company is exploring compression and bottling of excess gas that might be generated. Ludy expects the plant to hit capacity in the next year or so. The operation was sized to take up to 70 percent of the output of about eight to 10 area dairy plants. If it reaches that point, GreenWhey will need to consider alternatives, which could include a plant expansion or simply bringing in more concen-



Josh Peaster adjusts the settings of a polymer makedown skid. GreenWhey Energy uses polymer in its two dissolved air flotation (DAF) units.

like clay, that can be stored up to six months on site. The methane is drawn off the top of the digester and conditioned as needed to remove moisture.

Then the methane is fed directly to a pair of 2,200 hp Caterpillar model 3520 engines of the type often installed on landfills to generate electricity. They produce 20 million Btu/hr. The engines drive generators that produce electricity for sale to an Xcel Energy power grid under a renewable energy tariff.





Tom Ludy,  
GreenWhey  
co-founder  
and president

trated, dewatered feedstocks.

For the moment, GreenWhey is focusing on what it knows, even as the company considers new outlets for its end product. Slow and steady seems the likely approach, says Ludy: "This is a very new industry that basically is just getting off the ground." **tpo**

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# Neighborly Things to Do

TREE PLANTINGS, ODOR-CONTROL SYSTEMS, NOISE ABATEMENT AND NEW LIGHTING STRATEGIES HELP A CLEAN-WATER PLANT ADAPT TO SUBDIVISIONS GROWING UP NEXT DOOR

By Jeff Smith

When the South Cary Water Reclamation Facility was built in 1988, the nearest residential neighborhood was more than 4 miles away. Vacant land surrounded the 40-acre plant site in the Town of Cary, North Carolina. The plant sits at an elevation nearly 30 feet below the perimeter tree line. Today, a cul-de-sac in a subdivision — one of several near the site — overlooks the 12.8 mgd advanced tertiary facility.

To accommodate neighbors, facility managers undertook extensive tree plantings and other landscape improvements that made the facility more compatible with what had become a surrounding residential community. By all indications, the neighbors greatly appreciate the changes.

## COMPLAINTS ARISE

As the neighborhoods grew closer to the facility by 2004, plant personnel began getting complaints about noise, lights and odor. “We became more proactive in exploring ways to address the complaints,” says Andy Russell, plant manager.

A strategy of planting more trees and shrubs was among the first considerations. The trees that remained on the perimeter after the housing expansion were not enough. A grove of decorative fruit trees, planted during construction as a demonstration for use of the facility’s reclaimed water for irrigation, contributed little to the solution.

Kevin Steed, a certified arborist with the town’s Public Works Division, designed a series of evergreen plantings of loblolly and Virginia pine, cedar, magnolia, arbor vitae, juniper and wax myrtle, along with deciduous trees, such as birch, cypress, holly and Oklahoma redbud. Shrubs like azaleas and boxwood were also included.

The goal in part was to mix the species and vary the heights to change the flow of air and distribute it above grade level. The other intent was to draw neighbors’ eyes in closer to their homes so it diverted their view from the facility.

Nearly 90 4-inch-diameter trees 14 to 16 feet tall were planted along the

perimeter nearest to the housing areas. “We would have preferred to use smaller trees because they establish better, but we were looking for an immediate effect and planted rather intensely,” Steed says.

The project also narrowed a portion of a 30-foot-wide service road that provided access to the plant through the neighborhood. The compacted surface was replaced with engineered soil more conducive to plant growth. Reclaimed water for irrigation was distributed to the trees through runs of PVC pipe. Steed expected 25 percent first-year mortality, but after the first winter only about 15 percent of the trees had to be replaced.

## SOUND AND LIGHT

Recognizing that plants and trees were not a complete solution for the neighbors’ issues, the plant team also installed aeration diffusion devices and managed process aeration equipment to minimize excess noise. Process pumps, blowers, air piping and tanks were soundproofed with mineral wool insulation and cladding. Silencers were applied to up-blast fan exhaust systems.

Outdoor lighting was changed to eliminate up-beam directional aiming. LED lamps replaced incandescent and fluorescent bulbs. Heavy industrial curtains were installed in the tall biosolids thermal dryer building, which has large windows and high interior lighting.

“We have successfully used landscaping to control some noise and lighting issues, but I’m not sure how much that would have helped odor,” says Russell. “We have relied on unit processes and technology to deal with that issue.”

To more positively control odor, the facility staff covered open structures and collected dirty air into a centralized odor-control system — a biofilter with activated carbon adsorption. They also retrofitted a thermal solids dryer with a multimedia dry scrubber with carbon adsorption. Humid side-streams are now treated with carbon media point-of-use filter cartridges.

“Feedback from the neighbors about the facility’s efforts has been positive,” Russell says. “We have monthly utility updates that track customer interactions. We’ve seen a big decrease in number of complaints.” **tpo**

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# The Long View

A TREATMENT PLANT UPGRADE GIVES WISCONSIN'S HO-CHUNK NATION AMPLE CAPACITY FOR DECADES OF GROWTH AND SENDS HIGH-QUALITY EFFLUENT TO THE BLACK RIVER

STORY: **Ted J. Rulseh**

PHOTOGRAPHY: **Mark Hirsch**

NATIVE AMERICAN TRIBES STRIVE TO MAKE DECISIONS with thought about their effects seven generations into the future.

Wisconsin's Ho-Chunk Nation couldn't look that far ahead in planning a wastewater treatment plant upgrade. Still, the nation, under President John Greendeer, designed the plant to handle 30 years of expected growth, which includes an expansion of its casino at Black River Falls, a single- and multifamily subdivision with some 200 lots, a community center and possibly a school and a recreational vehicle park.

Today, the Wazee Area Wastewater Treatment Plant, serving about 500 residents of the Ho-Chunk community and 1,000 inmates and staff at the Jackson Correctional Institution, has a design capacity of 0.5 mgd and an average flow of 0.2 mgd.

Operated by Veolia North America, it has technology many smaller clean-water plant teams would envy, including an automated screening system in the headworks, automated dissolved oxygen control in the oxidation ditches, biological phosphorus removal, UV disinfection, a full SCADA system and a wastewater information management system for process control.

"The Ho-Chunk looked at their plans for the community and saw that they didn't have the wastewater capacity they needed," says Tim Wiesner,

Tim Wiesner, plant manager, takes pride in the Wazee Area Wastewater Treatment Plant's long record of consistent permit compliance. He's shown adding soda ash to the alkalinity tank (mixer by SPX).

plant manager. "They made the wise decision to address that early, before we had any issues."

## GROWTH AND PROGRESS

Wiesner, a Grade 4 wastewater operator who holds a bachelor's degree in water resources from the University of Wisconsin-Stevens Point, runs the facility with Duane Johnson, a Grade 1 operator who has a two-year associate degree as an electrical service technician.

The current facility (0.265 mgd capacity) was constructed in 1996. Wiesner came to the Wazee plant in 1997 to lead the Veolia operation there. Before the plant was built, Ho-Chunk community residents used septic systems. Davy Engineering of La Crosse designed the plant, collections system and pump stations; Staab Construction of Marshfield built the plant.

The core process was an oxidation ditch, and the expansion, commissioned in mid-2014, essentially doubled the original capacity with a second slightly larger treatment train. As part of the \$10.4 million project, the old system received upgraded motors and aerators. MSA Professional Services of Baraboo designed the expansion, and Staab Construction built it.





“I’m pretty proud of the effluent. We haven’t had a permit violation in years, and I definitely don’t want to have any from here on.”

**TIM WIESNER**

The plant consistently meets its BOD/TSS permit limits as well as a 1.0 mg/L phosphorus limit. “I’m pretty proud of the effluent,” says Wiesner. “We haven’t had a permit violation in years, and I definitely don’t want to have any from here on.”

#### PLANNED WITH CARE

Wiesner and the engineers chose technologies carefully. “We went around to other plants and looked at equipment, and that was fantastic,” he says. “We got to observe it in action and see what we liked and what we didn’t like

### Wazee Area Wastewater Treatment Plant Black River Falls, Wis.



BUILT: | 1996 (upgraded 2014)

POPULATION SERVED: | 500 (plus prison and casino)

FLOWS: | 0.5 mgd design, 0.2 mgd average

TREATMENT LEVEL: | Secondary

TREATMENT PROCESS: | Oxidation ditch

RECEIVING WATER: | Black River

BIOSOLIDS: | Aerobic digestion, land-applied

ANNUAL BUDGET: | \$355,000 (operations)

GPS COORDINATES: | Latitude: 44°20'40.84"N; longitude: 90°46'36.86"W

Tim Wiesner credits the Ho-Chunk Nation for having the foresight to look at future needs and design a facility that successfully meets them.



Pumpkinseed sunfish swim in final effluent in an aquarium in the lobby at the Wazee Area plant.

## TEN GALLONS OF EDUCATION

The Wazee Area Wastewater Treatment Plant helps protect the Black River, a high-quality warm-water fishery in west-central Wisconsin. To make clear to visitors that the plant doesn't harm the river, the lobby includes a 10-gallon aquarium where pumpkinseed sunfish swim in final effluent.

"Many people don't understand what we do here," says Tim Wiesner, plant manager. "I can explain with the aquarium that our effluent goes to the river and the fish like it. People can see the wastewater and realize that it's not harmful to the fish."

The Black River is home to walleyes, smallmouth bass, muskies, crappies, bluegills and other popular species. "It's a great canoeing river," says Wiesner. "There's not a lot of development. It's forested on sides almost all the way down."

so much. MSA brought good ideas. They designed the plant based on what we needed."

The process begins with a pre-aeration tank. Wastewater from the prison, 6 miles away, arrives by way of a force main in which it can go septic and release hydrogen sulfide gas. "We didn't want that gas in our new headworks building," says Wiesner. "In the pre-aeration tank we can drive that sulfur into a form that's not gaseous."

Two Sutorbilt rotary lobe blowers (Gardner Denver) supply the air by way of Tideflex diffusers (Red Valve). The blowers also feed air to the aerobic digester and an aerated waste activated sludge holding tank.

From the pre-aeration tank, wastewater passes through a stair screen (Vulcan Industries) with an automated rake. Screenings are washed, compacted and dropped into a bagger for transport to landfill.

### AUTOMATED AERATION

Secondary treatment, a modified Bardenpho process, begins with a three-

basin selector tank with anaerobic and anoxic zones where denitrification occurs and biological phosphorus removal begins. "The water runs through the first basin just to get the DO down," says Wiesner. "Basin 2 and 3 are mixed with an internal recycle."

"The raw wastewater goes into Basin 2 and the return activated sludge goes into Basin 3. We are bringing the nitrate down in Basin 3, then mixing that return, which is now nitrate-free, into Basin 2 and getting phosphorus release in Basin 2 and Basin 3."

The flow then passes to the oxidation ditch trains (Lakeside Equipment) with covered rotary aerators. "The bugs grab the phosphorus and eat the waste and do all the things they do, and then it's on to the clarifiers," says Wiesner.

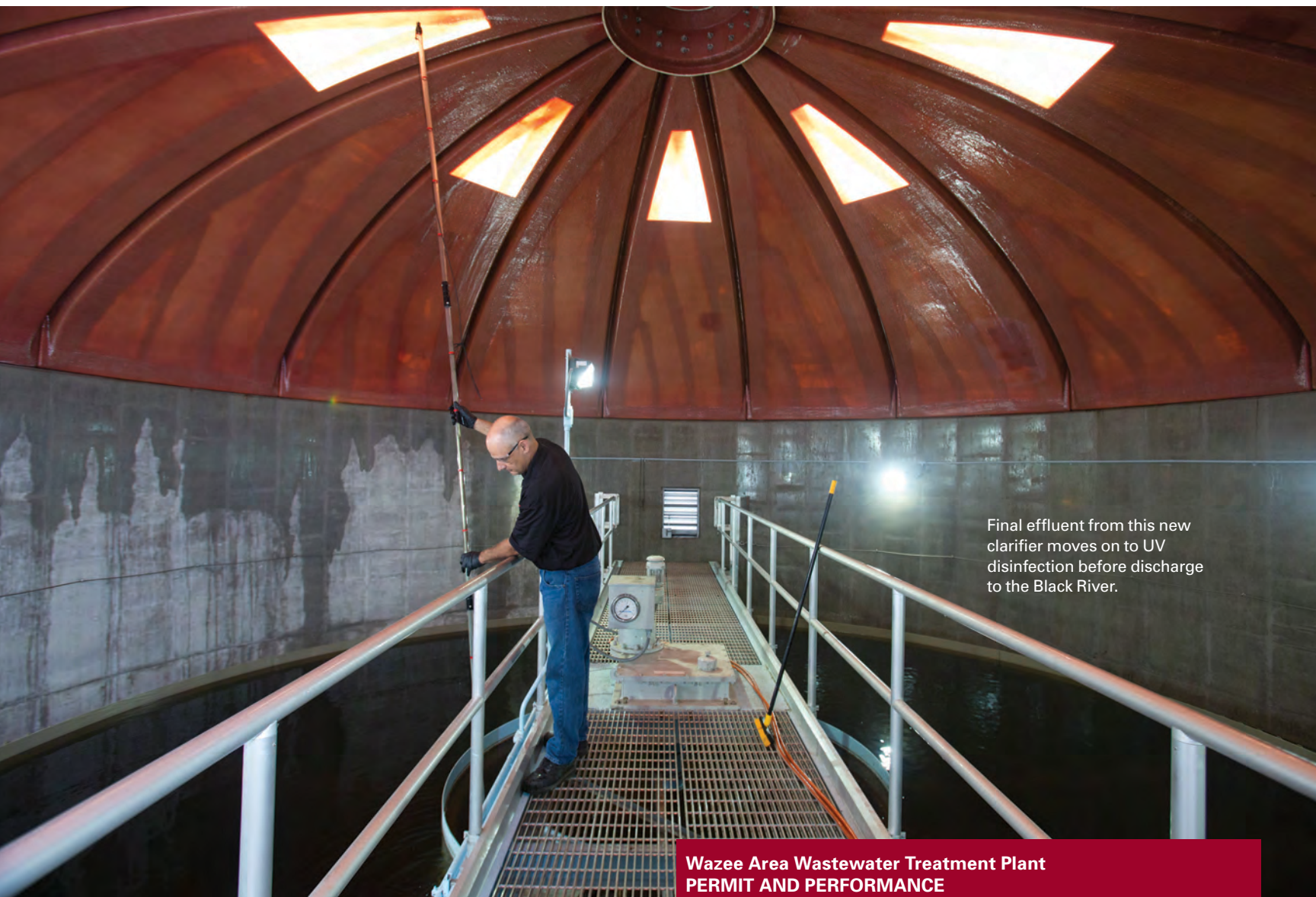
Automated control of the aerators by way of variable-frequency drives

“The Ho-Chunk looked at their plans for the community and saw that they didn't have the wastewater capacity they needed. They made the wise decision to address that early, before we had any issues.”

TIM WIESNER

keeps dissolved oxygen in the ditches at 2 parts per million. "We have DO probes in there," says Wiesner. "If the DO drops below 2, the aerators speed up. If it rises above 2, they slow down."

The new clarifier includes features Wiesner suggested. It is configured for easy cleaning with a single, wide concrete weir channel around the perimeter. "The channel is easy to access," says Wiesner. "There's a safety rail



Final effluent from this new clarifier moves on to UV disinfection before discharge to the Black River.

attached to the wall. There's enough headroom to clean the channel, and floating solids can't get up around the back of the weir to cause problems." Final effluent goes to a new and enlarged UV disinfection system (TrojanUV) before discharge to the river.

### SOLIDS SIDE

Waste activated sludge from the aerated holding tank goes through a rotary drum thickener (Vulcan). The material is batch-thickened once or twice a week. Thickened material goes to the 250,000-gallon aerobic digester. Digested biosolids are pumped to a 1-million-gallon storage tank and ultimately land-applied by injection by Veolia Environment.

A new Allen-Bradley SCADA system with FactoryTalk software (Rockwell Automation) installed by Van Ert Electric gives Wiesner and Johnson a comprehensive view of plant operations around the clock. They can access the system anytime and check status and make system adjustments remotely.

The plant's effluent performance has been consistent — BOD is typically about 3.0 mg/L and TSS generally below 2.5 mg/L. Phosphorus is the nutrient of concern. "We don't have an ammonia limit," says Wiesner. "It's just the nature of oxidation ditches that they tend to remove ammonia down to non-detect levels. The Department of Natural Resources didn't feel we needed an ammonia permit limit."

Meeting the phosphorus limit has been somewhat challenging. "We're still working to dial in the bio-P," Wiesner said last September. "The plant

### Wazee Area Wastewater Treatment Plant PERMIT AND PERFORMANCE

	INFLUENT	PERMIT	EFFLUENT
<b>BOD</b>	~200 mg/L	30 mg/L	3.0 mg/L
<b>TSS</b>	~200 mg/L	30 mg/L	2.5 mg/L
<b>Phosphorus</b>	6.0 mg/L	1.0 mg/L	0.5 mg/L
<b>Copper</b>	Variable	17 µg/L	Not detected

is brand new, so we just need to be patient. We have the right environment for the phosphorus-accumulating organisms. We just haven't had the time yet to grow them out. For that reason we still use alum for phosphorus removal. We expect to reduce our alum use and ultimately eliminate it, but keep it available as a backup." Typical effluent phosphorus is 0.5 mg/L.

The plant also has an effluent copper limit of 17 µg/L. "Due to the extreme soft water we have in this area, the DNR thought copper toxicity might be an issue," says Wiesner. "That's mostly controllable through the water distribution system. If they keep the pH high enough in the system so that the water is not aggressive to copper pipes, the copper stays out of the water."

Helping to keep the process consistent is a Hach WIMS (Water Information Management Solution) brought to the table by Veolia. "We can track BOD, TSS, mixed liquor suspended solids, sludge volume index and whatever parameter we want," Wiesner says.

### CARING FOR COLLECTIONS

Wiesner and Johnson are responsible for the collections system, built in



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Phosphorus levels in water samples are checked by colorimetry. The blue sample on the left registered 7.15 mg/L, and the clear sample on the right registered 0.22 mg/L.

1996. It includes 11 miles of piping and four lift stations with pumps from Flygt – a Xylem Brand. “We have a maintenance agreement with Flygt,” Wiesner says. “Once a year they pull the pumps, change the antifreeze and check them over.

“We do flushing of the collections system. From our low I&I, we can tell the sewers are in pretty good condition. The plan is to video them in the future to establish a baseline and catch problems before they develop.”

Wiesner credits success with the facility to the support received from the Ho-Chunk Nation: “They had the foresight to look at their needs and design a facility to meet them.” **tpo**

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# Once Is Good, Twice Is Better

KEEPING A TRADITION OF SUSTAINABILITY, A CLEAN-WATER PLANT IN LINCOLN SUPPLIES EFFLUENT TO HEAT AND COOL AN INNOVATION CAMPUS AT THE UNIVERSITY OF NEBRASKA

By Doug Day

**T**he City of Lincoln's Theresa Street Wastewater Treatment Plant has used its effluent for heating, cooling and process water for decades. Now that effluent is being used again to heat and cool the new University of Nebraska Innovation Campus.

The Innovation Campus encourages developments in agriculture, energy, and health and food production by assisting with engineering, hardware, and product and industrial design. The office building, conference center and business accelerator building for startup companies will be joined by a wet-laboratory building, food processing pilot plant and a greenhouse complex by 2015. Eventually, plans call for 19 buildings, including a hotel, private office buildings, housing and retail space, all for up to 5,000 people collaborating on technological advancements.

## RENEWABLE INNOVATION

The 164-acre site on the former Nebraska State Fair grounds is being developed by the city, the university and the TETRAD Property Group. It only made sense to look next door to the Theresa Street facility for an innovative way to heat and cool the \$800 million campus.

Steve Crisler, superintendent of water pollution control facilities for Lincoln, says the plant feeds effluent to the campus heat exchanger, called the Centralized Renewable Energy System (CRES). It is one of about a dozen such installations in the country and one of the largest.

"Our challenge was getting a pumping station between the UV disinfection building and our effluent discharge structure," says Crisler. "It was a very small space on our 51-acre site, so we built a 1,500-square-foot submersible pump station."

The effluent is automatically diverted to the pump station, then flows to the CRES through a 2,000-foot, 30-inch ductile iron pipe. A pipe returns the water to the plant for discharge to Salt Creek. "That eliminated a second point of dis-



Six pumps (Flygt) at the submersible pump station automatically divert effluent to the Centralized Renewable Energy System on the Innovation Campus through a 30-inch ductile iron pipe. The effluent is returned to the plant for discharge to Salt Creek.

PHOTOS COURTESY OF LINCOLN NEBRASKA DEPARTMENT OF WATER POLLUTION CONTROL FACILITIES



Steve Crisler, superintendent of water pollution control facilities for Lincoln, Nebraska.



charge and another National Pollutant Discharge Elimination System [NPDES] permit process," Crisler says.

A plate-and-frame heat exchanger at the CRES captures energy to heat and cool all buildings on the Innovation Campus. It took general contractor Kiewit Building Group of Lincoln about 10 months to build the system, engineered by the Lincoln office of Olsson Associates.

## HISTORY OF SUSTAINABILITY

The Theresa Street Wastewater Treatment Plant began using effluent for heating and cooling long before the Nebraska Innovation Campus came along. “Thirty years ago, we used hydronic heating with effluent as the water source, and in the last 15 years we’ve used heat pumps for air conditioning and heating in many areas of the facilities,” says Steve Crisler, superintendent of water pollution control facilities for the City of Lincoln.

As much as 1 mgd of effluent is reclaimed, about 500,000 gallons per day on average, for lawn irrigation, flushing of mechanical pump seals, belt filter press cleaning, grit removal and other purposes. The city’s Northeast Wastewater Treatment Plant reuses about 125,000 gpd in the plant and up to 70 million gallons a year for cooling a nearby natural-gas-fired power plant. Together, the plants save about \$576,000 a year over using potable water.

In the mid-90s, the plant began automating. In the 1980s, all pumps were converted from packing to mechanical seals, cutting energy use by up to 20 percent per pump. The plant began replacing pumps and motors with energy-efficient models 30 years ago. “I’m quite proud that we’ve been doing some of these things long before sustainability and green were buzzwords and standard practice,” says Crisler.

The 28 mgd (design) activated sludge plant has used cogeneration since 1991. A 900 kW facility produces about 5.5 million kWh a year, sold to Lincoln Electric System to generate about \$240,000 a year, about 45 percent of the plant’s annual electric bill. The digesters and buildings are heated by recovered heat.

The generation system is reaching end of life, and the wastewater division and the HDR engineering firm are studying future options. “We’re looking at working with the University of Nebraska to use biogas in their boilers, maybe using it for compressed gas to fuel the city’s bus fleet, or maybe selling it to the natural gas industry,” says Crisler. “We’re looking for the best ideas that are the most attractive for sustainability and return on investment. We may stay with what we’re doing, but it doesn’t hurt to look.”

## HIGH EFFICIENCY

The CRES is more efficient than typical geothermal systems, which operate with water at temperatures from the 40s to the 90s F. “Our effluent is 57 to 75 degrees F,” says Crisler. “In summer when the air is in the 90s, the CRES is more efficient than geothermal. In winter, the water temperature in a geothermal system can go down into the 40s. Our effluent typically doesn’t get lower than 57 degrees. They would certainly love to heat the water more and pull more cooling out of it, but our NPDES permit limits us to a 90-degree discharge temperature. The CRES is only allowed to take the water up to 85 degrees.”

The pump station is controlled by pressure demands from the CRES, which has five 110 hp, 5,000 gpm pumps, plus one backup. “As they bring more heat exchangers online, the pressure in the system drops,” says Crisler. “Our pumps will speed up to maintain a set pressure. It’s designed to work automatically, but we have redundant manual operation, as in any of our processes.”

The pump station matches standards and equipment used in the treatment plant. It includes Flygt – a Xylem Brand CP 3306 pumps and Allen-Bradley Powerflex variable-frequency drives (Rockwell Automation). “We wanted to make sure that we had redundancy in controls and pumps and

that it tied in correctly with our SCADA system,” says Crisler.

Theresa Street has an enhanced SCADA system using Allen-Bradley SLC 505 PLCs and Iconics HMI software. The CRES system uses Allen-Bradley ControlLogix PLCs with FactoryTalk PanelView (Rockwell Automation) and Wonderware HMI software (Schneider Electric). The systems share control functionality and process information. “Like all pump stations,



The Centralized Renewable Energy System on the Innovation Campus will eventually provide heating and cooling for 1.8 million square feet of building space.

“Our challenge was getting a pumping station between the UV disinfection building and our effluent discharge structure. It was a very small space on our 51-acre site, so we built a 1,500-square-foot submersible pump station.”

**STEVE CRISLER**

it’s a critical operation,” says Crisler. “We’ll have to be attentive and perform good maintenance, but that’s something we do every day.”

## ATTRACTIVE PAYBACK

The CRES will save about 30 percent over a conventional boiler and chiller system, and the savings will pay for operations and the construction debt. After that, the energy savings will be split between the partners.

The development came at an opportune time for Crisler, who was looking for ways to use the energy inherent in effluent: “We had some conversations about how that might work and what the challenges and regulatory hurdles might be. It started very low key a couple of years ago and then kind of went away.”

The Innovation Campus proposal came about a year later. “We looked a little closer, did some preliminary designs and had discussions with the Nebraska Department of Environmental Quality about compliance and permit issues,” Crisler says.

The idea went on the back burner while planning continued. “Then it was, ‘Hurry up, we have to get it done,’ and we couldn’t build it fast enough.” **tpo**

## 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.**

# From Worker to Leader

MARK ENGDahl TOOK TIME TO LEARN FROM AN EXPERIENCED TEAM AS PART OF WHAT CAN BE A CHALLENGING TRANSITION TO THE MANAGEMENT RANKS

By Ann Stawski

Promoted from team member to director, Mark Engdahl received a valuable nugget of advice in overseeing the Vicksburg Wastewater Department: Manage how you manage. He says learning from his team of six could be his strongest managerial skill.

Engdahl began his career in Vicksburg, Mississippi, in 2003 with a degree as a biological engineer, having taken wastewater courses and worked in a water-quality lab in college. He believes he gained his real education when he started working at the wastewater treatment plant.

Longtime members of the Vicksburg staff are Terry West, lead operator, Class 2 wastewater operator license, with 32 years' experience; Don McAuley, lab manager, Class 4, 26 years; and Randy Bennett, Class 2, 20 years. Engdahl holds a Class 4 license and this year will receive his collections system certification, even though state regulators do not require it.

When hired at Vicksburg, Engdahl did not know his predecessor, who had been with the facility for 15 years, was grooming him for the director role. When she retired and recommended him as her replacement, he accepted.

He acknowledges that being promoted from within may cause some ripples. "My advice is to lead by example, treat others the way you would like to be treated and earn the respect of your employees," he says.

After the promotion, "I was nervous because most of these guys were older than me. I worked with them for years and respected them." The transition was less stressful than he expected, and he considers himself fortunate. In his early days, West showed him the ropes in the facility and McAuley trained him on lab processes.

## KNOWING WHEN TO DEFER

Engdahl's management style is to lead and not get in the way. "These guys know their jobs and how to do them. I wasn't going to stand over them and watch them. If anything comes up, we talk about it and then they go do whatever needs to be done.

"Don and Randy both have great



The "old" U.S. 80 Bridge stands about half a mile north of the treatment plant's outfall.

experience. Terry really knows what's going on. It makes my job easier to have such good team members who work well together. It's such an asset because they can cross-train in so many areas across the facility and lab."

The Vicksburg facility (trickling filter process, 10 mgd design flow) is staffed around the clock, including evening, weekend and midnight shifts. Usually those team members don't see much of each other except at shift changes. "I'm working on spending more time with my guys on those shifts, but they do come to me with questions and I'm always available," says Engdahl.

## DEVELOPING SKILLS

Engdahl conducts monthly safety-training sessions and continually seeks new and updated materials to keep the content relevant. He attends the yearly Mississippi Water Environment Association Conference and has as many of his staff members as possible go along. "Last year and this year, the conference was held in Vicksburg," Engdahl says. "When it's close to home, that reduces travel costs so I can send more people."

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.**

Send your ideas to [editor@tpomag.com](mailto:editor@tpomag.com) or call 877/953-3301

Staff members also attend regional Mississippi/Alabama AWWA events, which include training sessions on multiple topics. Engdahl also attends the Mississippi Department of Environmental Quality's two-day laboratory workshop with lab manager, McAuley.

Engdahl views conferences and training sessions as important for continuing education. "The more education you have, the more it will help you," he says. "Any time we can



The Vicksburg team includes, from left, David Cochran, maintenance technician; Terry West, lead operator; Don McAuley, lab manager; and Mark Engdahl, plant director.



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learn, we can do our jobs better. I've also come to appreciate the networking opportunities."

Bennett, midnight shift operator, is eager to attend training but faces the challenge of working off-shift hours. "I don't want any member of our crew feeling left out," Engdahl says. "I do what I can to make sure he gets the same training and education opportunities. I'm looking for team members who are willing to make the commitment, even when it isn't convenient."

### WORKING SMARTER

The Vicksburg plant has won numerous awards, including a 2006 Water Environment Federation Safety Award, but Engdahl continues to identify areas for improvement.

He learns by visiting other clean-water plants that he believes can be

“The more education you have, the more it will help you. Anytime we can learn, we can do our jobs better.”

**MARK ENGAHL**

models for his own: "I've visited some great facilities, and I'm encouraged by what can be done. We want to upgrade our facility to improve processes and make our operators more efficient."

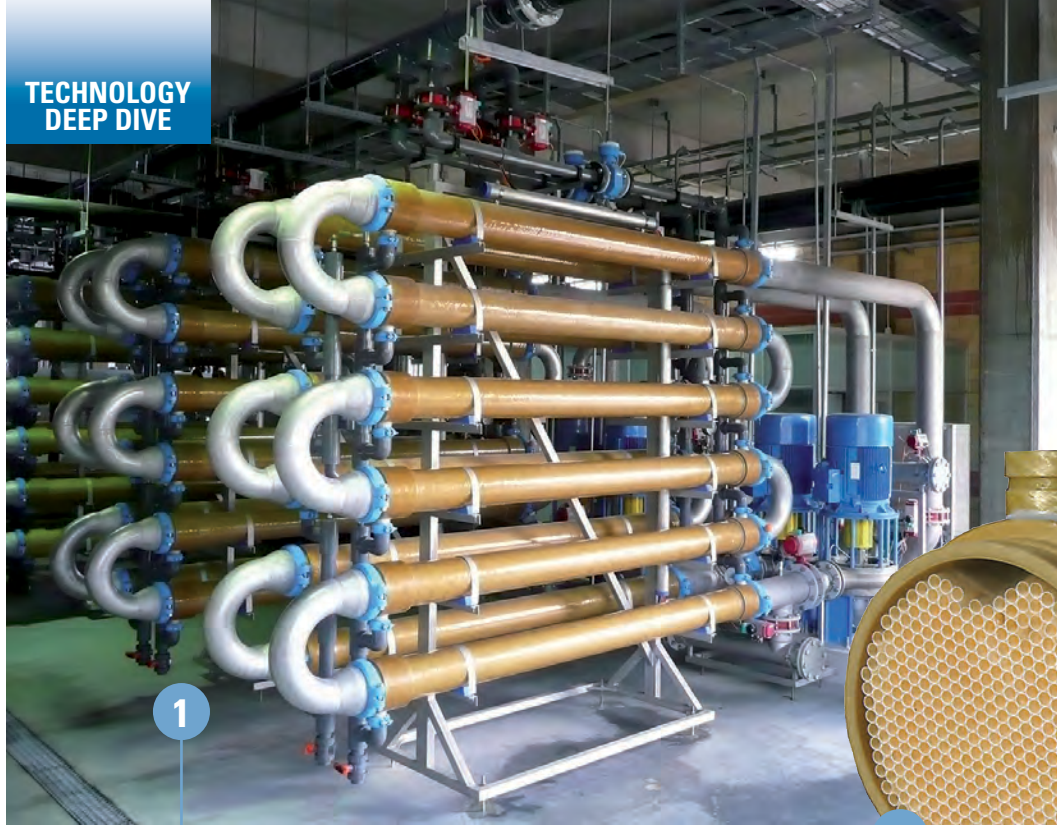
The plant has a 1973 original equipment clarifier that needs replacing; Engdahl has worked with the city's engineering department on the upgrade and secured \$400,000 in funding, including a federal Community Development Block Grant. "It will help the facility run smoother, eliminating downtime and improving efficiency," Engdahl says.

His goals also include more advanced technology: He's looking to upgrade the SCADA system to allow operators to monitor the plant remotely and so respond faster to issues.

### MANAGING THE FAMILY

When Engdahl started in Vicksburg, he did not plan to stay as long as he has. After more than 10 years at the facility, he says, "I've grown to love this job for what it is. Often people don't think of their utilities unless something goes wrong. What we do on a daily basis is often thankless, but knowing it is an important job makes the profession rewarding."

Engdahl and his team take pride in their work and how they serve the community. Whether it's managing systems efficiently or conducting tours, he's proud of his crew: "It's like a family environment, especially when we're together for so many hours. The best part of managing is having good people who make it easier to do my job." **tpo**



1

2

- 1) The Memthane system is modular in design. It yields suitable water for reuse on site, for further treatment to more demanding applications, or for permit-compliant discharge to a sewer system.
- 2) The Memthane technology includes bundles of ultrafiltration fibers.



## Two-Pronged Solution

THE MEMTHANE ANAEROBIC MEMBRANE BIOREACTOR COMBINES DIGESTION WITH ULTRAFILTRATION TO ENABLE EFFICIENT BIOGAS PRODUCTION FROM INDUSTRIAL WASTEWATERS

By Ted J. Rulseh

Businesses and communities that produce and treat wastewater increasingly look for ways to recover resources from the waste streams — whether energy, nutrient-rich fertilizer and other valuable byproducts, or water for reuse.

Pentair, in partnership with Veolia Water, has developed a technology for treating high-strength, high-solids waste streams from industrial facilities such as dairies, distilleries, breweries and bioethanol plants in a way that yields high-quality effluent and maximizes production of biogas that can be used for heating fuel or electric power generation.

The Memthane anaerobic membrane bioreactor combines Veolia's anaerobic biological wastewater treatment process with Pentair's X-Flow ultrafiltration (UF) membrane separation. Its advantages include low energy consumption, a small footprint, low chemical usage and substantial reduction in biosolids volume, reducing handling costs.

Phil Rolchigo, vice president of technology with Pentair, talked about the process in an interview with *Treatment Plant Operator*.

**tpo:** What is the reason behind bringing this offering to market?

**Rolchigo:** Treating wastewater is generally considered an expense. The moment you start thinking of wastewater as a resource, as a feedstock, you can start thinking about wastewater treatment as a profit center. Our focus is around reimagining wastewater treatment plants as resource-recovery facilities. We found it exciting that by coupling a membrane with an

anaerobic bioreactor we could change the efficiency of digestion such that we can get over 25 percent more methane out. The biogas generated through this process can help make the treatment plant energy neutral or even a net renewable energy producer.

**tpo:** So this process also functions as a treatment for the liquid side of the waste stream?

**Rolchigo:** Yes. COD is reduced by more than 98 percent. If you were to look at a sample of water coming out of an anaerobic digester versus water coming out of our process, you would see the latter coming out very low in color, whereas decant from an anaerobic digester would be colored from the presence of organics still in the water. So the net result is water suitable to be reused on site, treated further for more precise applications or at the very least cleaned to a level that makes it much easier to discharge to a sewer system.

**tpo:** So far, what are the primary applications for this technology?

**Rolchigo:** We've found really great traction in the food and beverage market because those waste streams tend to have very high BOD and require anaerobic digestion to treat the solids.

**tpo:** Are there potential applications in the municipal wastewater treatment sector?

**Rolchigo:** We are exploring new opportunities, and they include using

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this technology in municipal applications in what is traditionally the anaerobic digester part of a wastewater treatment plant. We see a significant opportunity there.

**tpo:** In basic terms, how would you describe the treatment process?

**Rolchigo:** It works in a manner similar to a kidney dialysis loop. You constantly circulate the solids and the liquid through the bioreactor. You

“We are exploring new opportunities, and they include using this technology in municipal applications in what is traditionally the anaerobic digester part of a wastewater treatment plant.”

**PHIL ROLCHIGO**

The key difference is that while a traditional anaerobic digester tends to digest biomass that is near the end of its lifecycle, the anaerobic bioreactor actually digests a great deal of liquid organic mass — the carbohydrates, the proteins and the fats, oils and grease, which are the primary food source.

**tpo:** How does the UF membrane filter fit into the process?

concentrate the solids in the membrane filter and pull off purified water. Meanwhile, you're continuously feeding the waste stream into the reactor. By significantly improving the digestion process, you convert more of the organic matter to methane while reducing the volume of solids and so reducing solids-handling costs.

**tpo:** How does the anaerobic bioreactor used in this process differ from a traditional anaerobic digester used in a municipal treatment system?

**Rolchigo:** The two are very similar in the way they are operated.

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**Rolchigo:** The UF membrane is outside the bioreactor. We constantly circulate the biomass across the membrane and back into the bioreactor. This yields a higher solids concentration in the bioreactor, making it more productive and enabling generation of more methane.

**tpo:** How do the UF membranes handle high solids loading without fouling?

**Rolchigo:** In designing UF membranes, you can change a number of parameters according to the flow being treated. With drinking water, you can use very fine fibers because the source water has low suspended solids. For our application, we use membranes shaped as tubes 1 mm to 2 mm in diameter. The material can flow through easily, and the flow velocity keeps the membrane surfaces clear. We also prevent fouling by making the membranes from PVDF material, which is similar to Teflon in that it repels oil, so you don't have oil sticking to the membrane pores. There is also a periodic clean-in-place process that is fully automated.

**tpo:** How complex is this technology to operate?

**Rolchigo:** It's no more complicated than a traditional solids treatment process, and in many cases it's a little bit simpler, because in a classic application where you rely on settling to separate the liquid from the solids, there are many ways in which the process can be upset. In our process, the membrane performs a complete separation between liquid and solids and doesn't rely on the density of biomass for separation. It's a highly automated process.

**tpo:** How does this process limit the release of odors?

**Rolchigo:** Because it's a closed system, there is no release of methane or any odorous gases. Our gas-recovery systems separate the CO<sub>2</sub> from the methane to create two gas streams. The CO<sub>2</sub> in some applications can be reused, such as to balance pH, and in other cases it is vented. The biogas is recovered and treated for use on site. **tpo**

# POWERED BY PASSION

DUYEN TRAN HAS COME A LONG WAY FROM SOUTH VIETNAM, TO PROJECT MANAGER IN AN ARKANSAS CITY, TO SUSTAINABILITY DIRECTOR FOR A MAJOR ENGINEERING CONSULTING FIRM

STORY: **Jack Powell**

PHOTOGRAPHY: **Stephen B. Thornton**

PASSION. YOU HEAR THAT WORD A LOT IN CONVERSATIONS ABOUT Duyen Tran. Her co-workers cite her “passion for the wastewater industry.” City officials applaud her “passion to improve sustainability.” Her boss credits her “passion for hard work and mentoring” with helping to strengthen client service.

Tran, who calls herself “green before green was cool,” puts it this way: “I’m passionate about water and wastewater. I didn’t recognize the importance of clean water until I actually worked in the wastewater field and understood how what we do helps prevent pollutants from entering our drinking water. So I made it my passion not only to make a difference in my career, but also to help young professionals who want to make wastewater their career choice.”

Tran has spent most of her 25-year career with the CH2M HILL consulting firm working for the Fayetteville (Ark.) Wastewater Division, first in the lab and ultimately as project manager. Last year she became CH2M HILL’s director of sustainable operations.

Last October the National Association of Water Companies honored her commitment to the profession with the 2014 Living Water Award Grand Prize, recognizing exemplary private water industry professionals. “It’s overwhelming to think I was selected from among all the dedicated water professionals and my peers,” Tran says. “I’m very thankful for the nomination, support and recognition of my efforts and passion.”

## UP THE RANKS

Tran came to the United States with her family after a difficult escape



Duyen Tran, CH2M HILL’s director of sustainable operations, at the Paul R. Noland Wastewater Treatment Plant in Fayetteville, Arkansas.

from South Vietnam in 1975 (see sidebar). She met her husband, Hung Duong, in a refugee camp in Fort Chaffee, Arkansas. Tran entered the wastewater business by answering a newspaper ad for a chemist in an environmental laboratory in Fayetteville. She and her husband had moved to Fayetteville from Little Rock after he took new assignments with IBM in northwest Arkansas.

Tran earned a bachelor’s degree in chemistry from the University of Arkansas-Little Rock and afterward worked three years as a chemist in the inorganic and radiochemistry laboratories for the Little Rock Health Department, analyzing drinking water. The Fayetteville job was with CH2M HILL, which has provided wastewater operations and management services for the city since 1987.

Tran started in 1989 as a chemist. She became lab director in a few months, then advanced to assistant project manager in 1997 and to project manager in 2003. Along the way she earned a Class IV municipal wastewater license.

“Fayetteville has been a great place to work, with the best team in the industry,” she says. “I love the culture and ethics of CH2M HILL and the strong partnership we have with the city. It’s a wonderful company and great city, especially for people of diverse cultures, like me.”

## MORE THAN TREATMENT PLANTS

As project manager in Arkansas’ third-largest city (population of 74,000), Tran directed operations at two wastewater treatment plants. The 11.2 mgd Paul R. Noland Wastewater Treatment Plant is an advanced facility built in 1987. The 10 mgd West Side Wastewater Treatment Plant is an advanced facility that came online in 2008. Both are biological nutrient





Jeff Hickle, environmental projects specialist, shows Tran the rain garden he developed out of a lawn area at the plant.

## Duyen Tran, CH2M HILL Fayetteville, Ark.



POSITION: | **Director, sustainable operations**

EXPERIENCE: | **25 years in wastewater industry**

DUTIES: | **Provide guidance on sustainability across markets such as water/wastewater, nuclear and transportation**

EDUCATION: | **Bachelor's degree, chemistry — University of Arkansas-Little Rock**

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

MEMBERSHIPS: | **Water Environment Federation, Arkansas Water Environment Association, Arkansas Water Works (Northwest District)**

GOALS: | **Improve sustainability companywide; promote wastewater as a career choice**

GPS COORDINATES: | **Latitude: 36°3'45.30"N; Longitude: 94°9'26.73"W**

“ Fayetteville has been a great place to work, with the best team in the industry.

I love the culture and ethics of CH2M HILL and the strong partnership we have with the city. It's a wonderful company and great city, especially for people of diverse cultures, like me.”

**DUYEN TRAN**



Tran and Jerry Genz, team leader, with the small dozer used to load biosolids into a thermal dryer at the Biosolids Management Site.

Duyen Tran, shown with Tim Tinsley, operations supervisor at the treatment facility, calls Fayetteville a great place for people of diverse backgrounds.

“If you tell her there is something you want to work on or set as a priority, she won’t quit until it’s done. She’s a real bulldog about follow-up and follow-through.”

DON MARR



## BOTTOM LINES ON SUSTAINABILITY

Duyen Tran used a “triple bottom line” approach to sustainability while working with the Fayetteville Wastewater Division. In making decisions on operations, repair or maintenance, they asked: Is this the best solution financially? Does it provide stakeholder value? How will it affect the environment?

“A few years ago we took a hard look at fuel use when fuel prices were skyrocketing because that affected our biosolids operations,” says Tran. “We tried to minimize costs, so we looked at ways to train our employees to drive better to save fuel and reduce greenhouse gas emissions.

“That led to looking at our entire biosolids operation. Rather than continuing to put biosolids in landfills, we decided instead to convert it into a reusable product that we could sell or make available for public use. Sustainability drives a lot of decision-making here.”

Tran’s sustainability achievements in Fayetteville include:

- Reusing 39.7 million gallons of effluent per year (about 1 percent) for hay irrigation.
- Reusing 2,481 dry tons of biosolids, reducing landfill trips from 198 in 2012 to seven in 2013.
- Recycling 305 UV lamps, 10 sodium halide lamps and 64 T-12 fluorescent lamps.
- Recycling 1,143 pounds of cardboard; 239 pounds of plastics, batteries and printer cartridges; 145 pounds of aluminum; 60 pounds of steel cans; 1,685 pounds of mixed paper; and 300 gallons of oil.
- Restoring habitat on the Paul R. Noland Wastewater Treatment Plant grounds, helping it become its state’s first site certified as a Community Habitat by the National Wildlife Federation.

Such accomplishments resonate in Fayetteville, where sustainability is increasingly important. Tran takes pride in helping drive a culture that promotes sustainable solutions: “Any time we talk about spending money, the mayor and the city council and other officials will likely listen to ideas that embrace all three elements of sustainability.”

removal plants with permit limits for ammonia and phosphorus in addition to BOD and TSS. Managing 45 people, Tran had responsibility for:

- The Biosolids Management Site (on 670 acres next to the Noland plant) that produces Class A material sold as fertilizer. The project uses six Thermo-System active solar dryers (Parkson Corporation) and a natural gas thermal dryer.
- The Nutrient Uptake Program. Fayetteville stopped land-applying biosolids in 2003 due to elevated soil phosphorus. Effluent from the Noland Wastewater Treatment Plant is applied to the Biosolids Management Site hay crops to enhance phosphorus uptake. The hay is harvested and sold, providing revenue to the city.
- The Industrial Pretreatment Program.
- The Woolsey Wet Prairie Sanctuary (next to the West Side plant), a 43.65-acre wetland restoration project built to offset the loss of 9.88 acres of wetlands to the plant’s construction.
- The city environmental laboratory, which in 2013 conducted 8,574 analyses on 3,359 samples, in addition to 2,205 analyses for data quality control.
- Operations of 38 lift stations and maintenance on five abandoned lift stations.

## LONG HOURS

Such responsibilities would be overwhelming if not for Tran’s work ethic. Her go-the-extra-mile focus earned the respect of her peers, subordinates and city officials. “Duyen is a very hard worker, often sending emails at 1, 2 or 3 in the morning,” says Billy Ammons, regional business manager for CH2M HILL and interim project manager in Fayetteville. “I’ve enjoyed working with her for the last 25 years. We made a strong team. She’s very gracious and gets along with everybody.”

Don Marr, chief of staff for Mayor Lionel Jordan, calls Tran “excellent” in managing the public-private partnership. He says the Fayetteville project has grown over the years largely because of the trust that has developed between Tran and her team and the city. As a result, the city has given CH2M HILL more responsibility in operations, regulatory research, sustainability and other areas. Over the years, the partnership has won several awards, including:

- 2013 National Safety Council Safety Leadership Award to the CH2M HILL staff for seven years without a lost-time incident.
- Finalist for a 2013 Arkansas Department of Environmental Quality Environmental Stewardship Award.
- 2011 National Conference of Mayors Award for Public-Private Partnership.

Tran received the 2014 Arthur Sidney Bedell Award from the Arkansas Water Environment Association for “extraordinary personal service in the water pollution control field.” She also has been recognized as Wastewater Manager of the Year by the Arkansas WEA, and by the Northwest District Arkansas Water Works & Water Environment Federation with an Individual Achievement Award.

She helped the Paul R. Noland Wastewater Treatment Plant win the 2010 AWW&WEA George W. Burke Jr. Award for safety programs. Earlier, her work helped Fayetteville win a 1998 U.S. EPA National Award for Outstanding Industrial Pretreatment Program. Those and other efforts earned Tran CH2M HILL’s Presidential Teamwork Award in 2009.

“The thing we love about Duyen is that we can always count on her to be well informed and well researched and take the time to educate us in her field, with which many don’t have great familiarity,” says Marr. “If you tell her there is something you want to work on or set as a priority, she won’t quit until it’s done. She’s a real bulldog about follow-up and follow-through.”

“I wouldn’t be where I am today as a female professional if it weren’t for Duyen’s nurturing and support.”

**MICHELLE STRANGE**

## MOVING STAFF UPWARD

Tran’s people skills are legendary. Tim Luther, operations manager, has worked with Tran since 1999, when he was a wastewater operator and she was lab supervisor. Luther calls her “a great supervisor” and credits her with helping him get promoted — first to lead operator, then operations supervisor and to his present position in 2008.

“Her biggest attributes are her dedication to promoting the wastewater industry, developing her staff and her forward thinking,” he says. “In terms of growing her people, she’s done great things with the Fayetteville staff and has been able to promote them to bigger jobs in the company. Some people have gone on to water projects across the United States as project managers, supervisors and other higher-level positions, thanks to her emphasis on training, education and especially one-on-one mentoring.”

Tran’s former administrative assistant, Michelle Strange, tells a similar story. Strange, who raised four children and had been out of the workplace for 15 years, found her boss “a great mentor in helping me balance home and a new career. I wouldn’t be where I am today as a female professional if it weren’t for Duyen’s nurturing and support.”

## GIVING BACK

While running the wastewater project, developing staff and raising three sons (now grown), Tran found time to give back to the community. In 1994, she helped form a hazardous waste committee in Fayetteville that organized annual waste “roundups.” She’s active in the chamber of commerce, helping educate business leaders about the importance of water treatment in industries. She served on the board of the Fayetteville Soccer Association, and as president led a reorganization that grew membership from 200 to 1,200. She regularly speaks in schools about the virtues of wastewater careers.

As an industry advocate, Tran has been a featured speaker at conferences in Oklahoma and Arkansas and at U.S. EPA regional events. She was recently elected speaker for the Water Environment Federation House of Delegates and is past president of the Arkansas WEA. She is also a member of the Awareness and Education Committee of the Beaver Watershed Alliance and the Technical Advisory Committee of the University of Arkansas Water Resources Center.

Given her drive and dedication to the environment, Tran’s new role as director of sustainable operations is a “great fit,” according to her boss, Robert Kuta, a CH2M HILL global operations director. As part of the O&M Services unit, she’ll bring a sustainability focus to the water, environment, nuclear and transportation markets, looking at energy savings, conservation, repurposing, recycling and reducing consumable goods.

Says Kuta, “Through Duyen’s sustainability efforts in Fayetteville and on other projects, we’ve seen some of the most impressive performances around sustainability with our client partners. Those successes have brought a lot of attention to the skills and passion she has for that area of the business. So to have her leading the charge is a win-win for us and those we serve.” **tpo**

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## COMING TO AMERICA

Duyen Tran’s coming to the United States is a story of determination. Her family of 10 — parents, siblings and other relatives — left South Vietnam in 1975, boarding a merchant ship uninvited on the eve of the country’s fall. She left behind her maternal grandparents. Her father had been a government official who faced imprisonment or worse.

“We offered all our money,” Tran recalls. “That included my mother’s jewelry and any valuables we had at the time so we could stay on the ship. When the ship reached international waters, we were told to leave because we were not part of their journey to Hong Kong.”

Fortunately, the ship came close to one of the barges being used to transfer refugees from different types of vessels to U.S. 7th Fleet ships. One by one, Tran’s family members jumped down to the barge, trying not to fall into the gap between the vessels.

Tran, then a teenager, helped keep her parents and siblings calm.

“On the barge, we floated for five days with just a couple of bags of ramen noodles and two cups of water before we got picked up by the Navy,” she says. “I was told that our barge was one of the most crowded, with close to 5,000 people aboard. We were packed back-to-back with no place to lie down. By the time we were rescued, I was hallucinating because of hunger and thirst. We were processed through Guam and boarded flights to Fort Chaffee [in Arkansas].”

Billy Ammons, CH2M HILL regional business manager, considers the journey remarkable: “Duyen is the classic American success story. She came here with nothing, sponsored by a couple of families. She got an education and worked hard to get where she is today. Anyone who says you can’t get ahead in America only has to look at how hard Duyen and her husband have worked to succeed.”

# Better Process, Better Product

A GERMAN-ENGINEERED SOLIDS-PROCESSING TECHNOLOGY YIELDS EXCEPTIONAL QUALITY BIOSOLIDS PELLETS IN A SMALLER FOOTPRINT AND AT LOWER COST THAN COMPOSTING

By **Scottie Dayton**

To produce Exceptional Quality compost, staff from KB BioEnergy, a biosolids management firm, mixed sawdust with primary and waste activated sludge at the Akron (Ohio) Renewable Energy Facility.

In 2009, the sawdust price increased from \$3 to \$15 per cubic yard. “We used 50,000 to 60,000 cubic yards annually, but compost sales didn’t generate enough revenue to cover the increased cost,” says Annette Berger, vice president of operations. “We needed an economical alternative that dovetailed with upgrading our 25-year-old facility.”

A trip to Germany to investigate anaerobic digestion technologies introduced officials to Schmack Biogas, a member of the Viessmann Group in Schwandorf. “Their reactors were processing manure slurry at 30 percent solids while our municipal technology achieved 3 to 5 percent solids,” says Berger. “When we saw the EUCO Titan system, we wanted it.”

The two-phase, \$32 million upgrade reduced annual electricity costs from \$360,000 to \$30,000 at the facility. The Akron facility now produces Exceptional Quality biosolids pellets, used by a landscaping company as a soil conditioner.

## TO THE TEST

To test whether the technology would generate biogas from 28 percent solids material, Akron officials contracted with KB BioEnergy to build a pilot plant handling one-third of the water reclamation facility’s primary and waste activated sludge (22 to 25 million gallons per year). The successful pilot provided a baseline for the full-scale system.

Previously, Akron’s 90 mgd (design) water reclamation facility annually pumped 65 to 75 million gallons of blended, thickened sludge under the Cuyahoga River to three holding wells at the renewable energy facility. After processing, the staff managed the composting in four reactor bays. Further curing occurred outside on a concrete slab.

While composting continued, the pilot-scale plant was built. It included a 168,000-gallon EUCO 600 plug-flow digester (BIOFerm Energy), a complete mix 500,000-gallon COCCUS 2000 second-stage digester and an all-



PHOTOS COURTESY OF KB BIOENERGY

ABOVE: Side-by-side 286,000-gallon EUCO 1000 plug-flow digesters share a wall and generate 50 percent of biogas production. BELOW LEFT: Darnell Johnson of KB BioEnergy monitors daily operations of the dry-feed system. BELOW RIGHT: The second-stage 704,000-gallon COCCUS 3000 polishing reactor digests organic compounds, turning them into biogas and carbon dioxide.



PRODUCT: | **EUCO Titan solids-processing system**

MANUFACTURER: | **Schmack Biogas**

USER: | **Akron Renewable Energy Facility**

APPLICATION: | **Anaerobic digestion, renewable energy**

BENEFITS: | **Clean process, small footprint, low operating cost**

in-one container with 335 kW combined heat and power (CHP) Jenbacher engine-generator and control room (GE Energy).

The process begins with five 2-meter, 200 gpm belt presses (Andritz) dewatering 65,000 gpd of 5 percent solids material to 28 percent solids filter cake. A conveyor transports the cake to two holding bins; a screw conveyor then feeds it to the EUCO digester, maintained at 98 degrees F. Horizontal paddles on the REMEX agitator mix the solids for six to seven days, generating 50 percent of biogas production.

The solids then transfer to the COCCUS polishing reactor, also maintained at 98 degrees and equipped with the same agitator. An integrated gas-storage membrane system expands and contracts based on biogas production. Residence time is approximately 21 days. Sulfide-reducing bacteria on fixed-film media digest organic compounds, releasing biogas and carbon dioxide. “We composted the dewatered solids and used the biogas to fuel the Jenbacher engine,” says Berger.

## SUPERCHARGED SYSTEM

Engineers from Applied Technologies worked with their German counterparts throughout 2006, redesigning equipment to pass U.S. building codes. Meanwhile, Great Lakes Construction began the concrete work, driving pylons into soft, spongy soil to support the equipment.

Schmack shipped the components from Germany along with mechanics to install and test the equipment. A Web-based control system (Evoqua Water Technologies) allowed engineers to review and modify operations. The \$7 million project took a year to complete, bringing Phase I online in November 2007.



KB BioEnergy employees Margo Luey; Annette Berger, vice president of operations; and Randy Campbell discuss pump material between the COCCUS and EUCO digesters.

Seed sludge obtained from another city was too thin (1 percent solids) to stabilize the bacteria, already hampered by cold weather. It took until early April to produce biogas, and production was erratic. “Schmack added bags of powdered micronutrients to manure digesters in Germany,” says Berger. “When we followed their directions, we had great gas production the first two weeks, and then it trailed off. By the fourth week, they’d tell us to add more material.”

River Bend Labs (Chemtron) tested the sludge, then injected nutrients designed specifically for the plant. “They acted like a One-A-Day vitamin on the system,” says Berger. “Biogas production became consistent, enabling the CHP engine to run smoother.” Higher efficiency generated more gas than the engine could consume. “We flared constantly. This was critical, as it helped us determine engine sizes for Phase II.”

## SEASONAL CHALLENGES

During the first summer, heat raised temperatures in the all-in-one container, causing the programming to derate the Jenbacher engine. An engineering firm determined where to introduce more air and how the fans should move it to cool the engine’s electronics.

That winter, the temperature in the EUCO digester dropped to 70 degrees despite heating tubes along the mixing shaft. Nevertheless, the microbes survived. The next year, engineers added a tube-in-tube heat exchanger to the unit that minimized heat loss and kept temperatures in the upper 80s during extreme cold.

KB BioEnergy used the thermal energy produced by Phase I to help heat the digesters. Any excess was released. The electric energy helped power composting operations.

## SCALING UP

For Phase II, BIOFerm Energy Systems/Viessmann Group, representing Schmack in the U.S., supplied two 286,000-gallon EUCO 1000 digesters and two 704,000-gallon COCCUS 3000 digesters with double-membrane domes. To maintain optimal temperatures in the tanks, engineers specified corrugated aluminum heating tubes (Brugg) around the walls. The EUCO units also had the tube-in-tube heat exchanger. “The digesters are maintaining 98 degrees in the winter now,” says Berger.

The 400 cfm of biogas they produce passes through a conditioning system (Unison Solutions) that removes hydrogen sulfide and siloxanes. KB BioEnergy sends the conditioned gas to the CHP units or the thermal-fluid heaters used by the dryer (Komline-Sanderson). The biogas also powers three 600 kW MWM engines (2G-Cenergy) to generate electricity and heat paratherm oil to 400 degrees in two thermal-fluid heaters with biogas and natural gas burners.

Two progressive cavity pumps feed 28 percent solids digested cake to the dryer, designed to process 10,000 pounds per hour. The resulting 92 to 99 percent dry pellets meet Exceptional Quality standards.

## PROFITABLE BYPRODUCTS

The full-scale 143,750-square-foot plant, designed to process 197,000 gpd and produce 15,000 cubic yards annually, went online in October 2013. “Using seed sludge from Phase I enabled Phase II to produce gas in four weeks,” says Berger. “Schmack engineers were surprised since they expected startup to take four or five months.”

Phase II provided new challenges. Condensation traps on biogas lines froze in winter. Engineers added more insulation and heat tracing on the lines. Then calcium carbonate built up on the dryer’s cooling system. “As deposits accumulated, we lost our capacity to cool pellets before storage,” says Berger. “Feeding an anti-scaling chemical [Solenis] solved the problem.”

The EUCO Titan technology met all the test parameters. The electricity

“Their reactors were processing manure slurry at 30 percent solids while our municipal technology achieved 3 to 5 percent solids. When we saw the EUCO Titan system, we wanted it.”

ANNETTE BERGER

it generates powers the renewable energy facility; if there is excess electricity, it is shared with the water reclamation facility. The thermal energy heats the digesters and provides supplemental heat to the dryer’s thermal fluid. A local landscape supplier uses the 35 to 45 cubic yards of pellets produced daily as a soil conditioner.

“Compared with composting, this process is cleaner, has a smaller footprint and is less costly to manage,” says Berger. “That is the return on our investment.” tpo

### Share Your Ideas

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# Spanning the Miles

NEBRASKA OPERATORS REACH HALFWAY ACROSS THE COUNTRY FOR A PARTNERSHIP TO DELIVER HIGH-QUALITY ONLINE TRAINING THAT HELPS PARTICIPANTS PASS LICENSING EXAMS

By Ted J. Rulseh

Licensing exams can be tough, especially at the upper levels. Passing them takes study, ideally in the form of a training course of some kind. But in a big rural state, like Nebraska, it's hard for operators to travel to a central classroom site for sessions of a course lasting multiple weeks. So what's a state operator association to do? Well, the Nebraska Water Environment Association (NWEA) looked to the online world.

Specifically, the group looked to Florida Gateway College, which offers online water and wastewater courses that function as exam preparation while also providing college course credits. Through an agreement with Florida Gateway, the NWEA gives its members access to courses that can help them boost their chances of exam success.

The program augments existing training programs offered by the state Department of Environmental Quality (DEQ) and the NWEA's own training classes. Ryan Hurst, facilities maintenance supervisor with the City of Seward Water & Wastewater Department, talked about the online program in an interview with *Treatment Plant Operator*.

**tpo: What's your history in the water professions and with certifications and exams?**

**Hurst:** I got my start in the industry when I joined the City of Seward eight years ago. Like a lot of young operators — I was 21 — I didn't have a college degree, although I had gone to a community college for general studies. As I acclimated to the industry, I discovered, "Wow, there is a lot to learn here." Part of our job as operators is to earn those certifications.

“When I attended that second class, I started to hear a common thread. All the operators of different ages were saying the same things. For one, they said the test was too hard. And for two, they said there just wasn't enough training for the Class IV test.”

RYAN HURST

At that time, the DEQ had a five-day training course. I took it and got my Class II wastewater operator certification. I scored really high on the exam, and so that same year, feeling cocky, I decided to try and get my Class IV — you can skip steps in Nebraska on the wastewater side. I just bombed the test. I wasn't prepared for it at all. A couple of years later I decided to commit to this career. NWEA had a three-day test preparation course. I took that and then took the Class IV exam again. I missed it by 5 percent. It's a very hard test.

**tpo: Did you find that other operators had experiences similar to yours?**

**Hurst:** When I attended that second class, I started to hear a common

thread. All the operators of different ages were saying the same things. For one, they said the test was too hard. And for two, they said there just wasn't enough training for the Class IV test.

I later took advantage of the Sacramento State test prep materials. I took the advanced wastewater treatment course and I did it all on my own. I must have made up more than 1,000 flash cards that I memorized. It almost became an obsession — I had to pass that test. I put a lot of effort into studying, and in July 2013 I passed and got my Class IV certification. I also have a Grade II water operator license.



Ryan Hurst

**tpo: What did you do with the information you had gathered about the exam and the shortage of effective training for it?**

**Hurst:** I had been flirting with what we could do in Nebraska to help operators pass the upper-level tests, and even the lower-level tests. I did some research and looked into what other states were doing. I thought of what we could do to provide longer-term training instead of just the three-day or five-day courses — what if we spread it out over 15 weeks? Because it's so much to learn. In three days, if you had to learn it all, there's no way you could do it.

In calling around, I found some courses in Florida where operators actually have to take test preparation courses before taking the exams. There were in-classroom courses, but I realized that would not work in Nebraska. There's no way you could get operators from places like Sidney, Lincoln and Alliance together for a long-term class. They're all eight hours apart. They couldn't make it to a class once a week.

**tpo: After coming to that realization, where did you look next?**

**Hurst:** I found Florida Gateway College in Lake City. They have what they call a Water2Go operator training program. It's a 15-week online certification training program and a five-credit college course. You can apply the credit toward an associate degree. Operators can log in and find reading assignments, practice tests and discussion forums where they can interact with operators from throughout the country. The course is taught by a professor, and if you have questions, if you don't understand something, you can email or call him.

(continued)



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**tpo:** Once you found this resource was available, how did you proceed?

**Hurst:** At first I thought, “We’re going to bring this to Nebraska.” But then I came to the realization that since Florida Gateway already had the infrastructure and the teachers, and it was an online course, it didn’t matter where we delivered it from. I saw that it would be cheaper and better to offer the course through a partnership between the NWEA and the college.

At the 2013 NWEA fall conference, I brought the idea up to Keith Kontor, who is wastewater superintendent in Fremont, and Todd Boling, who is wastewater superintendent in Norfolk. They were leaders on the NWEA Training Committee. I organized teleconferences with them and the staff at Florida Gateway, most notably Dr. David Shoup, who at the time was the water resources program director, but has since retired. On Jan. 9, 2014, we signed a memorandum of understanding between Florida Gateway and the NWEA that formally spelled out what our partnership would look like.

**tpo:** Since the college has all the training infrastructure, what is the NWEA’s role in the partnership?

**Hurst:** We decided that what we would do from our side is promote the program within the state. I’ve done two presentations about it at operator conferences. We’ve also put out announcements in some flyers and some newsletter articles.

**tpo:** How does this new online program fit in with the training previously available?

**Hurst:** We still offer the three-day NWEA test preparation course, but now when operators want to get the in-depth training they need for their upper-level certifications or even for the lower levels, we send them to Florida Gateway and the online training. We’ve only had a few sign up for it so far, but we hope that over the years as we keep offering it, we’ll really boost our training quality and improve our exam pass percentage.

**tpo:** Historically, what kind of success rate have you seen on the Class IV exam?

**Hurst:** On the Class IV operator certification, it has been about a 25 percent pass rate. We’re hoping to dramatically improve that through the online program and the existing offerings. Florida Gateway students have a pass rate of about 80 percent on average and about 70 percent on the highest level Florida certification exam.

**tpo:** How does the new offering differ in kind from the homegrown Nebraska programs?

**Hurst:** It’s far more in depth, and it’s online. There is no other online training in Nebraska. Also, instead of being just a three-day preparatory course, it’s actually training from the basics to advanced. It’s also an opportunity to discuss with other operators. And you take practice tests that really help prepare you for the exams.

**tpo:** How do you deal with state-specific differences in requirements?

**Hurst:** Both Florida and Nebraska use the Association of Boards of Certification testing program. So while there are some differences because there are items specific to each state, the vast majority of the training and information is applicable to both.

**tpo:** Have you encountered any specific resistance to the online training?

**Hurst:** It’s a significant time commitment. Operators need to devote about six hours a week for 15 weeks to the course. There are still some communities that need to embrace giving their operators the time they need for adequate training.

**tpo:** When operators sign up for the course and log on, what do they experience?

**Hurst:** They can’t just start at any time — it runs based on semesters,

and there are specific start and end dates. Other than that, they can do the work completely on their own time. They log into a portal for the discussion forums, assignments and assessments. All your information is available to click on and navigate. There are videos for watching and learning. The professors don’t lecture. They organize the course, make themselves available for email and phone consultation, and review and comment on the discussion forums. The instructor on the wastewater side is Sheldon Primus, and on the water side it’s Dr. John Rowe.

“We still offer the three-day NWEA test preparation course, but now when operators want to get the in-depth training they need for their upper-level certifications or even for the lower levels, we send them to Florida Gateway and the online training.”

RYAN HURST

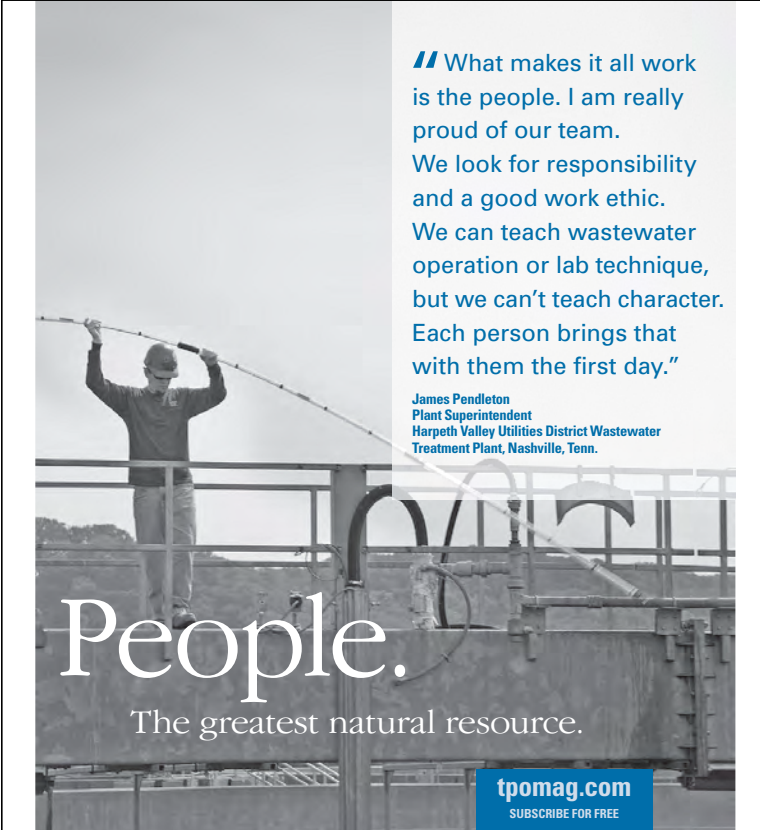
**tpo:** What is the cost of this training?

**Hurst:** For the 15 weeks, the cost is \$585, and that includes a \$150 manual. That’s very competitive for a course led by a professor and with opportunities to interact with other operators.

**tpo:** How does this course feed into actual degree programs?

**Hurst:** The credits count toward the college’s online associate degree in environmental science, which I recently completed. Beginning in January, Florida Gateway will also offer a bachelor’s degree in applied science in water resource management, completely online. So operators could start out with the online training course program just to help them get their certifications, but then turn it into part of attaining a college degree.

I hope we can continue to find ways to innovate and help operators get the training they need, especially when so many operators will be retiring in the next few years. There’s a lot of knowledge needed in this profession, and we can’t afford to overlook that. **tpo**



“What makes it all work is the people. I am really proud of our team. We look for responsibility and a good work ethic. We can teach wastewater operation or lab technique, but we can’t teach character. Each person brings that with them the first day.”

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# Monitoring and Instrumentation

By Craig Mandli

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**Testomat 2000 Phosphate online field measuring instrument from Heyl USA**

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**Lovibond MD 100 colorimeter from Tintometer**

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**Radioline wireless platform from Phoenix Contact**

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**T7BR HMI and Panel PC from Beijer Electronics**

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**TCU pump controller from Data Flow Systems**

### DATA FLOW SYSTEMS TCU

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**Dynasonics DXN flowmeter from Badger Meter**



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**FCI - FLUID COMPONENTS INTERNATIONAL ST100**

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**Halmi Nozzle from Primary Flow Signal**



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**Model 106-SPI-MV flowmeter from Singer Valve**

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**Jerome 651 hydrogen sulfide detection system from Arizona Instrument**

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### GFG INSTRUMENTATION G460

The G460 multi-sensor atmospheric monitor from GfG Instrumen-

tation has a concussion-proof boot along with dust- and water-resistant housing. It is automatically calibrated with one-button operation, a top-mounted display, interchangeable battery packs, highly configurable smart sensor design and standard data and event logging. Options include dual-range infrared combustible gas sensor, motorized pump operable in diffusion or sample draw mode, and up to seven channels of detection.



**G460 atmospheric monitor from GfG Instrumentation**

800/959-0329; [www.goodforgas.com](http://www.goodforgas.com).



**TA-2100 gas detector from Mil-Ram Technology**

### MIL-RAM TECHNOLOGY TA-2100

The TA-2100 gas detector from Mil-Ram Technology provides user-friendly data, bar graphs, instructions and diagnostics. It eliminates shorthand, coded messages. It has a programmable calibration reminder and detects hundreds of gases and vapors using sensor technologies, including electrochemical, catalytic, infrared, photoionization and solid-state. It has continuous advanced diagnostics to meet SIL 2 compliance. 510/656-2001; [www.mil-ram.com](http://www.mil-ram.com).

## Meters

### SODIMATE SLURRY METERING SYSTEM

The skid-mounted and pre-piped slurry metering system from Sodimate comes with pumps and all metering accessories needed for easy installation. It can be used for hydrated lime and activated carbon slurries. Standard skids come equipped with peristaltic pumps, a mounting panel (with solenoid valves, flowmeters, isolation valves and rinse valves) and the connections needed for slurry metering and transfer. The system is configured to work with a slurry tank and can be equipped with a control system to offer a complete slurry package. 773/665-8800; [www.sodimate-inc.com](http://www.sodimate-inc.com).



**Slurry metering system from Sodimate**

## Monitors



**Tango TX1 gas monitor from Industrial Scientific Corporation**

### INDUSTRIAL SCIENTIFIC CORPORATION TANGO TX1

The Tango TX1 single gas monitor from Industrial Scientific Corporation has two identical sensors for detection of the same gas. A three-year runtime and DualSense Technology increases worker safety while reducing maintenance costs. It detects CO, H<sub>2</sub>S, and NO<sub>2</sub>. It is powered by one replaceable AA lithium battery.

800/338-3287; [www.indsci.com](http://www.indsci.com).

### MARKLAND SPECIALTY ENGINEERING SUSPENDED SOLIDS DENSITY METER

The Suspended Solids Density Meter from Markland Specialty Engineering measures and monitors the concentration of primary, secondary, return-activated and backwash sludge/silt and slurries in pipes, tanks and clarifiers. Its ultrasonic sensor allows users to program underflow pumps to turn off before sludge becomes too

thin and helps optimize dosing and feed density. The nonintrusive in-line pipe spool-piece is simple to install, calibrate and clean. A throw-in-style version can be used as an automatic single-point interface detector, turning pumps on when the rising sludge blanket contacts it. **855/873-7791; www.sludgecontrols.com.**



**Suspended Solids Density Meter from Markland Specialty Engineering**



**Streaming Current Monitor from Micrometrix Corp.**

### MICROMETRIX STREAMING CURRENT MONITOR

The Streaming Current Monitor from Micrometrix Corp. measures particle charge and is used for monitoring and controlling coagulant dosage. The device responds to changes in raw-water quality and helps prevent plant upsets. It can be interfaced with

SCADA for process trending and automation. The sensor has a replaceable probe sleeve that extends sensor life. It can help optimize treatment and help save up to 20 to 30 percent in coagulant costs. **770/271-1330; www.micrometrix.com.**

### PALINTEST CHLORDIOX PLUS

The ChlordioX Plus from Palintest enables monitoring of chlorine dioxide and chlorite in the field. Using a disposable sensor, the U.S. EPA-approved method allows operators to monitor chlorine dioxide and chlorite using a simple, sequential method. Both parameters can be accurately determined, even in colored or turbid samples. **800/835-9629; www.palintestusa.com.**



**ChlordioX Plus monitor from Palintest**



**Pump Watch remote monitoring system from PRIMEX**

### PRIMEX PUMP WATCH

The Pump Watch remote monitoring system from PRIMEX allows remote management of lift stations and wastewater collections systems via a secure cellular network from a Web browser on a PC, tablet or smartphone. It visually tracks system performance through data logging and critical information trending. Alarms

are monitored and service personnel notified via email or text. Users can monitor data and trending anytime from the website. **844/477-4639; www.primexcontrols.com.**

### SCANTEK RION VIBRATION ANALYZER VA-12

The RION Vibration Analyzer VA-12 from Scantek monitors vibration per ISO 10816-1. It offers real-time frequency analysis up to 20 kHz with 3,200 fast Fourier transform spectral lines. From the character of the spectral data, the cause of vibration can be identified and attributed to bearing wear, rotational unbalance, shaft misalignment or even cavitation. It can detect resonance frequencies in casing or piping. **410/290-7726; www.scantekinc.com.**



**RION Vibration Analyzer VA-12 from Scantek**

### SENSAPHONE SENTINEL

The Sentinel environmental and equipment status monitoring system from Sensaphone remotely monitors up to 12 environmental and

equipment status conditions, including tank levels, power failures, flow rates, pump status, turbidity and temperature. When it detects issues, it instantly sends alerts via phone, text or email over standard cellular networks. The system is suited for operations where Internet or landline connectivity is unavailable. Users can access information and make system changes from any Web-enabled device.



**Sentinel monitoring system from Sensaphone**

It stores all readings in the cloud, protecting against data loss, providing unlimited information storage and allowing multiple devices to be managed from one account. The system can deliver daily event reports and generate an audit trail. An Ethernet-based unit is available. **877/373-2700; www.sensaphone.com.**



**700MM (Motor Monitor) from Sigma Controls**

### SIGMA CONTROLS 700MM

The 700MM (Motor Monitor) from Sigma Controls monitors up to two temperature sensors in each phase winding and also monitors upper and lower bearing temperatures and vibration. It monitors and displays the vibration sensor and each of the eight temperature inputs.

User-selectable setpoints if exceeded energize the four internal relays to advise facility personnel and shut down the motor if necessary. A

5 MB data logger logs all inputs on the user-selectable time base and allows for downloading logs for easy upload to common spreadsheet software. **215/257-3412; www.sigmacontrols.com.**

### STACO ENERGY PRODUCTS FIRSTLINE BMS

The FirstLine BMS wireless battery-monitoring system by Staco Energy Products provides real-time, proactive battery state-of-health data for critical power needs. Continuous voltage, current, impedance, temperature and cycling data are available at all times, archived and graphically displayed for immediate analysis. An



**FirstLine BMS monitoring system by Staco Energy Products**

LCD graphic touch-screen data collector enables on-site review with Ethernet/RS 485/input and output dry-contact ports for communication, Web connectivity and remote monitoring. It has email, text and dry-contact alarm notification and stores up to three years of data. **866/261-1191; www.stacoenergy.com.**

## Operations/Maintenance/Process Control Software

### ALLMAX SOFTWARE

Operations and maintenance software for water and wastewater from AllMax Software allows users to enter data once and store it, run calculations and create reports and graphs. Operator10 lets users enter data manually or through SCADA interface, LIMS import or with a DataPort hand-held data entry device. Users have access to all current and



**Operations and maintenance software from AllMax Software**

historical data to review process efficiency and create reports. Synexus Pretreatment is designed for control authorities to monitor and communicate with industrial users; users can organize inspection activities and results all in one solution. Antero CMMS helps manage maintenance programs, including work orders, equipment and parts information. **800/670-1867; www.allmaxsoftware.com.**

## IN-SITU SMARTROLL

The smarTROLL multiparameter hand-held device with Bluetooth from In-Situ Inc. simplifies water-quality spot checks. No training time is required to use the probe or the iSitu smartphone app. Users can instantly view results for 14 parameters on a smartphone. The app guides users through calibration steps and automatically generates a calibration report. It is designed to run on an iPhone, iPod touch or iPad. Users can instantly email data to colleagues or log data to an iOS device. Photos of sites and GPS coordinates can be stored with site data and instantly retrieved for routine sampling. The probe's dissolved oxygen sensor uses EPA-approved optical methodology. **800/446-7488; www.in-situ.com.**



**smarTROLL multiparameter hand-held device with Bluetooth from In-Situ Inc.**

## Process Control Equipment

### ABB LOW VOLTAGE EMAX 2

The Emax 2 low-voltage circuit breaker from ABB Low Voltage has integrated energy management functions that monitor power usage and control installed loads and generators. It includes an Ekip Power Controller that enables circuit breakers to monitor power usage and control installed loads by disconnecting non-priority loads when

consumption should be limited and reconnect them as soon as appropriate. It automatically activates emergency, standby or alternate power supplies when needed. It includes direct communication capabilities for seven industrial protocols, simplifying network integration. The trip unit has color touch-screen navigation with embedded ANSI codes. **262/785-8525; http://new.abb.com/low-voltage.**



**Emax 2 circuit breaker from ABB Low Voltage**

### ALL-TEST PRO 5 MOTOR TESTER

The All-Test Pro 5 Motor Tester provides complete stator and rotor analysis, detecting faults in low-, medium- and high-voltage AC and DC motors, transformers and generators. Its auto-diagnosis option obtains an immediate health status report on the spot. On-screen guidance eliminates instruction guides or manuals. Baseline and subsequent tests on individual motors are stored for immediate indication of any motor health changes. Testing can be performed from distances of more than 1,000 feet from the motor control center for inaccessible or hard-to-reach motors. The device provides data analysis using algorithms for comprehensive reports on motor health, including bad connections, winding and turn faults, air gap, broken bars, contamination and ground faults. **860/399-4222; www.alltestpro.com.**



**5 Motor Tester from All-Test Pro**

### ENVIRONMENT ONE CORPORATION IOTA ONEBOX

The Iota OneBox telemetry system from Environment One Corporation enables control of pressure sewer grinder pumps from an office desktop or a smartphone. It integrates into a SCADA network to provide information on tank storage capacities, power failures, blockages and faults. Diagnostics for individual properties, streets or whole networks are available in real time. It provides alerts even before the user becomes aware of any faults.



**Iota OneBox telemetry system from Environment One Corporation**

It also provides trend analysis, report generation, peak flow demand determinations, flow smoothing and maximized efficiency of downstream infrastructure. **518/579-3068; www.eone.com.**

### JENSEN INSTRUMENT JIC-RS100-B RAINSWITCH

The stainless steel JIC-RS100-B Rainswitch from Jensen Instrument has a 14-inch funnel to collect rain. Once 1/10 of an inch of rain has fallen, the level chamber is filled to the point that the capacitive level switch senses the level and changes state to divert the rainwater to the storm drain system. Once the rain has stopped, the pilot station is reset manually or automatically, and the system returns to normal mode. **626/969-7991; www.rainswitch.com.**



**JIC-RS100-B Rainswitch from Jensen Instrument**

### KRUGER USA THIOBOX

The ThioBox automated control package from Kruger USA optimizes chemical dosing based on local, continuous flow analysis. The controls compare real-time data such as temperature, flow rate and weather to historical, site-specific data to determine the exact dosing needed. Systems are constructed based on a study of the distribution network and historical

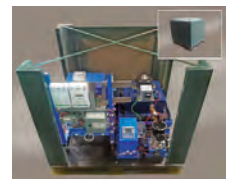


**ThioBox automated control package from Kruger USA**

trend data. An H<sub>2</sub>S monitor is installed downstream where septic, anoxic conditions lead to H<sub>2</sub>S stripping. A Hydrex line can provide the compatible chemical with the system to prevent odor and corrosion. **919/677-8310; www.krugerusa.com.**

### KUPFERLE FOUNDRY COMPANY ECLIPSE I-SERIES GENESIS

The Eclipse i-Series GENESIS intelligent flushing station from the Kupferle Foundry Company incorporates a chlorine analyzer and PLC that automatically maintains programmed safe residual levels while recording all relevant flushing and residual data. It flushes the exact amount of water needed to keep residuals safe. It is self-powered using the captured kinetic energy of the flushed water with a water turbine and battery bank. It can be placed anywhere on the water main using the distribution main as its power source. It can accommodate probes and sensors for pressure, temperature, pH, conductivity, turbidity and ORP. **800/231-3990; www.hydrants.com.**



**Eclipse i-Series GENESIS intelligent flushing station from Kupferle Foundry Company**

### TRICO CORPORATION DR-7

The DR-7 direct-reading ferrograph from Trico Corporation measures the concentration of wear particles in lubricants while providing basic wear-trend data to help determine equipment condition within minutes. It uses magnetic gradient to trap and optically measure ferrous wear particles on a scheduled basis. It establishes the baseline wear level; any sudden increase alerts the user to potential problems. It runs on PC-controlled hardware and can incorporate external devices via a four-port USB hub. It has an internal microprocessor that serves as a diagnostic system and has a 7-inch LCD display and an Ethernet port. **800/558-7008; www.tricocorp.com.**



**DR-7 ferrograph from Trico Corporation**

*(continued)*

## SCADA Systems

### TRIHEDRAL ENGINEERING LIMITED VTSCADA 11.1

VTScada 11.1 from Trihedral Engineering Limited enables growth from a full-featured single-server application to a multimillion-tag system that keeps critical features tightly integrated. The driver library supports combinations of standard and proprietary PLCs and RTUs. In minutes, users can configure redundant servers, historians, Internet servers or networks. Built-in version control provides accountability and improves recovery from unexpected effects of configuration. Over 200 graphic widgets make it easy to represent values as more than 4,500 realistic meters, switches, buttons and animations. **800/463-2783; www.trihedral.com.**



**VTScada 11.1 from Trihedral Engineering Limited**

## Sensors

### AUTOMATION PRODUCTS GROUP MNU

The MNU ultrasonic level sensor from Automation Products Group communicates via Modbus and can be programmed to fit almost any level application. It can deal with application challenges by altering such settings as pulse strength and sensitivity to incoming signals. It can also ignore obstacles, qualify echoes and deal with environmental variables. The housing is a durable polycarbonate with a PVDF sensor face. Inside the housing, the electronics are fully sealed in industrial potting for vibration resistance. Options include sensing ranges from 4 inches to 40 feet and corresponding 1-, 2-, and 3-inch NPT fittings. **888/525-7300; www.apgsensors.com.**



**MNU ultrasonic level sensor from Automation Products Group**

### BASELINE GREENLIGHT MODEL 930

The GreenLight Model 930 from Baseline measures the respiration of aerobic bacteria and equates changes in oxygen levels to the amount

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#### Analytical Instrumentation

- Analytical Technology Q46H/79S total chlorine monitor
- Burkert Fluid Control Systems Type 8905 Online Analysis System
- CEM Corporation SMART Turbo moisture/solids analyzer
- Electro-Chemical Devices FC80 Panel Mount Free Chlorine Analyzer
- Heyl USA Testomat 2000 Phosphate online field measuring instrument
- Thermo Fisher Scientific AquaPro multi-input process analyzer
- Tintometer Lovibond MD 100 colorimeter

#### Communication Equipment

- Fluid Conservation Systems Omnicoll Transmitter
- Grace Industries TPASS 3 motion-sensing man-down device
- Phoenix Contact Radioline wireless platform
- Weidmuller WI-I/O-9-U2

#### Control/Electrical Panels

- Beijer Electronics T7BR 7-inch HMI and Panel PC

#### Controllers

- Data Flow Systems TCU pump controller
- Pulsafeeder MicroVision conductivity cooling tower controllers

#### Drives

- Hoffman & Lamson, Gardner Denver Products Rigel Variable-Frequency Drives

#### Flow Control and Software

- Engineered Software PIPE-FLO Professional piping system modeling software
- Smith & Loveless QUICKSMART system controls
- The Vortab Company Elbow Flow Conditioner

#### Flow Monitoring

- AMETEK Drexelbrook DR 2000 level meter
- Badger Meter Dynasonics DXN ultrasonic flowmeter
- FCI - Fluid Components International ST100 Thermal Mass Flow Meter
- Greyline Instruments PDFM 5.1 portable Doppler flowmeter
- Hawk Measurement America MiniWave noncontact level transmitter
- Primary Flow Signal Halmi Nozzle

- Pulsar Process Measurement Flow Pulse compact pipe flow monitor
- Singer Valve Model 106-SPI-MV electromagnetic flowmeter

#### Gas/Odor/Leak Detection Equipment

- Arizona Instrument Jerome 651 fixed hydrogen sulfide detection system
- Chlorinators Incorporated REGAL Series 3000 Gas Detector
- GfG Instrumentation G460 multi-sensor atmospheric monitor
- Mil-Ram Technology TA-2100 gas detector

#### Meters

- Sodimate skid-mounted and pre-piped slurry metering system

#### Monitors

- Industrial Scientific Corporation Tango TX1 single gas monitor
- Markland Specialty Engineering Suspended Solids Density Meter
- Micrometrix Corp. Streaming Current Monitor
- Palintest Chlordiox Plus monitor
- PRIMEX Pump Watch remote monitoring system
- Scantek RION Vibration Analyzer VA-12
- Sensaphone Sentinel environmental and equipment status monitoring system
- Sigma Controls 700MM (Motor Monitor)
- Staco Energy Products FirstLine BMS wireless battery-monitoring system

#### Operations/Maintenance/Process Control Software

- AllMax Software operations and maintenance software

- In-Situ Inc. smarTROLL multiparameter hand-held device with Bluetooth

#### Process Control Equipment

- ABB Low Voltage Emax 2 low-voltage circuit breaker
- All-Test Pro 5 Motor Tester
- Environment One Corporation iota OneBox telemetry system
- Jensen Instrument JIC-RS100-B Rainswitch
- Kruger USA ThioBox automated control package
- Kupferle Foundry Company Eclipse i-Series GENESIS intelligent flushing station
- Trico Corporation DR-7 direct-reading ferrograph

#### SCADA Systems

- Trihedral Engineering Limited VTScada 11.1

#### Sensors

- Automation Products Group MNU ultrasonic level sensor
- Baseline GreenLight Model 930 water analyzer
- Force Flow Echo-Scale ultrasonic sensor

#### Security Equipment/Systems

- Orenco Systems DuraFiber Shelters

#### Software – Maintenance

- Proactive Maintenance Toolbox

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of organisms in the sample. In as little as 45 minutes, it calculates the total aerobic bacteria count in a sample or provides a pass/fail indication based on defined thresholds. It can work with 2 or 15 mL sample vials via a carousel. The system is monitored with software that can display pass/fail indications or bacterial counts and export data for analysis. **303/823-666; www.baseline-mocon.com.**



**GreenLight Model 930 water analyzer from Baseline**

## FORCE FLOW ECHO-SCALE



**Echo-Scale ultrasonic sensor from Force Flow**

The Echo-Scale ultrasonic sensor from Force Flow monitors the amount of chemical used and the remaining amount in bulk tanks. It can monitor up to four tanks on a single indicator when combined with a Wizard 4000 advanced multichannel indicator. If no local indication is required, it can be used stand-alone by sending its 4-20mA output direct to a computer. **800/893-6723; www.forceflow.com.**

## Security Equipment/Systems

### ORENCO SYSTEMS DURAFIBER SHELTER

DuraFiber Shelters from Orenco Systems safely house process and control equipment, generators and chemicals. The lightweight, insu-

lated structures (up to R24 insulation values) are made of fiberglass. Standard sizes are 8 feet tall; 4, 6 or 8 feet wide; and up to 20 feet long. Interior surfaces are coated with a polyester gelcoat, and exterior surfaces are protected with a high-performance polyaspartic urethane. The roof is rated at up to 100 pounds per square foot while the shelter has wind ratings up to 160 mph. Units have no mechanical joints or seams. Options include skid-proof fiberglass floors, windows, interior walls, load centers, transformers and control systems. **877/279-0464; www.orenco.com.**



**DuraFiber Shelters from Orenco Systems**

## Software – Maintenance

### PROACTIVE MAINTENANCE TOOLBOX



**Proactive Maintenance Toolbox**

The Proactive Maintenance Toolbox increases equipment reliability and overall maintenance knowledge by bringing vital equipment and plant information into one easy-to-use platform. This user-friendly software will give your personnel the tools, information and knowledge they need for proactive maintenance. It enables you to create, organize, and track all critical equipment information and maintenance tasks specific to individual equipment. **715/893-5035; www.proactivetoolbox.com. tpo**

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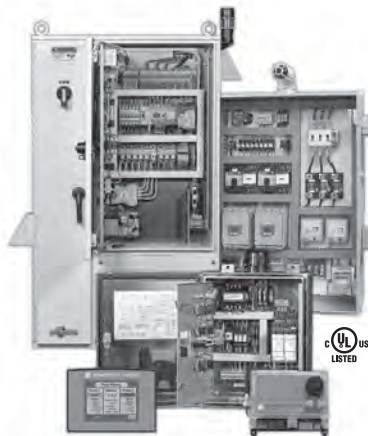
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## Analyze That!

The Eagle Microsystems RP-1000 Residual Chlorine Analyzer utilizes an amperometric probe sensor to measure free or total residual chlorine. A rotameter and control valve permit regulation of sample flow. The RP-1000 is easy to use, accurate, and simple to maintain.

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## Switch helps prevent arc-flash exposure in high-voltage applications

### Problem

The Los Angeles County Sanitation District conducted an arc-flash study on its high-voltage switchgear and concluded that the best protection for maintenance personnel was not to be present in the area when the trip or close occurs. The facility needed to find a way to remotely control the process.

### Solution

The **Electroswitch TD-CSR** enables service technicians to remove themselves from harm's way by initiating a time delay through a push-button sequence available in the lighted nameplate of the switch, providing 10 seconds to clear the area before the switch changes position. The switch was a direct replacement of the existing breaker control switch, requiring no panel modification or changes in existing drawings.



### RESULT

"The TD-CSR is an easy-to-implement and very cost-efficient option for providing a level of protection from arc flash," says John Shay, director of electrical maintenance with LACSD. "We have deployed this solution in multiple locations within our network and are pleased with the results and reliability." 781/335-5200; [www.electroswitch.com](http://www.electroswitch.com).

## Calibration capabilities enable low-conductivity water measurement

### Problem

In 2011, a water and wastewater authority in western Canada added a UV disinfection plant. For part of the year, the water supplied was too low in conductivity to use electromagnetic flowmeters. Because the plant was designed with a small footprint, the minimum straight-run inlet section for the KROHNE UFM 3300 ultrasonic flowmeter could not be met. The plant team had to keep optimal accuracy to ensure adequate dwell time for the UV treatment.

### Solution

To achieve the accuracy with the reduced straight run, the on-site piping configuration was duplicated at the **KROHNE** calibration facility in Dordrecht, Netherlands, and all eight flowmeters were calibrated using this special piping configuration.



### RESULT

The meter calibrations were successfully completed and the required accuracy was achieved. Because the meters could be fabricated and calibrated to unusual piping configurations, the customer was able to achieve the desired accuracy to run the process successfully. 800/356-9464; [www.krohne.com](http://www.krohne.com).

## Ultrasonic flowmeters measure biogas from digesters

### Problem

The City of Charlotte, North Carolina, wanted to generate biogas at its wastewater treatment plants and burn it to generate electric power. The city needed to know the quantity and quality of biogas that could be reliably produced from its anaerobic digesters to determine the economic viability of the process.

### Solution

The city installed **Proline Prosonic Flow B200 ultrasonic flowmeters** from **Endress+Hauser**. Similar technology is often used to measure the flow of wet, dirty, low-pressure and variable-composition refinery flare gas, making it an effective solution for biogas measurement. With its integrally mounted PT1000 temperature sensor, the unit uses sound velocity to calculate the methane fraction of the gas. Further calculations determine net and gross heating values, energy flow and Wobbe Index.



### RESULT

The city purchased, installed and started up its first B200 in March 2013. Expected readings for both flow rate and methane content were immediately seen. There have been no requirements for maintenance of the device since installation. 888/363-7377; [www.us.endress.com](http://www.us.endress.com).

## Subscription-based monitoring system helps city simplify monitoring

### Problem

The City of Kimberley, British Columbia, made significant investments in monitoring instruments for its water and wastewater systems and was seeking a data management solution to provide leakage-control flow monitoring and to monitor and alarm other processes.

### Solution

In October 2013, the city implemented **FlowWorks** subscription-based monitoring solution. Previously, data had been collected manually, and alarm notifications were done through a third-party auto-dialer system.



### RESULT

FlowWorks enabled the city to control monthly expenses. "With FlowWorks, we know what's actually going on in the field," says Chris Mummery, utilities supervisor. "We have been able to pick up on leaks and issues at PRV stations much, much faster than in the past." The city no longer needs to manually record compliance monitoring data, and performance reporting is easier. This frees up time for operations and management personnel. 206/859-6999; [www.flowworks.com](http://www.flowworks.com).

## Plant uses dynamic imaging to improve digester performance

### Problem

Team members at a wastewater treatment plant in Augusta, Georgia, wanted to monitor the condition and presence of methanogens in the anaerobic digestion process to find a potential correlation with methane production. They wanted to optimize anaerobic digestion and ultimately improve digester performance using dynamic imaging particle analysis.

### Solution

After running samples on the **Fluid Imaging Technologies FlowCAM** to determine particle shape, they found some were rod-shaped bacillus they believed to be *Archaea*. With its VisualSpreadsheet software, the instrument can record over 30 different measurements per particle and capture particle images at up to 22 frames per second, allowing for high sampling efficiency and fast analysis times.



### RESULT

The data collected trended closely to some of the performance parameters the staff normally tested for in the analytic digestion strains. Future studies need to be conducted, but the basic morphology and frequency of testing available enables effective population dynamics studies. 207/289-3200; [www.fluidimaging.com](http://www.fluidimaging.com).

## Analysis of frequent water pump motor failure points to resonance

### Problem

A large Florida water treatment plant employed a mixed flow pump producing 113,750 gpm at 76 feet of head. The pump was direct-coupled to a 3,000 hp, 514 rpm induction motor. Since installation 30 years ago, the system had experienced elevated vibration of the above-ground structure as well as frequent motor and pump failures, including contacting of the motor rotor and stator, motor bottom bearing failure and pump impeller vane breakage.

### Solution

After a catastrophic motor failure, the plant commissioned a system analysis from **WEG Electric Corp.** to determine root cause. The analysis concluded that discharge piping support grouting was fractured and unable to provide sufficient support. The existing motor was beyond repair.



### RESULT

Vibration at the pump was due to system resonance as well as poor hydraulic impeller design. Review of maintenance records revealed the original impeller had been replaced with a third-party design. System resonance was corrected using column stiffeners. Additional investigation determined system resonance to be a common issue in the model pump when operating above 350 rpm. 800/275-4934; [www.weg.net/us](http://www.weg.net/us).

## District relies on flowmeter to comply with allocation quota

### Problem

The Ashley Valley Water and Sewer Improvement District in Vernal, Utah, shares its water source, a year-round spring, with several other water entities. The spring's output can vary with weather and the seasons, making accurate tracking of water use for allocation and conservation critical. To better meet performance objectives for a new pilot plant application, the district needed to replace the flowmeter on the raw waterline while minimizing operational interruptions and reducing labor needed to bring the flowmeter into service.

### Solution

**McCrometer's** application team recommended the **FPI Mag flowmeter** for its consistent, accurate performance, easy hot-tap installation, low maintenance and versatility. The meter allowed simple installation and easy connection to the district's SCADA system without outside contractors.



### RESULT

The meter provides reliable flow readings to ensure that the district remains within its share allocations and avoids costly overage rates. Based on the results, the district plans to purchase two more meters for a new treatment plant under construction. 800/220-2279; [www.mccrometer.com](http://www.mccrometer.com).

## Facility meets minimum staffing requirement with continuous online monitoring

### Problem

New discharge permit requirements for nutrient removal required the water resource recovery facility in South Charleston, Ohio, to double staff hours. The facility was previously staffed by a part-time contract operator.

### Solution

Instead of increasing the number of hours the facility is staffed, the municipality installed a continuous monitoring system, an exception allowed by Ohio EPA. The **IQ SensorNet** system from **YSI, a Xylem brand**, uses an online sensor network for continuous water-quality monitoring and process control. Measured values are sent to a third-party cellular telemetry unit that allows real-time measurements to be viewed online. Alarms are programmed into the telemetry unit to notify of potential problems so that staff can take corrective action when necessary.



### RESULT

"The purpose for the installation was to maintain the same amount of hours required for the plant operator to be on site," says Steve Canter, the South Charleston project consultant. "The YSI IQ SensorNet system provides continuous monitoring of effluent DO, pH and turbidity, in addition to influent and effluent flow monitoring that can be remotely monitored to activate predefined alarm and relay setpoints." 800/765-4974; [www.ysi.com](http://www.ysi.com). tpo



**1. CAS DATA LOGGERS NEXT INDUSTRIES DATALOGGER**

The Mini OMNIAlog compact four-channel datalogger from NEXT Industries, distributed by CAS Data Loggers, combines high 0.05-percent measurement accuracy, simple installation and Web-based management software. Its four differential 4-20 mA analog inputs are compatible with all major geotechnical sensors. **800/956-4437; [www.dataloggerinc.com](http://www.dataloggerinc.com).**

**2. LARSON 50-FOOT PNEUMATIC LIGHT MAST**

The trailer-mounted, fold-over, seven-stage light mast (LM-50-5S-TLR-16X400L TL-LED) from Larson Electronics features hydraulic ram upright assist, air-powered pneumatic mast and high-output LED light fixtures. The entire assembly is mounted on a 21-foot by 8-foot tandem-axle trailer. The light plant extends to 50 feet and collapses to 13.5 feet. The 16 light heads are wet suitable and produce 52,000 lumens at 400 watts each. **800/369-6671; [www.magnalight.com](http://www.magnalight.com).**

**3. CRANE PUMPS FIBERGLASS LIFT STATION**

Preassembled Barnes fiberglass lift stations from Crane Pumps & Systems are available in pipe rail simplex/duplex and hard piped simplex. Sizes range from 24 to 36 inches in diameter and 48 to 96 inches in depth. Options include simplex/duplex design, pump, cover and control panel. **937/615-3544; [www.cranepumps.com](http://www.cranepumps.com).**

**4. YASKAWA MICRO INTELLIGENT PUMP DRIVE**

The iQpump Micro intelligent pump drive from the Drives & Motion Division of Yaskawa America provides control for variable-torque pump loads through 25 hp. The drive is available in NEMA 1 and NEMA 4X rated models. NEMA 3R configured packages are available. **800/927-5292; [www.yaskawa.com](http://www.yaskawa.com).**

**5. GATEWAY SAFETY DUAL-USE GOGGLES**

Cyclone dual-use goggles from Gateway Safety feature a polycarbonate lens surrounded by a sturdy vinyl frame. The Whirlwind antifog ventilation system helps prevent fogging. Optional Double-Take inserts added to the top and bottom of the goggle provide impact-to-splash protection. **800/822-5347; [www.gatewayssafety.com](http://www.gatewayssafety.com).**

**6. FLOWROX SLURRY KNIFE GATE VALVE**

The SKW slurry knife wafer valve from Flowrox is designed for industries where abrasive or corrosive slurries, powders or coarse substances are processed. **410/636-2250; [www.flowrox.us](http://www.flowrox.us).**

**7. WORLD WATER WORKS SLUDGE CONDITIONING**

S-Select sludge conditioning technology from World Water Works is designed to reduce floating or bulking sludge in conventional activated sludge (CAS) wastewater treatment systems. The technology is applicable to any activated sludge plant, municipal or industrial, with poor or inconsistent performing clarifiers. The customizable process can be installed while a plant is operating. It requires a small footprint, uses little power and requires no chemicals. **800/607-7973; [www.worldwaterworks.com](http://www.worldwaterworks.com).**

**8. CLEARSPAN FABRIC BUILDING STRUCTURES**

HD Buildings from ClearSpan Fabric Structures are available in gable-, round-style, and hybrid designs. They can be mounted as a free-standing structure or affixed to other foundations. The buildings, beginning at 25 feet wide, have a triple-galvanized structural steel tubing frame and 12.5-ounce high-density polyethylene rip-stop fabric cover. **866/643-1010; [www.clearspan.com](http://www.clearspan.com).**

wastewater:  
product spotlight

**Paddlewheel flowmeter with analog output provides remote communication**

By Ed Wodalski

The **Digi-Meter Micro-Flo digital paddlewheel flowmeter** with analog output from **Blue-White Industries** displays flow rate and accumulated total flow. The meter features 4-20 mA/0-10 VDC circuitry for low-flow applications. Units include an NPN open collector output for communication with SCADA systems.

“These are used quite often in water treatment applications, process applications or anywhere you want to measure flow rate and obtain an output signal back to a PLC or a SCADA system for remote flow monitoring,” says David Koch, sales manager for Blue-White Industries. “In a wastewater treatment plant, if you’re dosing chemicals into a clarifier, you can measure what’s coming out of the metering pump.”

Connection options include 1/8-, 1/4- and 1/2-inch threaded and 1/4- and 3/8-inch O.D. tubing for smaller piping or tubing systems.

A clear PVC viewing lens allows for visual confirmation of flow with a PVDF chemical-resistant lens available.

The weather-resistant NEMA 4X meter is factory programmed or can be field programmed via the front panel touch pad. The panel has a lockout option for added security. The total reset function can also be disabled to prevent tampering.

“The Micro-Flo is a photo optic paddlewheel sensor equipped with a display,” Koch says. “There are six different units with different calibration ranges, 7,000 being the largest capacity. That unit would measure 700 to 7,000 mL/Min. The unit that goes down to 30 mL/Min has a range of 30 to 300, and there are four different units in between: 100 to 1,000 mL/Min, 200 to 2,000 mL/Min, 300 to 3,000 mL/Min and 500 to 5,000 mL/Min.”

The 1-pound meter has a maximum working pressure of 130 psig (PVC lens) or 150 psig (PVDF lens) at 70 degrees F. Maximum fluid temperature is 130 degrees F (PVC lens) and 200 degrees F (PVDF lens) at 0 psi. Input power requirements are 9-28 VDC with optional AC/DC transformers.

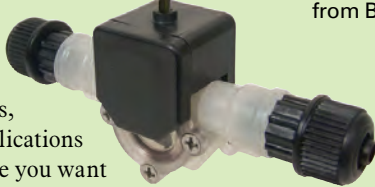
The six-digit (up to four decimal positions) LCD display includes operating mode and battery status.

“The display can give you rate of flow and lets you toggle to total display,” Koch says. “An accumulative totalizer counts the total number of units that can be reset to zero.”

User selectable or custom-programmable scale factors include flow (gallons, liters, ounces, milliliters) and time (minutes, hours, days). 714/893-8529; [www.blue-white.com](http://www.blue-white.com).



Digi-Meter Micro-Flo from Blue-White Industries



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FREE INFO ON THIS PRODUCT – RETURN FOLLOWING FORM (continued)

water:  
product spotlight

## UV systems disinfect water in large-flow treatment plants

By Ed Wodalski

**Wedeco Spektron 2000e and 4000e ultraviolet disinfection systems** from **Xylem**, designed for industrial and municipal drinking water sites with flow rates higher than 13 mgd (2,000 meters cubed per hour), provide inactivation of 4-log (99.99 percent) for chlorine-resistant pathogens, including *Cryptosporidium* and *Giardia*.

“The monochromatic lamps emit UV light at a wavelength of 254 nanometers, which is highly effective for the inactivation of pathogens,” says Tanja Burgschwaiger, Wedeco UV systems product manager for Xylem. “Used in combination with the variable-power option, the lamps provide energy efficiency under all operating conditions. In dimmed mode, they realize an average savings of 20 percent and use up to 80 percent less mercury than the previous lamp generation. With respect to sustainability, the UV lamp’s associated power savings translate to an atmospheric reduction of up to 1,100 pounds of carbon dioxide over its life cycle.”

The new models expand the Wedeco Spektron UV series to 14 systems and increase the maximum flow capacity per system to 26 mgd. The disinfection systems feature low-pressure, high-power 600 watt amalgam Ecoray UV lamp technology, reducing lamp count by about 60 percent, minimizing maintenance and lowering energy costs.

“In the past, for flow rates greater than 1,000 cubic meters per hour [6 mgd], mainly medium-pressure systems were used because lamp count for the alternate low-pressure systems was quite high,” she says. “Wedeco Spektron offers a low lamp count yet all the benefits of a low-pressure, high-power system such as energy efficiency, longer lamp life. The Wedeco



Wedeco Spektron 2000e and 4000e from Xylem

series suits any drinking water treatment plant, regardless of local pipe conditions, energy costs or local legal requirements.”

Closed-vessel reactors contain UV lamps separated from the water by a UV-transmitting quartz sleeve. Cleaning mechanisms keep lamp sleeves free of fouling. UV sensor flowmeters, and in some cases ultraviolet transmittance analyzers, monitor dose delivery by the reactor.

“UV reactors used in water disinfection are designed to deliver a certain UV dose to pathogenic microbes in water to inactivate them,” Burgschwaiger says. “Lamp placement, inlet and outlet conditions, baffles and mixers all affect mixing within a reactor. Inlet and outlet conditions in particular can have a significant impact on dose delivery. The OptiCone flow diverter ensures even flow distribution with low headloss regardless of the upfront piping configuration.”

Multiple flange and mounting options enable the disinfection systems to be incorporated into existing drinking water treatment facilities when replacing inefficient or aging UV equipment.

The disinfection systems are certified by German DVGW[1] directives as well as the U.S. EPA’s UV Disinfection Guidance Manual (UVDGM 2006). **855/995-4261; [www.xylem.com/treatment](http://www.xylem.com/treatment)**.

FREE INFO ON THIS PRODUCT – RETURN FOLLOWING FORM

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

- 1. NEXT Industries (distributed by CAS Data Loggers) Mini OMNIAlog datalogger
- 2. Larson Electronics light mast (LM-50-5S-TLR-16X400L TL-LED)
- 3. Crane Pumps & Systems Preassembled Barnes fiberglass lift stations
- 4. Yaskawa America iQpump Micro intelligent pump drive
- 5. Gateway Safety Cyclone dual-use goggles
- 6. Flowrox SKW slurry knife wafer valve
- 7. World Water Works S-Select sludge conditioning technology
- 8. ClearSpan Fabric Structures HD Buildings
- Blue-White Industries Digi-Meter Micro-Flo digital paddlewheel flowmeter
- Xylem Wedeco Spektron 2000e and 4000e ultraviolet disinfection systems
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**Sioux Corp.'s pressure washers receive certification**

Sioux Corp.'s electric-motor-driven, industrial cold-water pressure washer received third-party certification by ETL to UL and CSA safety standards. The washers now meet UL 1776 and CSA C22.2 #68 safety regulations and the requirements of OSHA regulation 1910.399. Nonexplosive electric-motor-driven models meet UL508A and CSA C22.2 #14-10 requirements.

**Spencer Turbine acquires TIGG Corp.**

TIGG Corp., manufacturer of air- and water-purification equipment for municipal water treatment, was acquired by the Spencer Turbine Co. of Oakdale, Pennsylvania.

**Xylem receives water reuse award**

Xylem was named the 2014 WateReuse Equipment Manufacturer of the Year by the WateReuse Association. Xylem was recognized for its work to optimize advanced water treatment processes for potable-water-reuse projects in Florida and California.

**Assmann Corp. receives drain outlet patent**

Assmann Corp. of America received patents for its molded full-drain outlet (FDO) assembly (U.S. No. 8,348,090 B2) and modular polyethylene tank stands (U.S. 8,814,110 B2). The FDO, for tanks 2,500 gallons and larger, provides the ability to drain the tank without the need for mechanically installed nozzles and can be utilized where heavy solids or salts might accumulate in the bottom of the tank. The tank stands, for use with the FDO assembly, can be installed on any suitable, flat surface and elevate tanks 12 inches from grade for a full-drain tank without the need to pour concrete.

**Ebara names vice president, customer service manager**

Ebara Fluid Handling Division (FHD) named Richard Thompson vice president for the U.S. sales and service subsidiary of Ebara Corp. He will assume full management and overall operations of the division. Thompson's appointment is part of an executive management transition. He succeeds Martin Perlmutter who served as Ebara FHD president for 16 years. Ebara also named Robert Hub customer service manager. He will be responsible for inside sales, applications engineering and aftermarket services. **tpo**



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**POSITIONS AVAILABLE**

The City of Salida, CO is seeking a Wastewater Treatment Plant Operator with a Colorado Wastewater Certification Class C or higher. This position is FT w/benefits. Salary range \$16.81-\$25.00 DOQ. See the full job description and application instructions at [www.cityofsalida.com](http://www.cityofsalida.com) or apply at Salida Public Works, 340 Hwy. 291. Closing date March 9, 2015. EOE. (o04)

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## people/awards

**Dr. Glen Daigger**, senior vice president and chief technology officer at CH2M HILL, retired from the company. Daigger was recognized worldwide as an expert in wastewater treatment technologies. He will continue work with CH2M HILL as a special advisor.

The **Atlantic County (N.J.) Utilities Authority** received Platinum Level Certification for its biosolids management program from the National Biosolids Partnership.

American Water Works Company named **Karla Teasley** vice president of customer service. She had been the president of Illinois American Water; **Bruce Hauk** is her successor.

The **Norway Wastewater Treatment Plant** received an Award of Excellence from the Maine Rural Water Association.

**Bill Millis** was named the water utilities director for Stillwater, Oklahoma, after serving as interim director for a year. He manages nearly 30 staff members.

**Nate Festi**, wastewater superintendent in Sugarcreek Village, Ohio, earned a Class III wastewater license.

**Ashley Hammerbeck** joined HR Green in St. Paul, Minnesota, as a staff engineer. She brings experience in municipal and industrial wastewater process design and modeling.

The Washington State Department of Ecology honored the **Larson and Dunes wastewater treatment plants** with Wastewater Treatment Outstanding Performance Awards.

The **Tyson Fresh Meats Wastewater Treatment Plant** in Lexington, Nebraska, received a 2014 Scott Wilbur Award from the Nebraska Water Environment Association for outstanding operation and maintenance. The plant also received the NWEA Gold Safety Award.

The **Anderson County Wastewater Department** received the 2014 Wastewater System of the Year Award from the South Carolina Rural Water Association.

**Keith Kontor**, superintendent of the Fremont Wastewater Treatment Plant, received the William D. Hatfield Award from the Nebraska Water Environment Association.

The **City of Elgin, Illinois**, was honored for the best drinking water based on taste, odor and clarity during the Kane County Water Association's annual water tasting contest in Batavia. Elgin's drinking water is a blend of well water and Fox River water.

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

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

## education

### AWWA

The American Water Works Association is offering these online courses:

- April 1 – Hydrant Flow Testing: Purpose, Process and Experiences
- April 8 – Potable Reuse and Conservation: Water Source Development to Plan for Drought

- April 16 – The Future of Water Utility Management: Advanced Metering Analytics (AMA)
  - April 22 – Hang on to Your Hat! Collaborative Emergency Plans and Response
  - April 29 – Solve Plant Hydraulics Questions Using Computational Fluid Dynamics
- Visit [www.awwa.org](http://www.awwa.org).

### Alabama

The Alabama Rural Water Association is offering these courses:

- April 9 – Revised Total Coliform Rule, Orange Beach
  - April 15 – Collection System Rehab Options, Oxford
- Visit [www.alruralwater.com](http://www.alruralwater.com).

### Alaska

The Alaska Department of Environmental Conservation Division of Water is offering these courses:

- April 10 – State Operator Certification Exam, online
  - April 20-24 – Introduction to Small Wastewater Systems, Fairbanks
- Visit [www.dec.alaska.gov](http://www.dec.alaska.gov).

### Arkansas:

The Arkansas Environmental Training Academy is offering these courses:

- April 7-9 – Intermediate Water Distribution, Fayetteville
  - April 7-9 – Backflow Assembly Repair, Conway
  - April 8 – Backflow Assembly Tester Recertification, Conway
  - April 14-16 – Basic Water Treatment, Springdale
  - April 20-24 – Backflow Assembly Tester, Little Rock
  - April 21 – Backflow Assembly Tester Recertification, Little Rock
  - April 27 – Basic Water Math, Hot Springs
  - April 27 – Backflow Prevention Association of Arkansas Seminar, Hot Springs
  - April 28 – Applied Water Math, Hot Springs
- Visit [www.sautech.edu/aeta](http://www.sautech.edu/aeta).

The Arkansas Rural Water Association is offering these courses:

- April 6 – Backflow Tester Recertification, Lonoke
  - April 6-10 – Backflow Tester Certification, Lonoke
  - April 21-23 – Water and Wastewater License Renewal Training, Mt. View
  - April 28-30 – Advanced Water Treatment, Lonoke
- Visit [www.arkansasruralwater.org](http://www.arkansasruralwater.org).

### California

The California-Nevada Section AWWA is offering these courses:

- April 1 – Water Use Efficiency Grade I Workshop, Rancho Cucamonga
  - April 9-10 – Two-Day Backflow Refresher, West Sacramento
  - April 27 – T1-T2 Review, Riverside
  - April 28 – T1-T2 Math Review, Riverside
  - April 28 – T3-T4 Math Review, Riverside
  - April 29 – T3-T4 Review, Riverside
  - April 30-31 – Two-Day Backflow Refresher, Rancho Cucamonga
- Visit [www.ca-nv-awwa.org](http://www.ca-nv-awwa.org).

### Canada

The Maritime Provinces Water and Wastewater Association is offering a Confidence in Facilities and Operations Seminar April 19-22 at the PEI Convention Center in Charlottetown, Prince Edward Island. Visit [www.mpwwa.ca](http://www.mpwwa.ca).

### Illinois

The Illinois Section AWWA is offering these courses:

- April 1-May 6 – Utility Management 6-week Night Class, Westmont
- April 7 – Automatic Control Valves – Protection Against Surge Potential, Benton



# events

## March 28-April 1

Missouri Water Environment Association Annual Conference, Osage Beach. Visit [www.mwea.org](http://www.mwea.org).

## April 1-2

New England Water Works Association Spring Conference, DCU Center, Worcester, Massachusetts. Call 508/893-7979 or visit [www.newwa.org](http://www.newwa.org).

## April 7-9

Nevada Water Environment Association Annual Conference, Tuscany Suites and Casino, Las Vegas. Visit [www.nvwea.org](http://www.nvwea.org).

## April 12-14

North Carolina AWWA-WEA Spring Conference, Wilmington Convention Center. Visit [www.ncsafewater.org](http://www.ncsafewater.org).

## April 12-15

Alabama Water Environment Association Annual Technical Conference, Perdido Beach Resort, Orange Beach. Call 205/330-0098 or visit [www.awea-al.com](http://www.awea-al.com).

## April 12-16

Kentucky Water and Wastewater Operators Association Annual Conference, Crown Plaza Hotel, Louisville. Visit [www.kwwoa.org](http://www.kwwoa.org).

## April 13-15

AWWA 2015 Waterborne Pathogens Symposium, Hyatt Regency Savannah Hotel, Savannah, Georgia. Visit [www.awwa.org](http://www.awwa.org).

## April 13-15

Illinois Association of Water Pollution Control Operators Annual Conference, Crowne Plaza Hotel, Springfield. Visit [www.iawpco.org](http://www.iawpco.org).

## April 14-16

New York's Water Event, Saratoga Springs. Visit [www.nysawwa.org](http://www.nysawwa.org).

## April 14-17

Water Environment Association of Texas' Texas Water 2015 Conference, Corpus Christi. Visit [www.txwater.org](http://www.txwater.org).

## April 19-21

Water Environment Association of Ontario Technical Symposium, Toronto Congress Centre. Visit [www.weao.org](http://www.weao.org).

## April 19-22

Water Environment Federation Collection Systems 2015: Collection Systems Taking Center Stage: Seize the Opportunity, Duke Energy Convention Center, Cincinnati. Visit [www.wef.org](http://www.wef.org).

## April 20-22

AWWA Financial Management Seminar, Atlanta Marriot Northwest At Galleria, Atlanta. Visit [www.awwa.org](http://www.awwa.org).

## April 22-23

Nebraska Water Environment Association Great Plains Conference, Embassy Suites, La Vista. Visit [www.ne-wea.org](http://www.ne-wea.org).

## April 26-29

Arkansas Water Works & Water Environment Association Annual Conference and Expo, Hot Springs. Call 501/835-3811 or visit [www.awwwea.org](http://www.awwwea.org).

## April 28

Illinois Section AWWA 8th Annual Water Distribution Conference, Medinah Banquets, Addison, Illinois. Visit [www.isawwa.com](http://www.isawwa.com).

## April 28-May 1

Water Environment Association of Utah Annual Conference, Dixie Center, St. George. Visit [www.weau.org](http://www.weau.org).

## April 29-May 1

California Water Environment Association Annual Conference, San Diego Town and Country Resort. Call 619/452-7800 or visit [www.cwea.org](http://www.cwea.org).

- April 9 – Hands-on Basic Water Quality Testing, Lake Bluff
  - April 9 – Automatic Control Valves – Protection Against Surge Potential, Danville
  - April 14 – Phosphate Technology and Biofilm Control, St. Charles
  - April 14 – Chemical Properties, Safety and Security, Park Forest
  - April 15 – Confined Space Training, Macomb
  - April 16 – Upgrades to the City of Chicago South Water Purification Plant, Chicago
  - April 16 – Tank Operations and Maintenance, O'Fallon
  - April 21 – Successful Water Main Service Line and Street Light Location, Morris
  - April 23 – Effective Backflow Programs, Moline
  - April 23-26 – Pumps and Pumping Workshop, Lake Bluff
  - April 27 – Wastewater Microscopy, O'Fallon
  - April 29 – Radium and Ion Exchange Systems, Rockford
  - April 30 – Radium and Ion Exchange Systems, Channahon
- Visit [www.isawwa.org](http://www.isawwa.org).

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

- April 14-17 – Cross Connection Control, Lake Bluff
  - April 28 – Class A Water Operations 1, Geneva
  - April 29 – Class A Water Operations 2, Geneva
- Visit [www.siue.edu](http://www.siue.edu).

## Kansas

The Kansas Water Environment Association is offering these courses:

- April 1-2 – Safety for Water and Wastewater Operators, Hutchinson
  - April 8 – Wastewater Collections Workshop, Topeka
  - April 15-16 – Activated Sludge, Manhattan
  - April 21 – An Examination of Your Ethics, Hugoton
  - April 21-22 – Wastewater Stabilization Ponds, Dodge City
  - April 30 – Small Systems Wastewater, Osage City
  - April 30 – An Examination of Your Ethics, Pratt
- Visit [www.kwea.net](http://www.kwea.net).

## Michigan

The Michigan Water Environment Association is offering these courses:

- April 9 – Fundamentals of Wastewater Math I, Manistee
  - April 21 – Purpose and Fundamentals of Wastewater Treatment, Gaylord
  - April 29 – Lab Practices Seminar, East Lansing
  - April 30 – Fundamentals of Wastewater Math II, Manistee
- Visit [www.mi-wea.org](http://www.mi-wea.org).

## New Jersey

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

- April 8 – Microbiology for the Non-Biologist, North Brunswick

(continued)

## New Jersey (continued)

- April 16 – Water Loss Management, Bordentown
  - April 17 – Pond Design, Management and Maintenance, Hillsborough
  - April 21 – Water and Wastewater Chemistry: Back to the Basics, North Brunswick
  - April 29-30 – Drinking Water Treatment Technologies, North Brunswick
  - April 30 – Customer Service Skills for Utilities, North Brunswick
- Visit [www.cpe.rutgers.edu](http://www.cpe.rutgers.edu).

## New York

The New York Water Environment Association is offering these courses:

- April 2 – Workplace Hazards and Compliance, Biohazards and Personal Protective Equipment, Babylon
  - April 8 – Low Pressure Sewer Systems, Middletown
  - April 16 – Anaerobic Digestion, Troy
- Visit [www.nywea.org](http://www.nywea.org).

The New York Section AWWA is offering these courses:

- April 7 – Basic Laboratory Skills, Troy
  - April 8 – Process Verification and Calibration, Troy
  - April 8 – Water Well Rehab, Woodbury
  - April 21 – Water Storage Tank Inspection and Cleaning, Utica
  - April 22 – Water Storage Tank O&M, Kingston
  - April 22 – Water Storage Tank Inspection and Cleaning, Troy
  - April 28 – Fundamentals of Hydraulics, Ogdensburg
  - April 29 – Dam Safety, Peru
  - April 29 – Water Meter Design and Maintenance, Troy
- Visit [www.nysawwa.org](http://www.nysawwa.org).

## Oklahoma

The Oklahoma Environmental Training Center is offering these courses:

- April 6-7 – C-Water Operator, Midwest City
  - April 10 – Proctored Exam Session, Midwest City
  - April 13-14 – D-Water Operator, Midwest City
  - April 17 – Renewal Training, Midwest City
  - April 27-30 – A/B Water Operator, Midwest City
- Visit [www.rose.edu](http://www.rose.edu).

Accurate Environmental is offering these courses:

- April 3 – Open Exam Session, Stillwater
  - April 3 – Quality Assurance and Quality Control, Tulsa
  - April 7-9 – D Water and Wastewater Operator, Stillwater
  - April 10 – Open Exam Session, Tulsa
  - April 13 – General Refresher for Water Operators, Stillwater
  - April 13-14 – C Water Operator, Stillwater
  - April 21-22 – D Water and Wastewater Operator, Tulsa
- Visit [www.accuratelabs.com/classschedule.php](http://www.accuratelabs.com/classschedule.php).

## Texas

The Texas Water Utilities Association is offering these courses:

- April 7 – Pumps and Pumping, Gatesville
  - April 7 – Chlorinator Maintenance/Disinfection, online
  - April 14 – Pumps and Pumping, Carrollton
  - April 15 – Water Distribution, Corpus Christi
  - April 21 – Water Distribution, San Marcos
  - April 21 – Chlorinator Maintenance/Disinfection, Victoria
  - April 21 – Utilities Management, online
  - April 21 – Surface Water Production I, Gatesville
  - April 28-30 – Southeast Texas Regional School, Beaumont
- Visit [www.twua.org](http://www.twua.org).

## Utah

The Intermountain Section AWWA is offering these courses:

- April 1 – Educational Extravaganza Midyear Conference, Sandy
  - April 9 – Administrative Professionals Training, West Jordan
- Visit [www.ims-awwa.org](http://www.ims-awwa.org).

## Wisconsin

The Central States Water Environment Association will hold an Education Seminar April 7 in Madison. Call 855/692-7932 or visit [www.cswea.org](http://www.cswea.org).

The Wisconsin Department of Natural Resources is offering these courses:

- April 7 – Anaerobic Digestion, Chippewa Falls
  - April 14 – Collection Systems, Stevens Point
  - April 14 – Iron, Zeolite and VOC Certification, Madison
  - April 21 – Lab Intro, Green Bay
  - April 21 – Iron, Zeolite and VOC Certification, Fond du Lac
  - April 29 – Iron, Zeolite and VOC Certification, Chippewa Falls
  - April 29 – Ponds and Lagoons, Chippewa Falls
- Visit [www.dnr.wi.gov](http://www.dnr.wi.gov).

The University of Wisconsin is offering a Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment Seminar April 14-16 in Madison. Visit [www.epdweb.engr.wisc.edu](http://www.epdweb.engr.wisc.edu).

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

- April 7-8 – Municipal Engineering Fundamentals for Non-Engineers
  - April 9-10 – Developing and Implementing Effective Municipal Capital Improvement Plans
  - April 13-14 – Advanced Modeling Using HEC-RAS
  - April 15-17 – Unsteady Flow Modeling Using HEC-RAS
  - April 20-22 – Using HEC-RAS to Model Bridges, Culverts and Floodplains
  - April 22 – Improving Communication Skills
  - April 22-23 – Control of Water Quality in Municipal Distribution Systems
- Visit [www.epdweb.engr.wisc.edu](http://www.epdweb.engr.wisc.edu).

The Wisconsin Rural Water Association is offering these courses:

- April 7 – Sanitary Surveys/Capacity Development, Mount Horeb
  - April 7 – Small Water System Operator Basics, Mount Horeb
  - April 9 – Sanitary Surveys/Capacity Development, Green Bay
  - April 9 – Winter Operations, Green Bay
  - April 27 – Water System Operations Basics – Regulations/Groundwater Resources, Plover
  - April 28 – Water System Operations Basics – Well and Pumps/Water Treatment, Plover
  - April 29 – Water System Operations Basics – Distribution Systems/Math Basics, Plover
  - April 30 – Water System Operations Basics – Operations and Maintenance/Cross Connection Control, Plover
- Visit [www.wrwa.org](http://www.wrwa.org). **tpo**

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*TPO invites your national, state or local association to post notices and news items in this column. Send contributions to [editor@tpomag.com](mailto:editor@tpomag.com).*



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

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Matt Green  
Operator  
City of Loganville WWTP  
Loganville, Ga.

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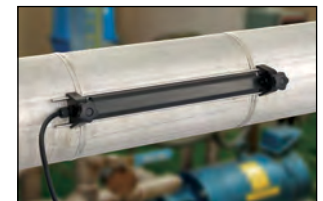
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