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SEPTEMBER 2014

**Technology Deep Dive:
Quick-install
lift station control**

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**How We Do It:
High-performing
treatment lagoon**

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Ed Matheson
Lead Operator
La Conner, Wash.

Plan B Leads to *Class A*

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A POPULAR AND REVENUE-
PRODUCING COMPOST**

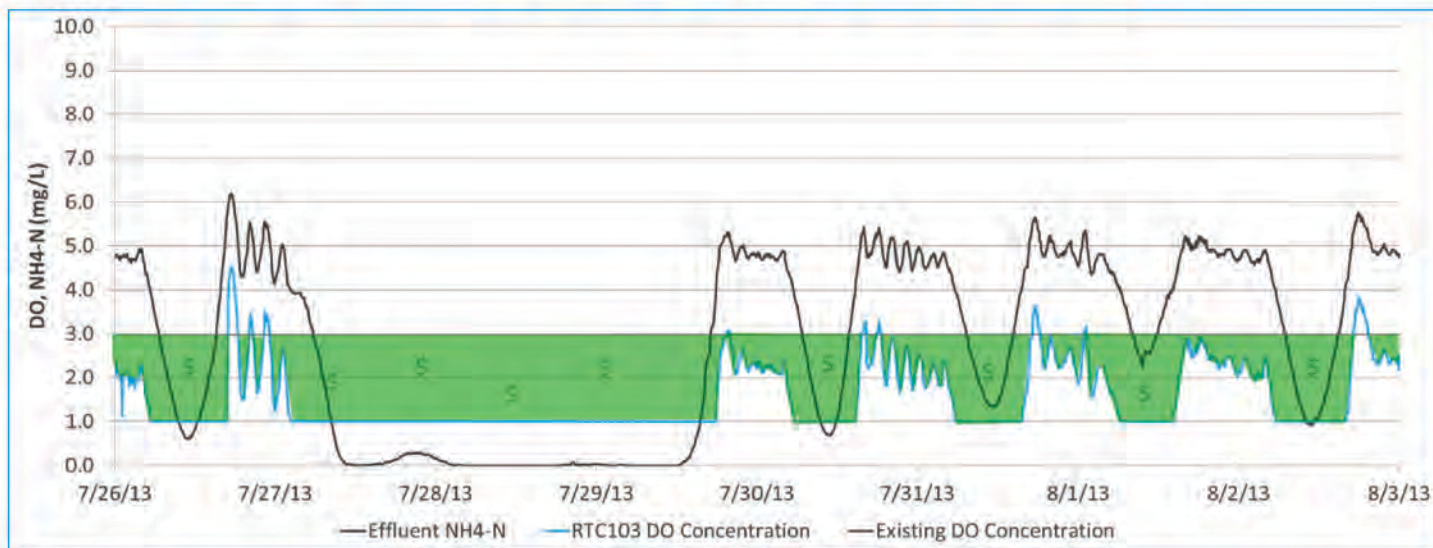
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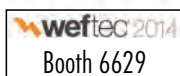
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TREATMENT**



on the cover

The Town of La Conner, Wash., combines biosolids with yard waste and wood chips to create compost for giveaway to local residents and sale to large-scale users. Ed Matheson is the lead operator at the La Conner Wastewater Treatment Plant, winner of a 2012 Excellence in

Biosolids Management Award from the Northwest Biosolids Management Association. (Photography by Mark Mulligan)

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» Top Performers:

Wastewater Operator: Kam Reeves, Ottumwa, Iowa

Biosolids: Program excellence at Trinity River Authority

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» How We Do It: Saving energy in Cumberland, R.I.

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let's be clear

Passing the Test

A LONGTIME OPERATOR ARGUES THAT THE SECRET TO SUCCESS IN EXAMS FOR WATER AND WASTEWATER LICENSING BOILS DOWN TO A SINGLE WORD. IT STARTS WITH P.

By Ted J. Rulseh, Editor



It's always nice to get a response to a "Let's Be Clear" column. Phil Bassett, a Grade IV (highest) wastewater operator at the Moccasin Bend Wastewater Treatment Plant in Chattanooga, Tenn., sent a good one after reading the column last December about overcoming test anxiety when taking licensing exams.

Bassett moved to Tennessee from Georgia at the end of 2012 with a first-level certification. While Georgia requires exams for higher levels to be taken in sequence, Tennessee lets operators jump straight to the highest level if they can demonstrate the knowledge. Bassett tried it and passed the Grade IV test on

his first try — while others around him were still failing to pass after numerous tries.

WHAT'S THE SECRET?

Bassett stresses that he's not interested in bragging — only in conveying a lesson. "The reason I passed the test on my first go is that I prepared," he says. (There's that P-word from the headline). "The smartest person in the world can't pass a licensing test like that if he or she hasn't studied the material. On the other hand, I have seen plenty of people not blessed with supreme intelligence achieve advanced certification — because they did what was necessary to prepare."

Bassett further observes, "I often talk about preparation to my co-workers who are planning to take tests. I ask them if they are studying. The answer is typically, 'No,' right up until days before the test. Then maybe some of them start cracking the books a bit. Then they don't pass. I always offer to help people advance in any way they want to, and that includes helping them prepare for tests. I keep telling them the same two things, when it comes to preparing:

1. People don't plan to fail, they fail to plan.
2. 'The will to win means nothing without the will to prepare.' (From marathoner Juma Ikangaa.)

CRAMMING WON'T DO IT

Bassett cautions against engaging in wishful thinking

that you'll "get around" to studying. Those who take that approach don't seem to get around to it. "I see this again and again," he says. "You have to begin studying weeks or even months in advance to successfully complete a license exam. So I start asking people weeks in advance if they have started studying. So far, no one has answered in the affirmative. The question mostly seems to annoy them if asked more than once.

"Yet they continue to fail the exam and keep going back to take it again and again. This is like getting into repeated cage matches with mixed martial arts champions without training and thinking repeated tries will eventually bring a win."

“They continue to fail the exam and keep going back to take it again and again. This is like getting into repeated cage matches with mixed martial arts champions without training and thinking repeated tries will eventually bring a win.”

PHIL BASSETT

He advocates treating a licensing test just like a project at work, with a start, a finish and a deliverable. "Plan the work, and work the plan," he says. "Sure, there will be some deviations and unexpected occurrences, but the plan will see you through. Make one, and follow it.

"It doesn't have to be fancy. It can be the most rudimentary of plans. It just has to be a plan, executed with some commitment and persistence. If you do this, you will go as far as you care to in professional licensure."

WHAT'S YOUR EXPERIENCE?

Do you have a story of success or struggle with licensing exams? What did it take for you to get over the top? Feel free to share your experiences with others in the industry. Send me a note to editor@tpomag.com. I promise to respond, and we'll publish comments in a future issue of the magazine. In the meantime, good luck studying — and passing. **tpo**

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Linda and Gary DeKock

IDEA OF THE MONTH:

Witnesses for Water

A FORMER MICHIGAN TREATMENT PLANT SUPERINTENDENT AND HIS WIFE PADDLE THE ENTIRE MISSISSIPPI TO RAISE FUNDS FOR WATER FOR PEOPLE

By Ted J. Rulseh

It's said a drop of water takes 90 days to travel from Minnesota's Lake Itasca down the Mississippi River to the Gulf of Mexico, some 2,291 miles.

Gary DeKock and wife Linda plan to make the trip in less time, paddling a kayak the full length of the river to New Orleans for the 2014 WEFTEC conference, Sept. 27 to Oct. 1. They're doing it to emphasize the value of every drop of water and to raise funds for nonprofit Water for People, which helps provide safe water to communities in developing countries.

Both retired, the DeKocks have ample experience paddling rivers in and around their home state of Michigan. Gary was superintendent of the Grand Rapids Wastewater Treatment Plant at the end of a 30-year clean-water career. "I've been canoeing and kayaking for a lot longer than that," he says.

MAKING A DIFFERENCE

The DeKocks set out from Lake Itasca on July 19 and had given themselves 70 days to reach New Orleans — they need to average 33 miles per day, traveling in a 26-foot-long sea kayak.

The trip helps fulfill an aim to be productive in retirement. "When you retire, all of a sudden you're faced with choices about how to spend your time," says Linda. "We came to retirement knowing we wanted it to be more than not working and having a good time. We wanted to do something meaningful."

Gary connected with Water for People at a WEFTEC conference in Chicago about 10 years ago and later started a Water for People committee within the Michigan Water Environment Association. At last year's WEFTEC show in Chicago, he helped with a bicycling fundraiser, and that inspired him to do more.

"Water for People is a great avenue for helping a community for a very small investment," he says. "It's just a matter of bringing some expertise and persistence to the task. You can really change the lives of a lot of people through the work of Water for People."

GATHERING FUNDS

The couple set an initial fundraising goal of \$5 per river mile — \$11,455.

They aim to reach it through industry and personal connections and the Crowdrise website; as of early August they had raised more than \$11,800, exceeding their goal. They're paying their own travel expenses, so every dollar of every pledge goes to Water for People.

Sponsors who pledge at least \$1 per mile (\$2,291) will have their names or logos displayed on the kayak and on materials promoting the trip. "We hope to be able to display the kayak in the exhibit area at WEFTEC, and we will also recognize our supporters at all Water for People events in New Orleans," says Gary.

While on the river, they'll try to create publicity for the charity. "We wanted a platform to talk about Water for People, and this gives us a whole 10 weeks to talk about it," says Gary. "We want to connect along the way with some youth communities and some water and wastewater treatment plants. We're going to fly the Water for People flag on our kayak."

UP TO THE CHALLENGE

The DeKocks will document their journey as they go. A satellite tracking device will enable them to show on a website where they are at any given time. They'll upload photos, video clips and messages to the extent time and battery power permit.

They try not to be discouraged by people who warn them about the river's perils: Asian carp, barge traffic, insects, the hardship of camping on the river's islands. Instead they listen to people who have paddled the river and

“Water for People is a great avenue for helping a community for a very small investment. It's just a matter of bringing some expertise and persistence to the task.”

GARY DeKOCK

say they can't wait to go back. "They are nothing but encouraging," says Linda. "They say it is just a wonderful river. They're passionate about it and tell us we're going to have the time of our lives."

Gary adds, "We'll be paddling for about eight hours a day, probably seven days a week, with a few rest days. You're going downriver. Other people have done it. It's just a matter of taking one day at a time until you get there. You don't have to be a superhero to paddle a river. We're hoping for low water, gentle rains and few mosquitoes."

And lots of sponsors and donors. You can follow the DeKocks' progress or donate to their cause by visiting www.mi-waterforpeople.com. **tpo**



In favor of the change

This is my first ever letter to the editor, but I thought with such a big change, you might be looking for input. First off, your magazine is excellent. I appreciate the quality of contributors you expose us to.

As far as combining the two disciplines (wastewater and drinking water), I can only see it as being a good thing. I am certified in and operate in both water and wastewater. However, in recent times I have worked in a wastewater plant that switched over to tertiary, reclaimed water. I think this is something that will be more and more common, at least in California. Being able to think in terms of both processes gave me a feeling of being at ease with that new process adaptation. Anyway, I appreciate every opportunity to learn, so please, keep up the good work.

Pete Delaney

Operator

Sonoma County Calif. Water Agency

Call a spade a spade

Here's a question to ponder: Your magazine is named *Treatment Plant Operator*. Are you prepared to change the title of your magazine to represent our "improved" image in the wastewater industry? If not, I see this entire discussion as a moot point.

We *are* treatment plant operators. I have never felt any shame about being one. Although I'm a lab technician now, I still work with the same materials as when I was an operator. I've never needed a change of title to feel all right about myself or my chosen career path.

Calling a sewage plant a sewage plant is simply less confusing to the public than calling it by any other name. I am employed at what was once called a POTW (publicly owned treatment works). It was known to the locals as the sewage treatment plant. It was renamed the Water Pollution Control Center, and for years we've taken calls from the public inquiring as to the phone number of the sewage plant. More than once after explaining that they were in fact in contact with an employee of the sewage plant, I've been asked, "Well, if it's a sewage plant, why don't they call it the sewage plant?"

Calling a treatment plant operator anything else may build up someone's ailing ego, but it won't necessarily make them a better, happier, more satisfied worker. Maybe they'll walk around with their chest puffed out a bit more initially, but the truth will remain: They're still working as treatment plant operators. Maybe the change needs to take place in the region between a person's ears, not in the job title or the name on a sign.

Mark Stears

Lab Technician

Findlay (Ohio) Water Pollution Control Center

Who's to blame for nutrients?

I find it a disservice that you blame so much of stream nutrient problems on nonpoint sources ("Of Cows and Phosphorus," *TPO*, June 2014). This is the standard reply from the "clean-water plant" profession. When you indicate "major contributor," you need to be clear about which nutrient you are talking about.

You indicate in your article that point sources — clean-water plants and industries — account for a small (2 percent perhaps) fraction of the phosphorus load to waterways. I would like to see the data used to make this claim. I find that treatment plant discharges account for more like 60 to 70 percent of phosphorus in streams.

I am a retired wastewater chemist who has seen much stream monitor-

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ing data in central Illinois farmland. What I see is that farm drainage is the major contributor to nitrogen (nitrate) in the streams. With phosphorus, it is just the opposite. Treatment discharge, without phosphorus removal, is the major source of phosphorus in a given stream.

I agree that farmers need to be more responsible in the solution. They need to ensure that nitrogen use is timely and needed for crop production. They need to stop soil erosion, as most of agricultural phosphorus is in the soil. Fertilizer needs to be applied so that it is incorporated and will not wash off in heavy rains. Manure application is another problem. Sometimes proper application techniques are not followed or shortcuts are taken. This can also happen with biosolids application.

Jim Royer

Retired Wastewater Chemist and Wastewater Operator
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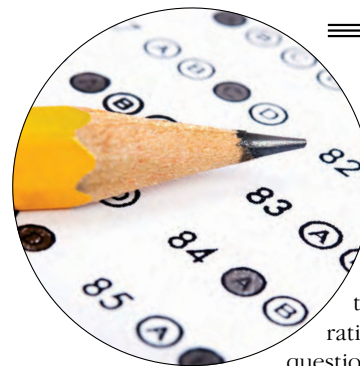


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Non-Contacting Conductivity System



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FEATURES

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- Multiple Monitoring Configurations
- Easy Calibration

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FEATURES

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A GROUP OF ALABAMA COMMUNITIES CREATE A WATER DISTRICT AND DEPLOY AN INNOVATIVE TECHNOLOGY TO PRODUCE ABUNDANT, HIGH-QUALITY WATER FOR TODAY'S AND FUTURE NEEDS

STORY: **Jim Force**

PHOTOGRAPHY: **Sarah Finnegan**

“The water is so clear. It can range between 1 and 4 NTU. That can make it difficult for the particles to bond, and we actually need to add more chemicals to coagulate the floc.”

TIM MITCHELL

IN THE OLD DAYS, SEVERAL COMMUNITIES IN ALABAMA'S St. Clair County depended on individual wells for drinking water — sources that weren't always reliable because of droughts, over-drafting and water-quality issues.

Yet economic development and population growth in the area, including a major Honda automobile production facility, depended on the availability of clean water.

Today, the communities are served by a state-of-the art regional water treatment plant and system. Source water is drawn from an abandoned rock quarry fed by the Coosa River, and the treatment facility includes the state's first Superpulsator upflow clarifier (Infilco Degremont) applied to drinking water. It's an innovation that saved on capital cost and reduced the plant's equipment footprint.

Four entities — Springville, Pell City, the Town of Odenville and St. Clair County — gave up their water systems to form a regional district, says Steve Cawood of the engineering firm Goodwyn, Mills and Cawood, which designed the plant and system.

DESIGN INNOVATIONS

The district was formed in 2003. After eight years of planning, grant applications, permitting and construction, the new Coosa Valley Water Treatment Plant began operating in 2011.

It is operated by the private firm ClearWater Solutions, a sister company to Goodwyn, Mills and Cawood. The plant manager is Tim Mitchell, whose team includes Casey Cambron, Joseph Burt, Joel Casey and Lamar Shirley, operators; and Brian Moore, trainee.

Two things about the plant excite Mitchell and his staff. For one thing, the plant is completely enclosed, warding off summer heat and humidity and occasional winter cold snaps that could cause freezing issues with feed lines and other equipment.

For another, designers built the treatment process around the Superpulsator, which combines flocculation, coagulation and upflow clarification in a single compact step.

Water for the Coosa Valley Water Supply District is pulled from a quarry fed by a creek branching off of the Coosa River.



Casey Cambron, water quality specialist, performs chlorine and manganese tests.

"Excellent" is how Mitchell describes its operation, although his team has had to tinker with the water chemistry to compensate for the low-turbidity source water.

The 200-foot-deep quarry, fed by the river and a series of springs, is full of relatively clear water. "The water is so clear," Mitchell says. "It can range between 1 and 4 NTU. That can make it difficult for the particles to bond, and we actually need to add more chemicals to coagulate the floc."

Ferric sulfate is added to the raw water to increase the precipitation of particles. "We use polymer to keep everything attached," Mitchell says. "At certain times of the year, we do a little prechlorination in order to get even better coagulation."

Coosa Valley (Ala.) Water Supply District



FOUNDED: | 2003

POPULATION SERVED: | 43,000

SOURCE WATER: | Rock quarry

INFRASTRUCTURE: | New water treatment facility, 227 miles of piping, 2 storage tanks, 1 booster pump station

CAPACITY: | 4-8 mgd design, 3 mgd average

TREATMENT PROCESS: | Flocculation, upflow clarification, filtration, disinfection

SYSTEM STORAGE: | 2.5 million gallons

WEBSITE: | www.clearwatersol.com

GPS COORDINATES: | Latitude: 33°42'24.02" N; longitude: 86°11'23.80" W



Kody Walker (left), vice president of operations at ClearWater Solutions, and Tim Mitchell, plant project manager.



A metering pump (ProMinent) measures chemical dosing for treating water provided to municipalities in St. Clair County, one of the fastest growing counties in Alabama.

COMPACT SYSTEM

The Superpulsator consists of a rapid-mix zone, followed by a vacuum chamber and then a series of inclined settling (lamella) plates. Coagulated water from the rapid-mix system enters the vacuum zone and then is uniformly distributed to the basin containing the inclined plates. A sludge blanket, maintained about midway in the plate basin, attracts and collects solids as the water passes up through it. Powdered activated carbon aids in clarifying the water by absorbing organic material.

The vent valve assembly on top of the vacuum chamber opens and closes, drawing water in and out of the chamber. As a result, the sludge blanket contracts and expands (pulses), combining the flocculation, clarification and sludge collection steps into a single process. "In our system, the sludge blanket is about 24 inches thick and expands and contracts every 15 seconds," Mitchell says. "Because our turbidity is so low, we don't generate a large volume of sludge."

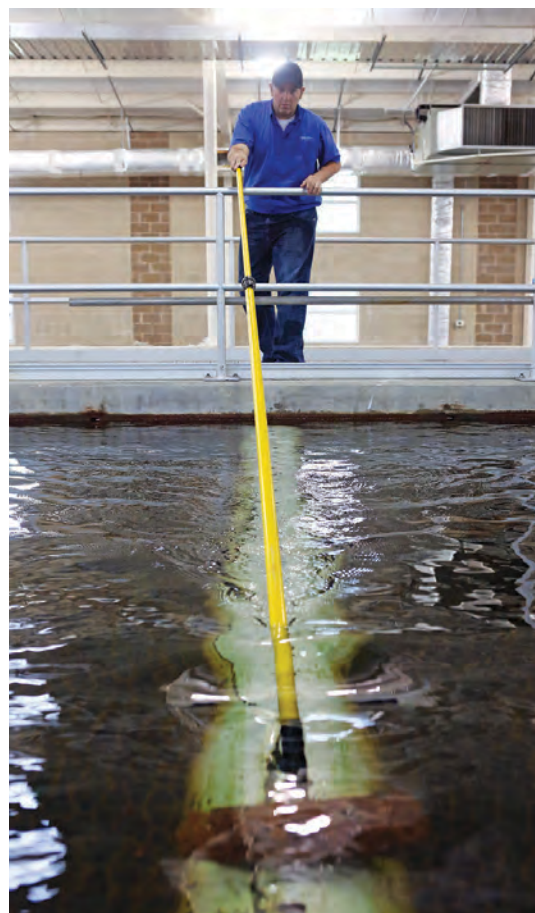
“We wash down the clarifier basin once a year. The next time we wash it, we’re going to try Bentonite clay as a binding agent to try to expedite the process of building the sludge blanket. Make it dirty in order to clean it, in other words.”

TIM MITCHELL

Solids wasted from the sludge blanket and filter backwash water are pumped to two lagoons operating in parallel, each with 1-million-gallon capacity. Water discharged from the lagoons is dechlorinated and pumped back to the Coosa River.

Back at the Superpulsator, clarified water is collected uniformly across the length of the settling area and is passed through 1.5-inch holes in PVC pipe into a trough that feeds subsequent treatment processes. Filtration is the next step. Three 750 gpm dual-media filters (Leopold), consisting of granular activated carbon and sand, are rated for 2 gpm per square foot of filter surface area. Bed depth is 72 inches. The filters are equipped with a Leopold control system.

After filtration, the product water is disinfected with sodium hypochlorite at 2 ppm and is pumped to a 750,000-gallon clearwell. From there, maintaining a chlorine residual of 1.5 to 1.75 ppm, it travels to the four community water systems. The district maintains 227 miles of distribution lines, two ground storage tanks and one booster pump station. Master Meter smart flowmeters at each connection point yield continuous measurements of the flow being used by each community. The meters feed into the district’s SCADA system (MR Systems), and the communities are billed quarterly based on consumption.



Casey Cambron clears sediment from pipes in the Superpulsator unit (Infilco Degremont).

QUICK STUDY


Although the Superpulsator technology was new to the Alabama water treatment profession, the Coosa Valley plant staff picked up on it quickly. “We conducted special training when we first started,” says Mitchell. His staff consulted the operations manuals and simply practiced to achieve successful operation.

“Six months into it, we were producing high-quality water,” says Mitchell. “We’ve never been out of compliance.” Staffing seven days on, seven off,




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GUARANTEEING THE SUPPLY

What began as a conversation has evolved into a complete raw water intake and treatment plant known as the Coosa Valley Water Supply District, providing affordable, clean water to municipalities in St. Clair County, one of the fastest growing counties in Alabama.

That's according to Steve Cawood of Goodwyn, Mills and Cawood, the engineering firm that helped the county plan and develop the district and the treatment facility that now serves Springville, Pell City, the Town of Odenville and St. Clair County.

"We had the idea that one source could meet the demand of all the communities and could stabilize and lower water rates over time," says Cawood. It wasn't easy. Eight years in the making, the effort required inter-city cooperation, permitting for surface water treatment, funding, and design and operation of a state-of-the-art water treatment plant able to meet current and future needs.

"It was a massive undertaking, but it was fruitful and has added to the overall quality of life for the residents of these communities," says Cawood. Paul Manning, St. Clair County commissioner and chairman of the Coosa Valley Water Supply Board, believes the water plant will continue to foster rapid development in the area: "This community collaboration positions the county for continued residential and economic growth."

The district has the capacity to serve other utility systems within the county, as well as neighboring counties, many already connected for emergency or redundant water supply. Currently providing 3 mgd, the plant has the infrastructure in place to process twice that amount in the future.

“Six months into it, we were producing high-quality water. We’ve never been out of compliance.”

TIM MITCHELL

increase, so the district is expanding the treatment plant capacity. The filter rate will be increased from 2 to 3 gpm per square foot of filter surface area, enabling the plant to produce up to 5 mgd. The project is expected to deliver additional water the district can sell to outside customers, keeping rates for existing customers as low as possible.

It's the next phase of an idea that blossomed just over a decade ago and set up area communities and residents for a future of abundant water. **tpo**

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A Hach 2100N turbidimeter is used to test the finished water in the plant's lab.

each operator takes 12-hour shifts. One extra person helps in the distribution system.

The quality of the raw water was critical. "We needed to be patient with the process to allow it to sort of create itself," says Mitchell. "With low turbidity it takes awhile to create the sludge blanket; with NTUs of 5 or above the blanket creates itself much faster."

The staff continues to experiment. "We wash down the clarifier basin once a year," says Mitchell. "The next time we wash it, we're going to try Bentonite clay as a binding agent to try to expedite the process of building the sludge blanket. Make it dirty in order to clean it, in other words."

The demand for clean water in St. Clair County is only expected to

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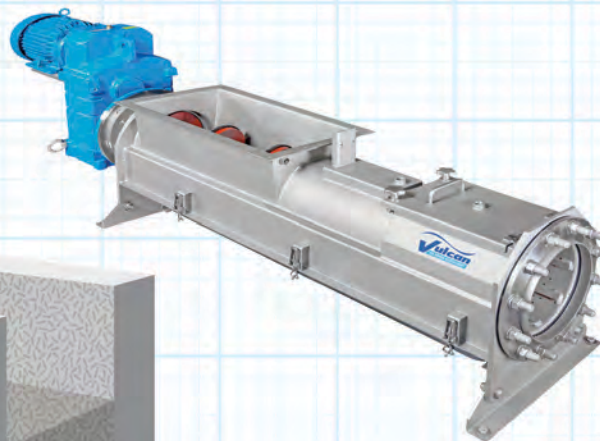


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STORY: **Ted J. Rulseh**

PHOTOGRAPHY: **Cory Dellenbach**

EDITOR'S NOTE: Jeremy Cramer, who was superintendent of the Stevens Point Wastewater Treatment Plant at the time this article was researched and written, has since left to become superintendent of the Fond du Lac (Wis.) Regional Wastewater Treatment Facility. His successor is Chris Lefebvre, formerly chief wastewater operator at Stevens Point.

THE STEVENS POINT WASTEWATER TREATMENT Plant could hardly be a better fit for its central Wisconsin community of 27,000.

Walkers and bicyclists passing just outside the fence on the 26-mile Green Circle Trail experience little or no odor. The University of Wisconsin - Stevens Point and its College of Natural Resources provide a steady pipeline of interns for the plant, and three of its full-time operators are graduates.

The plant's multiple green features — biogas-fueled cogeneration that produces nearly all of its energy, biological phosphorus removal, use of effluent for heating and cooling, and a host of energy-saving innovations — match the community's strong environmental ethic. Even the building architecture is harmonious: The handsome sandstone exteriors match those of the structures at Jules Iverson Memorial Park.

Most important, Jeremy Cramer and his operations team make sure the



A linear motion mixer (Ovivo) sits on top of digester No. 3 at the Stevens Point Wastewater Treatment Plant.

plant sends high-quality effluent to the Wisconsin River, with an eye toward keeping rates down and helping local businesses prosper and grow.

"It's a well-run facility, and that doesn't start and end with me," says Cramer, wastewater superintendent. "My predecessors Eric Niffenegger, Don Ceplina and Henry Tork left a great legacy to build on, and I'm blessed to be part of a strong team. We have a great boss [Joel Lemke, director of utilities] and excellent operators."

FUEL FOR INNOVATION

The solids side powers this 4.6 mgd design/3.0 mgd secondary facility. High-BOD wastewater from dairies and the fast-growing Stevens Point Brewery supports high biosolids and biogas production. The plant's three mesophilic anaerobic digesters, also fed directly with brewery, dairy, food processing and distillery wastes, yield some 91,000 cubic feet of gas per day, enough to make the plant actually energy positive at times. (As a bonus, tipping fees from the wastes generate about \$115,000 in annual revenue.)

The gas feeds a 180 kW engine-generator (MAN) by way of a fuel treatment skid (Unison) that removes hydrogen sulfide, water and siloxanes. The electricity powers essentially all plant processes, while heat recovered from exhaust gas and jacket water heat recovery keeps three buildings comfortable in cold

“We’ve continued to make progress because we focus on energy — we consider energy in every decision we make.”

JEREMY CRAMER



Chris Lefebvre, formerly chief operator and recently promoted to plant superintendent, cleans equipment at the end of a workday.



Jeremy Cramer, former plant superintendent, checks flocculation of biosolids after the material enters the Hycor rotary drum thickener (Parkson Corp.).

Stevens Point Wastewater Treatment Plant PERMIT AND PERFORMANCE			
	INFLUENT	EFFLUENT	PERMIT
BOD (influent)/ CBOD (effluent)	350 mg/L	5 mg/L	30 mg/L
TSS	340 mg/L	5 mg/L	30 mg/L
Phosphorus	7 mg/L	0.75 mg/L	0.93 mg/L

Stevens Point (Wis.) Wastewater Treatment Plant



BUILT: 1940; upgrades 1955, 1971, 1993
POPULATION SERVED: 27,000
FLOWS: 4.6 mgd design, 3.0 mgd average
TREATMENT LEVEL: Secondary
TREATMENT PROCESS: Activated sludge, biological phosphorus removal
RECEIVING STREAM: Wisconsin River
BIOSOLIDS: Class B, land-applied
ANNUAL BUDGET: \$5 million (operations)
WEBSITE: www.stevenspoint.com
GPS COORDINATES: Latitude: 44°30'41.95" N; longitude: 89°35'07.32" W

weather and maintains the digesters at 96 degrees F. Two boilers that once burned natural gas to heat the digesters now function as heat exchangers.

“We still flare some gas because we bring in so much additional material and we don’t have gas storage,” says Cramer. “We could have installed a bigger engine, but we sized it for the amount of gas we would produce if we lost all our sources of high-strength waste. If we had upsized the generator, you wouldn’t see that flare.”

The digesters take in a mix of waste products and primary sludge, plus waste activated sludge thickened from 0.5 to 3.5 percent solids in an Envirox dissolved air flotation (DAF) system (Evoqua).

Biosolids leave the digesters at about 2 percent solids. Polymer is added,

and a Hycor rotary drum thickener (Parkson Corp.) boosts the solids content to 4.5 to 5 percent. That material is delivered to two 1.6-million-gallon storage tanks, where decanting raises the solids content to as high as 6 percent. The finished Class B material (about 3 million gallons per year) is applied to grain corn ground in spring and fall and on alfalfa fields in summer after cuttings.

DOING IT BIOLOGICALLY

The overall treatment process makes use of most structures and tankage from the original facility, built in 1940. The highlight of the liquid side is the bio-P process. “In about five years, there will be a total maximum daily load on the Wisconsin River, and at that time our effluent phosphorus limit will be substantially lower — about 0.1 mg/L versus the current 0.93.”

Stevens Point wastewater is higher in organic waste than is typical. “While the average for a municipal plant is about 250 mg/L BOD, we see about 350,” Cramer says. “The Point Brewery nearby contributes to the higher organic loading.”

Two 78-inch-diameter screw pumps (Evoqua) lift influent 32 feet, after which it flows through the plant by gravity. The headworks includes a 3 mm stair screen (Vulcan Industries), a PISTA Grit vortex grit removal system (Smith & Loveless), and a grit washing and dewatering system (Huber Technology).

RIGHT: The staff at the Stevens Point Wastewater Treatment Plant, from left, Frank Suchon, operator; Adam Clark, operator; Jeremy Cramer, former superintendent; Joel Lemke, public utilities director; Michael Vassar, operator; and Chris Lefebvre, plant superintendent. Not pictured: Dan Ryskoski, operator. BELOW: Inspecting the stair screen (Vulcan Industries).



Primary clarifiers remove about 60 percent of incoming organic solids, accounting for 25 to 30 percent of BOD removal. Primary effluent enters an anaerobic zone where phosphorus-accumulating organisms first release phosphorus. When the water passes out of that zone (after about one hour) and enters the aeration basins, they take more phosphorus than they released.

"We do bio-P removal 100 percent of the time," says Cramer. "We don't use any metal salt for chemical precipitation. The high organic content of our wastewater drives the bio-P process — the brewery wastewater definitely helps. If ever we were to struggle with our bio-P, we could use one of our high-strength waste substrates as a carbon source."

"Bio-P is not necessarily easy. It takes some operational changes through the seasons. In cold temperatures and warm temperatures we have to make some adjustments. But it's definitely a huge savings. For a facility our size to get our influent down to our permit level of 0.93 mg/L using ferric chloride, that would cost about \$128,000 per year. We spend essentially zero. In addition, if you add a metal salt, the precipitate increases your biosolids somewhat, so we avoid the extra expense of handling that material."

The plant's three aeration basins run in parallel. Air is driven through



WELL-EDUCATED, HIGHLY VERSATILE

Team members at the Stevens Point treatment plant are fully cross-trained and share duties almost equally in the plant and laboratory. They staff the facility from 7 a.m. to 3:30 p.m. Monday through Friday; one operator is on call after hours and on weekends.

Several team members hold four-year college degrees and top-level certifications. Joel Lemke, director of utilities, has a bachelor's degree in resource management and environmental protection from the University of Minnesota. Jeremy Cramer, wastewater superintendent, is a Grade 4 wastewater operator with a bachelor's degree in biology from the University of Wisconsin - La Crosse and a master's in business management from Cardinal Stritch University in Milwaukee. He has been with the plant for 11 years, the last two in his current role.

Chris Lefebvre, chief wastewater operator, is also Grade 4 certified and has a bachelor's degree in soils and waste resource management from UW-Stevens Point. Adam Clark, operator, has the same degree and is Grade 4 certified; Michael Vassar, operator, is Grade 4 certified and has a bachelor's degree in fisheries and limnology from UW-Stevens Point. The team also includes operator Dan Ryskoski (Grade 4) and Frank Suchon.

"The level of education here really helps this facility," says Cramer. "It helps us think outside the box and complete some unique projects, like becoming energy positive."

Lefebvre adds, "When you have good management, everything else follows. Good leadership helps people buy into things better. The people here truly care about what's going on. We all work together — we view it as our plant, not somebody else's plant that we just happen to be running."

membrane fine-bubble diffusers (Sanitaire) by three 150 hp rotary-lobe positive displacement blowers from a 1993 plant upgrade, and a 3-year-old rotary screw blower (Atlas Copco) that is about 20 percent more efficient. "We try to run only one blower at a time to limit electric utility demand charges," Cramer says.

Michael Vassar checks oil levels on a drive on an Envirex final clarifier (Evoqua).



“We could have installed a bigger engine, but we sized it for the amount of gas we would produce if we lost all our sources of high-strength waste. If we had upsized the generator, you wouldn’t see that flare.”

JEREMY CRAMER

Wastewater leaving the aeration basins enters two Envirex center-feed final clarifiers (Evoqua). Clarified effluent is disinfected (summer only) in a TrojanUV3000Plus system (TrojanUV) before discharge to the river through a concrete outfall structure.

OUT WITH ENERGY WASTE

Apart from consistent effluent quality, a point of pride for Cramer and his team is steady progress on saving energy, even as plant loads have increased. The biggest energy project was the cogeneration system, installed in 2012, but other projects, large and small, have contributed to energy self-sufficiency.

The team reduced power consumption significantly by ratcheting down the aeration basins’ dissolved oxygen setpoint from 2.5 mg/L to 0.9 mg/L. “If you give the bacteria more oxygen than necessary, you’re just wasting

EYE ON PROGRESS

There’s more to be done. That’s the attitude of the Stevens Point treatment plant team. While running a high-performing facility, they’re reaching for new levels of excellence.

The most immediate initiative is construction of a force main to deliver concentrated high-strength waste from the Stevens Point Brewery directly to the treatment plant digesters, so that the BOD bypasses the aeration process. That project is to be completed by spring 2015. Other projects on the radar screen include:

Nutrient harvesting. Technologies are available to harvest phosphorus and nitrogen from the wastewater stream and produce a marketable fertilizer. Notably, such a process would reduce the phosphorus content of the plant’s biosolids, expanding potential land application sites to include farms with soils already high in phosphorus.

Class A biosolids drying. The team will evaluate solar biosolids drying as a way to produce a fertilizer product suitable for sale to the general public.

Cogeneration. A second engine-generator would expand beneficial use of biogas. Gas production could be boosted by converting one of two biosolids storage tanks to an anaerobic digester fed by treatment sludges and high-strength waste materials.

Last May, Cramer presented these ideas to the city Water and Sewerage commissioners and received approval to explore them. “The mayor was present, everyone loved the ideas and they recommended that we proceed,” says Cramer. “It’s very exciting.”

ENERGY USAGE COMPARISON

	2002	2011	2013*
Electric energy purchased	1,917,900 kWh	1,467,300 kWh	-29,100 kWh
Power consumed per day	5,255 kWh	4,047 kWh	-79 kWh
Peak demand	384 kW	267 kW	222 kW
Power consumed per million gallons per year	1,647 kWh	1,283 kWh	-28 kWh

* Negative values reflect sales of power produced on site to the utility grid

energy,” Cramer says. “Through years of profiling, experimentation and testing, we found that we can treat effectively at 0.9 mg/L of DO.” The DO setpoint is maintained in a feedback loop with LDO probes (Hach) that signal a programmable logic controller (PLC) to ramp blower output up or down. Other energy innovations include:

- Installing heat pumps using plant effluent to heat and cool the lab and office building and a new garage.
- Downsizing the compressor that supplies air to the plant’s DAF system, diaphragm pumps and non-potable water reuse system from 50 hp to 10 hp.
- Installing an energy efficient linear motion mixer (Ovivo) on a digester.
- Programming PLCs to prevent high-horsepower motors from running at the same time, limiting demand charges.
- Downsizing three mixers in the bio-P basin from 8.3 hp to 2.5 hp.
- Shutting off pole lights for yard lighting and converting building exterior lamps to LEDs.

“This was a well-run and very efficient plant since before my time,” says Cramer. “Before we put in the biogas cogeneration, we were in upper 90s per-

A tractor connected to a drag hose injection pump injects biosolids into the soil on an area farm.

PHOTO COURTESY OF STEVENS POINT WASTEWATER TREATMENT PLANT



centile in the country for energy usage. We've continued to make progress because we focus on energy — we consider energy in every decision we make.”

AN EXCITING FIELD

Energy is just one of many aspects of the profession that keep Cramer enthused about going to work: “Most people wouldn't think of wastewater as an exciting field, but it is. It's inspiring when leading tours to see people start to appreciate all that goes on here and start asking questions and get involved. The wastewater field is ever-changing. I'm proud to be part of it.” **tpo**

“Bio-P is not necessarily easy. It takes some operational changes through the seasons. In cold temperatures and warm temperatures we have to make some adjustments. But it's definitely a huge savings.”

JEREMY CRAMER

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Giving water-saving tips to three visitors are, starting from far left, Deb Lane, water resources analyst; Dan Galvin, chairman of the Board of Public Utilities; and Pam Lorence, water resources specialist.

Driving Up to Save Water

IN DROUGHT-RAVAGED NORTHERN CALIFORNIA, SANTA ROSA WATER STAFF MEMBERS TAKE TO THE STREETS TO SPREAD THE WORD ABOUT THE NEED FOR WATER CONSERVATION

By Craig Mandli

Drive-ups usually mean hamburgers, french fries and chocolate shakes. But in Santa Rosa, Calif., a playful spin on the concept made it convenient for residents to embrace water conservation in a region that's fighting serious drought.

The Drought Drive-Up campaign by Santa Rosa Water promotes conservation by stressing the value of water. Working with the Sonoma-Marin Saving Water Partnership and the Sonoma County Water Agency, Santa Rosa hosted four Drought Drive-Up locations on April 23.

Residents walked, biked, rode the bus or drove to the locations to build customized drought toolkits. Each location was staffed by a team of local officials and water and wastewater department staff, who offered drought tips and free high-efficiency showerheads, aerators, shower buckets, dye tabs and shower timers. Visitors were also entered to win a high-efficiency washing machine or toilet.

“In the past we would ramp up our outreach when water supplies would reach alarming levels, but we are now looking for water-use efficiency at all times.”

KIMBERLY ZUNINO

“The event exceeded our expectations, as more than 3,000 residents took part,” says Kimberly Zunino, water-use efficiency coordinator. “Some picked up partial kits, but most got full kits. The high-efficiency showerheads were especially popular. People were truly inquisitive, engaged and grateful for an opportunity to help extend our water supply.”

The event got so busy that, at times, staff had trouble keeping items in stock, particularly the showerheads. “It was our first time doing something like this, so the community took a bit of a risk,” says Zunino. “Fortunately, I believe it really paid off. It was a huge effort, but seeing all the engaged people was worth it.”

TAPPED SUPPLY

Santa Rosa gets most of its water from Lake Sonoma, where reservoir capacity sat at 75.8 percent as of early May. However, Lake Mendocino, which supplies the smaller communities upriver from Santa Rosa, was at 48.2 percent of capacity.

Zunino says that although the water supply situation wasn't dire, residents still needed to conserve: “We were trying to convey that we were starting at water levels where they would normally be at the end of the peak water-use season. The more community members we can get to understand that, the better off we'll be.”

Residents are conserving already but not yet at the 20 percent reduction goal set by Gov. Jerry Brown in declaring a statewide drought emergency.

The most recent numbers show Santa Rosa using about 15 percent less water than a year ago. But there's also a tendency, especially when it rains, for what Zunino calls “amnesia” — people just forget that 2013 was one of the driest years on record.

“We are trying to drive home the point that conserving water is not only for dry times,” she says. “It's really a habit that our residents need to get used to all year. That's why we are constantly reaching out to our customers.”

As summer begins and folks turn their attention to gardens and lawns and home improvements, the department offers water-wise landscaping and gardening tips along with equipment residents can install to reduce consumption.

The department also hosts seminars on water-use management. The latest, on land use in drought conditions, filled up quickly. “We had a waiting list of 38 community members, which was so awesome to see,” says Zunino. “The people here want to learn about this. As long as that interest continues, we're going to keep offering programming.”



The city government has also taken steps to save water. Every toilet in city buildings has been replaced with a low-flow version, and the city offers rebates to citizens who replace their toilets with more efficient models.

"We have also sent out direct mailers, gone on the radio, visited community groups and civic organizations, and given weekly updates on our water situation at council meetings," says Zunino. "Our rainfall this year is what we have to work with and manage for the remainder of the year. It's an ongoing challenge."

COMMUNITY SUPPORT

Zunino is pleased with how the community responded to the outreach. "We have seen a total water savings of 1.4 billion gallons per year in our community since we instituted our drought programs," she says. "That tells me the message is hitting home. The people here are placing a high value on their water supply."

"Running these programs is actually less expensive to the community's bottom line than buying water. This drought encompasses a huge area of the country, so the price of water increases as demand increases."

"We are so fortunate that the community is buying into the idea that efficient water use is a big deal. In the past we would ramp up our outreach when water supplies would reach alarming levels, but we are now looking for water-use efficiency at all times. Not only does that prepare citizens for drought conditions, it saves money and hopefully helps keep the extreme water deficiencies to a minimum."

By saving so much water, the community has been able to negate wholesale water rate cost increases. "We operate knowing that we likely won't see an increase in our allotted supply," Zunino says. "If we can stay within our water use limits, the rates will stay palatable for our citizens, and we won't have to allot funding toward additional infrastructure. Operating lean definitely makes sense, even when we no longer have to deal with drought conditions." **tpo**



Sparky, Santa Rosa Fire Department mascot, entertained kids at the Drought Drive-Up.

What's Your Story?

TPO welcomes news about your public education and community outreach efforts for future articles in the Hearts and Minds column. Send your ideas to editor@tpomag.com or call 715/277-4094.



Roberta Atha (foreground), administrative analyst, and Randy Barron (background with hat), water resources specialist, staff a booth at the Drought Drive-Up.



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Trees line the entrance road to the Red Oak Creek facility. INSET: The plant team includes, front row, from left: Richard Dennie, chief operator; James Watson and Gerald Smith, operator II; and David Luther, senior operator; back row: Omar Maisonet, maintenance mechanic I; Wendy Derdeyn, office coordinator; Claud Lesly, senior maintenance mechanic; Billy Hill, project manager; and John Wardell and Barry Beeson, operator II.

Fitting Right In

ARCHITECTURE, LANDSCAPING AND ODOR AND NOISE CONTROLS MAKE A TEXAS TREATMENT PLANT AN UNOBTRUSIVE PART OF A RESIDENTIAL AREA

By Jeff Smith

Being a good neighbor is a serious matter to the staff at the Red Oak Creek Regional Wastewater Treatment Facility in the town of Red Oak near Waxahachie, Texas. That has been true since the plant was built in the late 1980s.

“The facility was built to preserve the rural ambience of the area surrounding the plant site,” says Billy Hill, project manager for Trinity River Authority (TRA), facility owner. Located close to Bells Chapel Road, a popular roadway serving several nearby neighborhoods, the plant is screened by trees and gently rolling berms that present a pastoral landscape to passers-by.

WELL HIDDEN

“People would have to go out of their way to see the plant,” says Hill. That’s because the grass-covered berms around the 43-acre site are 12 to 14 feet high. They took about a year to build and were crowned with hundreds of trees — elm, cedar, oak and persimmon — that have matured to 15 to 25 feet tall and shield the conventional activated sludge plant from view.

The facility’s low profile was enhanced by excavating limestone 4 to 6 feet below before grade construction. Low-level lighting, noise control features and odor control also help the plant fit in, says Hill. Light fixtures along the driveway are mounted close to the ground and direct the light down. On-site fixtures are aimed away from neighboring areas. Most lighting is controlled by sensors.

Blower noise is contained by using silencers and locating the blowers within buildings. Originally, the plant used chemicals to reduce hydrogen sulfide emissions, but biofilters have been added. “We also converted the primary clarifiers to aeration basins because they were the source of odors

“The facility was built to preserve the rural ambience of the area surrounding the plant site.”

BILLY HILL

from the front,” says Hill. “So now it just has kind of an occasional earthy odor instead of a pungent, rotten-egg odor. We understand that if there is any kind of issue here at the plant, it will affect our neighbors.”

POSITIVE IMPACT

There are no signs or other markers on the roadway to identify the facility. An S-shaped roadway winds from Bells Chapel Road to the plant’s most outstanding feature — an administration building designed to look like a country home. A small sign is attached to the building. “Out of sight, out of mind,” says Hill.

The plant outfall is at the back of the property and flows about 100 yards into Red Oak Creek before the effluent makes its 25-mile journey to the Trinity River. The plant was originally sized for 3.5 mgd, but a recent capital improvement project increased design capacity to 6 mgd and peak flow to 15 mgd.

“Since it began operation in 1991, the plant has provided a positive environmental impact on the Red Oak Creek and Trinity River ecosystems,” says Hill. Among the many award plaques displayed on the walls in the administration building is a Platinum 13 Peak Performance Award from the National Association of Clean Water Agencies, recognizing 13 years of consistent compliance with the plant’s NPDES permit.

The TRA considered several locations before building the Red Oak Creek facility, which serves about 60,000 residents in the southern portion of the Dallas-Fort Worth metroplex. Hill and his staff of nine are proud of the plant’s performance and their success in operating unobtrusively in a residential neighborhood. Says Hill: “I know I wouldn’t want to live right next to a place that didn’t care.” tpo

Share Your Ideas

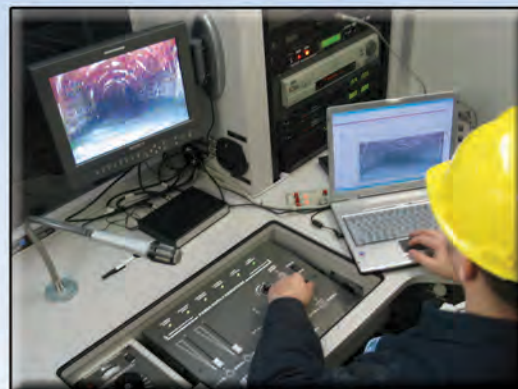
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A WASHINGTON TOWN TURNS TO BIOSOLIDS COMPOSTING
AND CREATES A HIGHLY POPULAR, REVENUE-PRODUCING PRODUCT
WITH STRONG DEMAND FROM COMMERCIAL AND RESIDENTIAL USERS

STORY: Erik Gunn
PHOTOGRAPHY: Mark Mulligan



Community members are welcome to load and haul free compost from the La Conner Wastewater Treatment Plant. The plant, operated by Water & Wastewater Services, won a 2012 Excellence in Biosolids Management Award from the Northwest Biosolids Management Association.

NEARLY 20 YEARS AGO THE TINY TOWN OF LA CONNER faced a biosolids dilemma. Located in Washington's Skagit Valley, about 70 miles north of Seattle, the town had relied on farmland application, but that was becoming more difficult.

One option would have been to assume the cost of sending Class B biosolids five hours away to eastern Washington for use on farmland there, but town leaders wanted to try a different approach. "We thought, we're surrounded by farmland — we can turn this material into a resource," says Kelly Wynn, who manages the La Conner Wastewater Treatment Plant.

That resource is compost. The town now combines its biosolids with yard waste and wood chips, composts the mixture for up to a year, and offers it free to local residents and for sale to large-scale users. The program has been growing steadily, and in 2012, the Northwest Biosolids Management Association, representing 14 municipalities and clean-water districts, recognized La Conner with its Excellence in Biosolids Management Award.

LAND APPLICATION FACES LIMITS

Wynn has managed La Conner's wastewater treatment for 34 years through his business, Water & Wastewater Services (W&WS). His company specializes in managing rural utilities with 3,000 or fewer customers. Clients are scattered over seven counties; about 30 are wastewater operations, including La Conner, and more than 100 are water utilities.

The La Conner treatment facility serves the town itself, a rural community of about 800 people, as well as the nearby Swinomish Indian Tribal Community and Skagit County Sewer District No. 1, bringing its total customer base to 1,600. For the first 15 years or so after W&WS took over the facility in 1980, the plant's Class B biosolids were directly land-applied. As the region's population grew, however, the role of farming began to diminish.

The Skagit Valley, still farming country, is famous for tulips and is also a source of seed crops. But agriculture is "not nearly as predominant as it was 10 or 15 years ago," says Wynn.

Then La Conner's treatment plant, which had been operating below capacity, began treating waste from boats of the Washington state ferry sys-

Town of La Conner (Wash.) Wastewater Treatment Plant



POPULATION SERVED: | **1,600**

FLOWS: | **0.52 mgd design, 0.32 mgd average**

TREATMENT LEVEL: | **Secondary**

TREATMENT PROCESS: | **Oxidation ditch**

BIOSOLIDS PROCESS: | **Static pile composting**

BIOSOLIDS VOLUME: | **2,000 cubic yards of compost per month**

BIOSOLIDS USE: | **Distribution and sale for gardens and landscaping**

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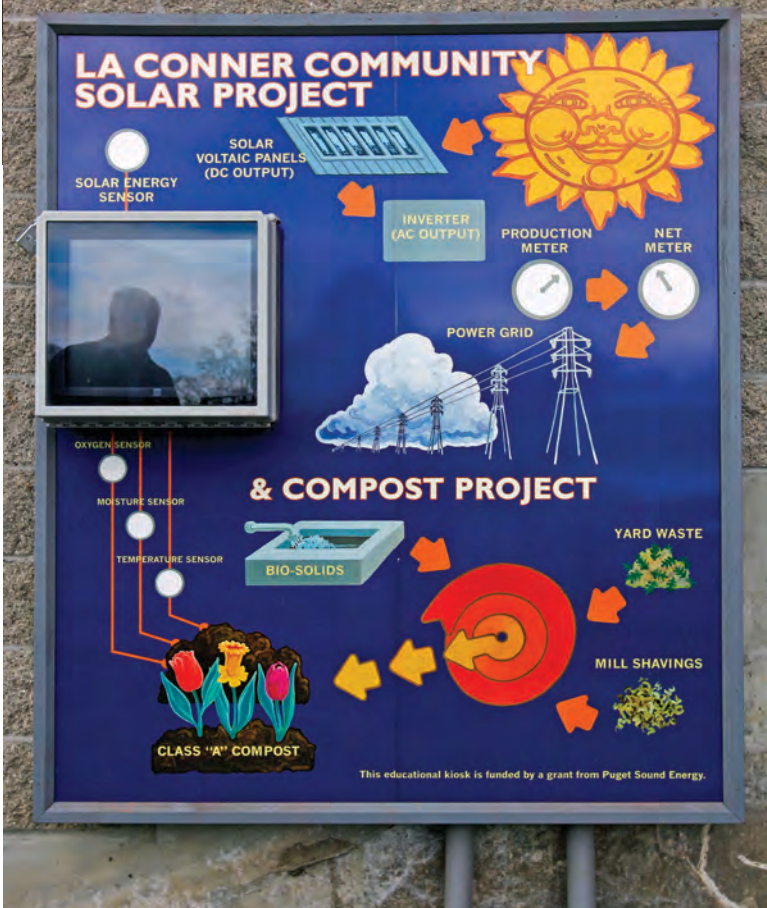
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“We thought, we’re surrounded by farmland — we can turn this material into a resource.”

KELLY WYNN



ABOVE: The La Conner wastewater facility team includes, clockwise, from front, MacLeod Pappidas and Jake Hamlin, operators; Ryan Erickson, compost operator; Kelly Wynn, plant manager; and Ed Matheson, lead operator. LEFT: An educational kiosk at the treatment plant explains the La Conner Community Solar Project.



tem. That meant extra revenue for the town but also more biosolids, even as application site permits were getting more difficult to obtain.

“There was more and more permitting and bureaucracy involved,” Wynn says.

In the early 1990s, La Conner decided to expand the treatment plant to serve as a central site for treating septic tank waste from throughout the Skagit Valley, where haulers were also running out of options. Other utilities in the region chose to dewater their biosolids, then truck the material over the Cascade Mountains to eastern Washington for application to wheat fields. But La Conner officials felt the biosolids still had a viable use right at home.

And so La Conner turned to composting. “It all came together in about 1994,” says Wynn. “It’s been constantly growing since then.” The town collects yard waste from residents for \$10 for 10 32-gallon cans, or \$40 for 10 cubic yards, and also buys wood chips from lumber mills.

TRIO OF STREAMS

The La Conner treatment plant is designed for 0.52 mgd. Both the treatment plant and the composting facilities were upgraded in 2000, about six

“There’s a steady stream of septage and biosolids flowing into the plant through trucks, and a somewhat steady stream of cars and trucks leaving the facility with compost.”

KELLY WYNN

years after the composting program started. Overall, the plant has doubled in size since it was built 40 years ago.

The plant receives wastewater through its collection system, septage delivered by haulers, and biosolids trucked in from other wastewater treatment plants, some operated by Wynn’s company. The wastewater is treated in an extended aeration activated sludge process. Final effluent is UV disinfected and discharged to the Swinomish Slough.

Influent is screened, sent to one of two oxidation ditches, and then delivered to one of two clarifiers. Biosolids from the clarifiers are sent to two aerated holding tanks (25,000 and 80,000 gallons) in series. The material is held in the first tank and aerated, then transferred to the second tank and aerated again. Contents from that tank are sent to a Roediger Model TP 12.43 S-belt filter press (Charter Machine Company). Filtrate from the press returns to the headworks.

The biosolids cake is stored in a bin until an agricultural mixer blends it at a ratio of one part biosolids to two parts wood chips and yard waste. The mixture is then off-loaded into storage bays in piles 15 feet deep and 10 feet wide.

STATIC PILE AERATION

“We use static pile aeration,” says Wynn. Air is drawn from the blowers that feed the holding tanks and pumped into the center of the compost piles. Internal chemical and biological reactions heat the piles to 130 degrees F for three days in a qualified process to further reduce pathogens. After that, the temperature is maintained at 104 to 113 degrees F for 14 days.

The pile is then transferred from the composting storage bay to another area where it is cured for at least 30 days. After curing, a sample is tested in the county health department’s designated outside laboratory for fecal coliform and other potentially harmful constituents. The resulting compost qualifies as Class A biosolids.

La Conner’s wastewater is typical of a residential and tourist town except that the Swinomish Fish Company, owned and operated by the Swinomish Indian Tribal Community, sends waste from processing canned salmon and other seafood products. During busy processing periods, “the waste coming into the plant turns red — it’s full of blood,” says Wynn. Screening at the plant removes bones and other large solids, but the blood enriches the biosolids, Wynn says.

The resulting compost looks a bit like shredded landscape bark. In front of the treatment plant, a garden demonstrates the benefits of using the compost. Some of the product is sold to topsoil companies and landscapers and other large-volume users. La Conner homeowners can pick up compost for free at the treatment plant.

“There’s a steady stream of septage and biosolids flowing into the plant through trucks, and a somewhat steady stream of cars and trucks leaving the

facility with compost,” Wynn says. “I use it in my vegetable garden at home, and I also use it in my ornamental gardens. I just do it every year and it really helps the soil.” He has seen less weed growth and richer soil as a result.

A MONEY-MAKER

Users who want large amounts of compost and need help to load it purchase a punch card for the amount they want.

Plant personnel then load it into the buyer’s truck with a tractor. Compost is sold at \$10 per cubic yard for up to 10 yards and \$5 a yard after that. Screened compost costs \$13 a yard for up to 10 yards and \$9 a yard thereafter. “We generated about \$30,000 last year in compost sales,” Wynn says.

Occasionally, big users such as landscape contractors skirt the system. On a Friday night, they drop off a loader at the site. “They show up with a truck on Saturday morning and scoop out the entire bin, and none of the

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SUPPORTING SCIENCE, SPREADING THE WORD

To help advance scientific understanding about biosolids and improve public awareness, the Town of La Conner took an unusual step: It paid for a soil scientist's graduate education.

That scientist is Caitlin Price Youngquist, who completed her studies as a Ph.D. candidate at Washington State University's Mount Vernon Research Center in spring 2014. Her Ph.D. program "was entirely funded by the Town of La Conner," she says. "This is a very unique arrangement and was a successful example of university-community collaborative research."

Her research included field studies of La Conner's biosolids compost in the cultivation of small grains and potatoes. She also assisted with a trial using the compost on a spinach seed crop. "The results from both trials were very positive," she says. Specific findings await publication in peer-reviewed scientific journals. Some of Youngquist's town-funded research is included in her Ph.D. dissertation, published earlier this year.

Youngquist also took part in research on the effects of antibiotic residues in compost. The project reflected public concern that antibiotic residues in biosolids might make some bacteria more resistant. Youngquist's team looked at the antibiotic ciprofloxacin. In a poster summarizing the findings, the research team concluded that the compost appears to neutralize the antibiotic so that it doesn't further encourage the spread of resistant bacteria. The results of this study will be published soon in a peer-reviewed journal.

Youngquist's work also included a mail-in survey of town residents' attitudes toward La Conner's compost program. In the November 2013 survey, more than 90 percent of respondents indicated moderate or strong support, and more than two-thirds believed that composting turns a waste into a valuable resource. Results are at <http://puyallup.wsu.edu/soilmgmt/Biosolids.html>.

homeowners can get anything," Wynn says. "It's kind of frustrating." Because they do the loading themselves, they're not violating any rules.

"The debate we've been having lately is, do we try to control that," Wynn says. "But the spirit of the community is, this material is free." So for now, the town chooses not to take action.

Such incidents aren't common. Most commercial users purchase the compost and ask plant workers to load it for them.

BUILDING ON SUPPORT

There is room for growth. "We take in about 60,000 gallons a day of outside waste," says Wynn. "Right now, we process about 2,000 cubic yards of compost a month. We have enough land space to go to 5,000 cubic yards a month."

So far, marketing has been ad hoc. The program has turned to Washington State University (WSU) and other outside advisers to help develop the market. That includes funding a Ph.D. student to study the compost and public perception (see sidebar). Wynn expects marketing to become more systematic in the future. For now, it's all word of mouth, mainly directed at the wholesale market and the farming community.

"The state highway department here has shown wonderful results using biosolids compost on the sides of roadways and for construction landscaping projects, so we'll look toward those kinds of partners," Wynn says. Recently WSU, working with a local farmer, put in a request for the town to supply 25



A belt filter press (Charter Machine Company) produces cake that later is mixed with wood chips and yard waste to create compost. Ed Matheson is shown opening a garage door in the building that houses the press.

“The state highway department here has shown wonderful results using biosolids compost on the sides of roadways and for construction landscaping projects, so we'll look toward those kinds of partners.”

KELLY WYNN

tons of compost for a 10-acre plot that is the site of an experiment in growing beet seed.

One thing isn't on the agenda: retailing. La Conner has decided not to bag and sell its compost in garden centers or hardware stores. "We've talked about it, and really we prefer to be on the wholesale end of this," Wynn says. That will let the program stick to its original mission: enriching the local agricultural land, depleted of nutrients from more than a century of use.

"Our long-term goals are to partner with farmers and just work pieces of land," Wynn explains. Slowly, steadily, those goals are bearing fruit — thanks to La Conner's nutrient-rich compost. **tpo**



A freshly mixed batch of future compost rolls off a conveyor.

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Two Birds, One Stone

A NORTH CAROLINA PLANT TEAM'S INNOVATIONS INCLUDE SIMULTANEOUS NITRIFICATION-DENITRIFICATION TO MEET UPCOMING PHOSPHORUS AND NITROGEN REMOVAL MANDATES

STORY: **Trude Witham**
PHOTOGRAPHY: **Al Drago**

FACED WITH A FUTURE MANDATE TO LIMIT phosphorus and nitrogen discharged to Jordan Lake, the City of Mebane (N.C.) expected to upgrade its activated sludge plant to a biological nutrient removal system.

Interestingly though, effluent ammonia levels were below 1.0 mg/L even though the aeration basin dissolved oxygen (DO) was below the recommended 1.0-2.0 mg/L for nitrification. Because of the low DO, the plant was also removing some nitrates.

Encouraged by the nitrification and denitrification at low DO, the plant staff looked into simultaneous nitrification-denitrification. "We installed timers and started cycling two of the six floating aerators on and off to maintain DOs averaging less than 1.0 mg/L on a given day," says Dennis Hodge, wastewater director. "The results were looking good — ammonia averaged below 1.0 mg/L and nitrates less than 5.0 mg/L."

Plant staff members felt they could do even better with improved controls. They added InsiteIG dissolved oxygen probes and oxygen reduction potential probes and controllers to the aeration basin, and a SCADA system (Trihedral Engineering) to monitor and adjust the aerators. They also pilot-tested a s::can analyzer with ammonia, pH, temperature and nitrate probes (s::can Measuring Systems), and eventually installed an s::can system. Since then, effluent ammonia has been within permit limits, and nitrates have averaged below 2.0 mg/L.



“We’re a great team — very family-like. Although everyone has a specialty or area of expertise, no one has an attitude of ‘It’s not my job.’” **DENNIS HODGE**

The plant’s innovative practices earned a 2013 Operation and Maintenance Excellence Award from the NC Professional Wastewater Operators Committee central region.

FAST GROWTH

Built in 1981, the 2.5 mgd (design) Mebane treatment plant sits in one of the state’s fastest growing areas. The city is growing at 4 percent per year, mostly because of its equal distance between Raleigh and Greensboro. A 1992 upgrade doubled capacity and added a 200 gpm rotary drum thickener (Parkson Corp.), a 70-foot-diameter secondary clarifier (Walker Process Equip-



The team at the Mebane Wastewater Treatment Plant includes, back row, from left, Dennis Hodge, wastewater director; Tony Bowes, lead operator; and David Douglas, senior operator; front row, Amanda Hill, laboratory technician; Carol Walker, administrative support; and Rickey Connally, operator/mechanic. Not pictured are Amy Varinoski, compliance manager, and Lee Parker, part-time operator assistant.

ment), a coagulant feed system for phosphorus removal and an Aqua Guard influent screen (Parkson).

A 2013 upgrade added a MiniDisk effluent filter (Aqua-Aerobic Systems) to replace old traveling bridge filters. Other plant equipment includes:

- Jet surface aerators (Aqua-Aerobic Systems)

City of Mebane (N.C.) Wastewater Treatment Plant



BUILT: | 1981

POPULATION SERVED: | 4,500 connections

EMPLOYEES: | 8

FLOWS: | 2.5 mgd design, 1.1 mgd average

TREATMENT LEVEL: | Secondary

TREATMENT PROCESS: | Activated sludge

RECEIVING WATER: | Moadams Creek

BIOSOLIDS: | Composted

ANNUAL BUDGET: | \$1.4 million (operations)

WEBSITE: | www.cityofmebane.com

GPS COORDINATES: | Latitude: 36°05'19.34" N; longitude: 79°17'07.31" W



Dennis Hodge, wastewater director



Amanda Hill runs tests that help keep the plant in compliance and the process running smoothly.

- Return activated sludge and waste activated sludge pumps (Pentair - Fairbanks Nijhuis)
- Two secondary clarifiers (Ovivo)
- Chemical feed pumps (Blue-White Industries)
- Effluent blower (Hoffman & Lamson)

Influent passes through the bar screen, then to the grit chamber, aeration basin, final clarifiers, disk filter, chlorine contact basin and sulfur dioxide basin. From there, it flows to a reaeration basin, which adds dissolved oxygen to meet the required 6.0 mg/L minimum before discharge. Waste activated sludge is treated with polymer, and the water is removed in the rotary drum thickener. Thickened material is discharged to two aerobic digesters for further treatment.

The plant treats an average of 1.1 mgd from 4,500 residential connections. Most of the growth in Mebane has been residential and commercial, but the plant has an industrial pretreatment program, required in North Carolina for plants with flows greater than 1.0 mgd. Says Hodge, "During the 1980s and 1990s, the industrial contribution was about 50 to 60 percent of the daily flow, but the textile and furniture companies have gone elsewhere. The industries that are here now are fairly low process water users."

Biosolids are dewatered on site by Synagro and transported off site. "We land-applied in the past, but now we have a vendor with a mobile belt press who takes the biosolids to a compost facility," says Hodge. "For now, it's cheaper than buying equipment and having our employees operate it."

GROWING THE TEAM

A team of eight keeps the Mebane plant operating smoothly. Says Hodge,

Mebane Wastewater Treatment Plant PERMIT AND PERFORMANCE

	PERMIT (annual avg.)	EFFLUENT (2013 avg.)
BOD	5.0 mg/L summer 10.0 mg/L winter	4.05 mg/L
TSS	30 mg/L	4.60 mg/L
Ammonia	2.0 mg/L summer 4.0 mg/L winter	1.49 mg/L
Nitrogen	40,000 pounds/year	24,966 pounds
Phosphorus	5,000 pounds/year	3,971 pounds
Fecal coliform	200/100 ml	125/100 ml

"None of our operators were hired with more than a Grade I license. That gave us a unique opportunity to grow our own operations team."

Hodge holds Grade IV biological wastewater operator, land application/residuals operator, and American Water Works Association advanced utility leadership certifications. He has been with the plant for six of his 36 years in the field.

The other team members are:

- Tony Bowes, lead operator (Grade IV, 10 years)
- Rickey Connally, operator/mechanic (Grade IV, six years)
- David Douglas, senior operator (Grade II, six years)
- Amanda Hill, laboratory technician (Grade III biological wastewater operator, Class I wastewater laboratory analyst, three years)
- Amy Varinoski, compliance manager (Grade IV biological wastewater operator, Class III wastewater laboratory analyst, Grade III pretreatment specialist, five years)
- Lee Parker, part-time operator assistant (three years)
- Carol Walker, administrative support (Grade II wastewater operator in training, three years)

The plant is staffed Monday through Friday from 7 a.m. to 5 p.m. and checked on weekends by the on-call operator. Operators handle routine daily checks and process adjustments, including chemical feed rates and flow rates, and field testing for dissolved oxygen, chlorine residual and ammonia. Says Bowes, "We do all our own equipment maintenance, except for electrical, and we also do all the mowing and painting."

(continued)



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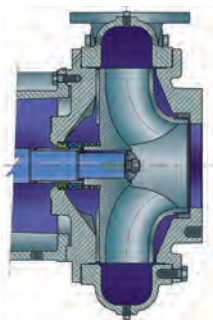


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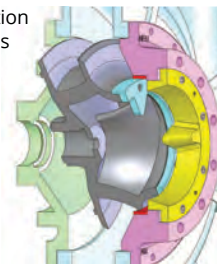
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GIVING BACK

The operations team at the Mebane Wastewater Treatment Plant is active in the community. Members give plant tours for local high school and college students and take part in school career fairs and the high school's Earth Day observance.

The team also gives back by volunteering for professional organizations. This includes serving on the board of directors for the North Carolina Water Quality Association, chairing the Upper Cape Fear River Basin Assembly Technical Advisory Committee, presenting at the North Carolina Rural Water Association 2013 conference, and teaching at the Western North Carolina Biological Operators' School.

"Our lead operator, Tony Bowes, is great at coming up with ideas on how we can help the community, like taking up a food collection during the holidays," says Dennis Hodge, the plant's wastewater director.

Amy Varinoski, compliance manager, shares her expertise by teaching classes for pretreatment certification and biological wastewater treatment at various locations.

“My philosophy is: Don't get by, get better. If you're just getting by, then you must be doing the same thing you did yesterday without improvement.”

DENNIS HODGE

Carol Walker collects a sample for total chlorine analysis.



Tony Bowes, left, and Dennis Hodge check the s::can equipment which analyzes ammonia, nitrates, total suspended solids, pH and temperature.

MEETING THE LIMITS

Effluent is discharged to Moadams Creek, which flows into the Haw River and eventually into Jordan Lake. “Because our effluent is the majority of the flow in the creek, our limits are some of the most stringent in the state,” says Hodge.

The TSS limit is 30 mg/L; BOD is 5.0 mg/L in summer and 10.0 mg/L in winter. The plant is meeting the nitrogen removal mandate to protect Jordan Lake. “The mandate was supposed to go into effect in 2016 but has been pushed to 2019,” says Hodge. “We will probably be able to meet the limit until 2021, when we will be looking at our options to meet our future wastewater needs.”

In North Carolina, the limit is based on pounds, not concentration. “Discharge into the lake is based on our flows,” explains Hodge. “The nitrogen limit is 40,000 pounds per year and the phosphorus is 5,000 pounds per year.”

Operators have met the nitrogen and phosphorus limits by using the SCADA to monitor nitrate, ammonia, pH and dissolved oxygen. “We use this data to manipulate the aeration based on the ammonia and nitrate levels,” says Hodge. “We continually monitor the data and try to keep the ammonia below 2.2 mg/L as a peak during the day, and attempt to keep the nitrates below 2.0 mg/L while maintaining a DO range of 0.2 to 0.8 mg/L. We will soon be using the ammonia and nitrate readings to automatically adjust the DO as needed.”

LIKE FAMILY

The operators’ biggest challenge is the weather. Rain events can increase influent flow, and winter’s colder temperatures can decrease nitrification system efficiency, making it harder to remove ammonia. Last winter, the plant partially lost nitrification when 4 inches of rain fell in one week and temperatures dropped rapidly.

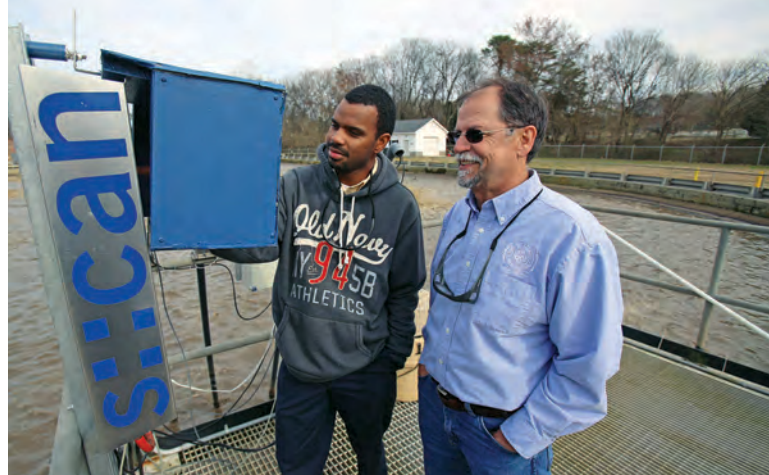
“We were in noncompliance, so we did some testing and found that it was temperature-related,” says Hodge. “During that week, the temperature dropped from 19 to 8 degrees C. We started partially diverting the incoming water to a currently unused aeration basin, and it gave us breathing room to try and save the microorganisms. When something like this happens, we might as well bring a cot to work and sleep here.”

But the staff members don’t complain. “We’re a great team — very family-like,” says Hodge. “Although everyone has a specialty or area of expertise, no one has an attitude of ‘It’s not my job.’”

Bowes agrees: “Everyone is interested in getting the work done and helping each other out.” For example, the staff worked as a team several years ago to switch from gas to liquid chlorination. They did all the work in-house, saving an estimated \$20,000.

“They decided to take on the project, constructing a new building, installing the tanks and chemical feed pumps, and running the piping,” says Hodge. “We ended up with a very nice structure, as well as pride in knowing we accomplished it ourselves.”

(continued)



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Working around the usual duties, the staff completed the project in about a month. Most had been involved in construction before, either at another job site or at home.

The greatest future challenge will be to stay one step ahead of regulations. Says Hodge, "The rules will continue to get more stringent, which is why we have to be careful how far out we go in the planning stage. It's always an unknown for us."

Hodge enjoys the challenge, though: "My philosophy is: Don't get by, get better. If you're just getting by, then you must be doing the same thing you did yesterday without improvement." **tpo**

Jim Hurley, a graduate research assistant at North Carolina State University, works with the mini Mebane plant, a bench model of the treatment facility used to test treatment processes.



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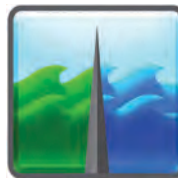
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To a New Level

FIRST-OF-A-KIND TECHNOLOGIES ENABLE CREATION OF A 'COMPLETE REMOVAL' TERTIARY TREATMENT SYSTEM FROM A LAGOON FACILITY IN CENTRAL CALIFORNIA

By Peter Lescure, P.E., and Edward C. Myers, M.S.Ch.E.

The Graton (Calif.) Community Services District (GCSD) had just been formed in July 2004 when the Regional Water Quality Control Board issued a notice of public hearing for October to upgrade its water resource recovery facility (WRRF) from secondary to tertiary discharge standards.

Graton's collection system and secondary treatment plant were built in 1979 by the Sonoma County Department of Public Works. In 1995, the county transferred all wastewater plant operations to the Sonoma County Water Agency. That agency in 2004 transferred the Graton plant to local control but continued to operate the plant through the first year, giving the Graton district time to build the management and operations structure needed to assume control.

Lescure Engineers had started design of a flood wall when, six months into GCSD's control, a flood struck. The district completed construction of a Flood Works Project in November 2010 to protect its treatment ponds and an anticipated treatment upgrade. In March 2014, the district commissioned its upgraded 160,000 gpd (design) WRRF, employing three first-of-a-kind technologies, and began producing Title 22 tertiary disinfected effluent. The facility serves an unincorporated community of about 1,700 residents.

INNOVATIVE FILTRATION

Graton's first board of directors adopted a policy to maximize land discharge of effluent, aiming to sustain the local watershed. The original vision was to disperse effluent to a redwood forest and nearby farms. However, limited land dispersal capacity and the Regional Water Quality Control Board's

A system from Pasteurization Technology Group disinfects effluent while generating 30 kW of electricity instead of consuming power.



The Suspended Air Floatation (SAF) system from Heron Innovators has one-tenth the connected hp and one-fifth the footprint of conventional approaches. It also uses less chemistry while generating substantially higher percent algae solids.

order to achieve tertiary standards required the district to upgrade the treatment process as early as possible. A design criterion added by the district general manager was to achieve "complete removal," leaving no residuals needing further treatment or cleanup.

In response to the water board's order, GCSD implemented a unique process for treating secondary aerated lagoon effluent to tertiary standards. Before considering how to meet the tighter standards, Lescure Engineers examined the treatment ponds' capability and found they had sufficient biological treatment capacity to deliver effluent meeting the numerical BOD limits for tertiary effluent without any adaptation. Initial operations of the tertiary system confirmed that capability.

Since the district had rejected membrane technology for tertiary treatment chain, the challenge was to specify an alternative. An investigation of various cloth membrane and media depth filters led to the Fuzzy Filter (Schreiber), a robust, simple depth filter with low energy and maintenance requirements. However, the filter was certified for Title 22 treatment of activated sludge effluent containing relatively large particles, whereas pond effluent contains large amounts of algae small enough to pass through.

The solution lay in the suspended air flotation (SAF) technology (Heron Innovators). The SAF process uses flocculants and coagulants to "glue" algae particles together and a surfactant agent to create froth that floats the algae and microbial floc out of the wastewater stream.

A pilot test found that the combination performed robustly. The SAF performed equally well with settled and unsettled pond effluent as a "roughing filter." The Fuzzy Filter reliably produced long filter runs with effluent turbidity better than 1 NTU, versus the Title 22 standard of 2 NTU.

Graton's was the first SAF installation in municipal wastewater service — it previously had been used only in industrial applications. The Graton WRRF was also the first application of the Fuzzy Filter to pond effluent, enabled by coupling it with the SAF.

COMPLETING THE PROCESS

Two more processes completed the tertiary treatment chain: disinfection and biosolids management. Graton historically disinfected with gaseous chlorine but now uses a first-in-the-world pasteurization technology for municipal wastewater.

Pasteurization Technology Group (PTG) certified its technology for Title 22 service in 2007. Besides disinfecting the effluent, the technology generates 30 kW of electricity rather than consuming electric power. It also eliminates formation of disinfection byproducts, the cost of monitoring effluent for them, and the risks of storing and handling chlorine.

Biosolids are stabilized by composting. The SAF removes biosolids from the main effluent stream and the Fuzzy Filter backwash. While dewatering of biosolids from an activated sludge process typically requires a centrifuge or press, at Graton the SAF "float" is pumped to a bin, where it drains by gravity to a solids content level suitable for composting, saving the district \$250,000 in capital costs. This step is key to achieving "complete removal" rather than returning constituents to the treatment process.

Lescure Engineers also designed a composting facility scaled to treatment plant capacity. The facility combines features of open static piles and the automated facility at Santa Rosa's Laguna treatment plant. The Graton composting site provides permanent structural cover with capacity for 80 days' production, yielding a Class A-EQ material.

The permanent cover prevents contamination by runoff and eliminates the labor of dealing with temporary cover. The geometry of the facility, with internal "push-walls" dividing it into quadrants, facilitates turning of the compost with a simple tractor loader. The first quadrant provides capacity for the 20- to 25-day initial period to achieve Class A-EQ standards. The remaining quadrants allow added time for aging and screening to produce the finished product.

PROCESS CONTROL

Edward C. Myers, M.S.Ch.E., of Lescure Engineers, prepared the process control narrative to direct



Fuzzy Filter simple depth filter technology (Schreiber) provides robust treatment with low energy and maintenance requirements.

package integrator Telstar in writing the SCADA programs for the facility. The SCADA program performs historical process data trending and graphics presentation while coordinating the relay logic panel for the SAF and the two programmable logic controllers for the Fuzzy Filters and the pasteurization system.

The control system works around the clock, incorporating features for monitoring performance and sending alarms to the operator on-call. If an operator is unable to respond promptly, programming and

mechanical features are built in to shut the system down in a fail-safe mode without compromising effluent quality.

The new treatment facility met the district's objectives within the constraints of regulations and compliance schedules, applying innovative technologies to produce two valuable products: tertiary disinfected reclaimed water and compost suitable for unrestricted application. The project also meets the goal of a complete-removal system, or a true water resource recovery facility.

ABOUT THE AUTHORS

Peter Lescure, P.E., is the principal engineer of Lescure Engineers, a civil and environmental engineering firm in Santa Rosa, Calif. He can be reached at le@lescure-engineers.com. Edward C. Myers, M.S.Ch.E., is a chemical engineer and project manager for water and energy efficiency with Lescure Engineers. tpo

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A Different Way of Thinking

STAFF MEMBERS WITH THE BANGOR WATER DISTRICT POOL IDEAS AND DEVELOP WAYS TO REDUCE ELECTRICITY USAGE WHILE ALSO GENERATING ON-SITE POWER

By Ann Stawski

In 2006, the Bangor (Maine) Water District received a notice that electric rates were about to rise sharply. Electricity was already the district's second biggest expenditure, and a 30 percent increase for forward capacity charges would overshoot the budget.

Management decided it was time to stop thinking like a water district. "We are a water utility, but we immediately took to learning and understanding the terms of the electric industry," says Kathy Moriarty, general manager.

Moriarty and the 30-person staff looked at the big picture to determine where to reduce power usage and costs. As the third largest water utility in the state, Bangor pumps 4.9 mgd to its 11,000 accounts. The infrastructure includes six standpipes, four rechlorination facilities, three treatment facilities — pumping, ozone and UV — and 180 miles of pipes.

TURBINE POWER

In 2002, under then-general manager Wayne Rogalski, the district removed a pressure reducing valve in a control valve facility and replaced it with a turbine to capture energy. When the rate increase notice arrived in 2006, the district looked at its options for generating power from that turbine. As the station was located at the bottom of a gravity-fed system, the 75 kW Cornell hydroturbine met the conditions needed to generate energy.

The turbine reduces pressure while also generating electricity continuously. The incoming flow at 135 psi is reduced to 80 psi for delivery to homes.

“Getting your staff involved to brainstorm ideas to save costs is key to energy efficiency and cost savings. And it's just as important to learn about kilowatts as gallons.”

KATHY MORIARTY

"Somewhere in your system you need to have both a reduction in pressure and constant flow," says Moriarty. "With more flow or a greater reduction of pressure, you can generate more electricity. We have the unique circumstance to install the turbine at the right spot." The turbine project cost \$183,000 and saves up to 12 percent in electricity costs; the district expects full payback on its investment in four to eight years.

The district maximizes the sale of energy produced by the turbine by selling power back to itself at electric wholesale rates, a process called net energy billing. "The utility meters what we produce, and then the kW hours

Bangor removed a pressure reducing valve in a control valve facility and replaced it with a turbine to capture energy.



The 110-foot-tall Thomas Hill Standpipe, built in 1897, is listed as a National Historic Landmark.

are credited against use at all our facilities," says Moriarty. "We generate minimum revenues of \$23,000 each year."

Other savings come from enrollment in a demand response program with ISO-New England, the regional electric transmission system operator. Under that program, the district is on call to go off-grid and operate on its emergency generators during times of extreme demand on the power grid. While still awaiting its

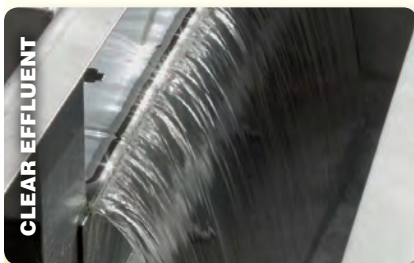
first call, the district receives monthly payments that total \$14,000 to \$17,000 per year.



FINE-TUNING TREATMENT

The operations staff also saves energy by constantly fine-tuning its processes for efficiency. At the Butler Ozone Water Treatment Facility, built in 1995, the district in 2011 replaced the original air compressor with an energy-efficient water-cooled unit (Atlas Copco). The project cost \$69,900, and the utility received a \$22,500 grant from Efficiency Maine, an independent trust dedicated to promoting the efficient and cost-effective use of energy. "Basically, the energy savings will pay for the project in less than three years," says Moriarty. "Additionally, we expect to save \$158,000 over the life of that compressor."

At its Johnson Pump Station, built in 1958, the district plans efficiency upgrades that include new windows, insulation and pumps, all to be completed by 2016.



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STANDPIPES STEP UP

The district also looks for savings at its six standpipes. At one site in 2009, the district replaced two steel tanks and their pumps with a 3.4-million-gallon concrete tank and a passive mixing system (Red Valve Co. / Tideflex Technologies). In summer, electric mixing costs upward of \$1,200 a month; the passive system uses no power. A \$26,000 Efficiency Maine grant helped fund the project.

At the 1.75-million-gallon, 110-foot-tall Thomas Hill Standpipe, built in 1897 and listed as a National Historic Landmark, a district employee found a way to save energy. The standpipe, also an AWWA-designated American Water Landmark, is open to tours several times per year. Along the standpipe's crown were 288 incandescent light bulbs with fixtures dating back to 1916. At an employee's suggestion, these were replaced with highly efficient LED lights that will last up to seven years and do not detract from the standpipe's historic beauty.

Since 2006, the district has seen a 40 percent reduction in power costs, and Moriarty knows there are more opportunities for savings. "Getting your staff involved to brainstorm ideas to save costs is key to energy efficiency and cost savings," she says. "And it's just as important to learn about kilowatts as gallons." **tpo**

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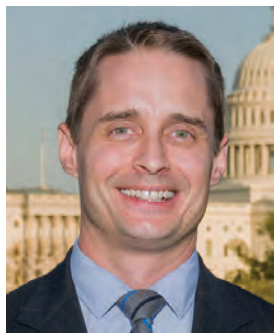
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It's the Watershed

NACWA ADVOCATES CONTROL OF NONPOINT POLLUTION SOURCES
AS A KEY TO REDUCING NUTRIENT LOADINGS TO THE NATION'S WATERS

By Ted J. Rulseh



Chris Hornback

As clean-water plants face tightening permit limits for nitrogen and phosphorus, communities and their utilities increasingly look upstream for solutions.

In most watersheds, more nutrients enter the waterways through nonpoint sources than from treatment plant outfalls, and it makes sense to look for ways to reduce those loadings as a big part of the answer to nutrient pollution. That's the position of the National Association of Clean Water Agencies (NACWA), a nationally recognized advocate for sound environmental policy and a technical resource on issues

related to water quality and ecosystem protection.

NACWA has advocated for clean-water agencies since 1970 and the passage of the first federal Clean Water Act, and since the late 1990s it has been on the forefront of policy development related to nutrient issues. Chris Hornback, NACWA's senior director of regulatory affairs, talked about current issues with nitrogen and phosphorus regulation in an interview with *Treatment Plant Operator*.

tpo: What is the history of NACWA's involvement with nutrient issues?

Hornback: Nutrients, specifically nitrogen and phosphorus, have been a top priority for us for the entire 13 years I have been here and even before that. In the late 1990s, the U.S. EPA began to develop criteria and policy statements on the need to address nutrient discharges. Starting about then and into the early 2000s when the EPA began developing national recommended eco-regional criteria for nutrients, we were actively engaged, since our members were the primary, easily controllable sources of nutrients.

tpo: Why is it important to look at entire watersheds when striving to reduce nutrient contributions to the rivers, lakes and oceans?

Hornback: We've seen over the last decade that failure to look at watersheds leads to a lopsided approach to dealing with nutrients. We've been talking about watershed approaches since the early 1990s, when we first tried to work with Congress to develop a better approach to water quality. That has grown into a nutrients issue, and nutrients are probably the best case study for why we need a watershed approach. You can have multiple sources in a watershed that contribute to the problem, yet the inclination from regulatory authorities has been to go after the entities that hold discharge permits.

We see watersheds where point sources have been taken down to the limits of technology, yet they are less than a fifth of the nutrient contributions. If you look at the Chesapeake Bay, the clean-water plant in Washington, D.C.,

is installing another round of nutrient removal technology that will take its effluent total nitrogen from 5 mg/L to 4 mg/L. In terms of the volume of their flow, that is a significant reduction in the mass of nutrients, but it's going to cost them \$900 million.

As the permit limits get lower, the cost of removal gets higher and higher, and from our perspective it's time to look at broader watershed approaches. If we're looking at the Chesapeake Bay, we should spend that \$900 million where it would have the biggest bang for the buck, and that's not on point-source control at one treatment plant on the Potomac River.

tpo: Has there been progress in nutrient removal technology for treatment plants?

Hornback: In our industry, we are engineers. We very much like to engineer solutions, and so we've been able to engineer technology to remove nutrients to lower and lower levels. In some cases we're finding cutting-edge technologies that will allow us to do that while using less energy and less chemicals. But we still come back to the question: Is that really the best way to go about this?

tpo: In watersheds, what is typical in terms of percentage of nutrient contribution, if there is such a thing as typical?

Hornback: It really varies from watershed to watershed. In the Chesapeake Bay, for example, point sources are less than 20 percent of the contribution. A good share is from urban runoff, but the largest contribution is from agricultural runoff, and 20 percent of the nitrogen is from air deposition — a very tough nut to crack. In the Mississippi River basin and the Gulf

“In the Chesapeake Bay, for example, point sources are less than 20 percent of the nutrient contribution.

A good share is from urban runoff, but the largest contribution is from agricultural runoff, and 20 percent of the nitrogen is from air deposition — a very tough nut to crack.”

CHRIS HORNBACK

of Mexico, I have seen 80 to 95 percent of the nutrients going into the Gulf attributed to nonpoint sources, notably agricultural runoff. Point sources are not insignificant in that major wastewater treatment plants discharge into that watershed, but even if you took them all to zero, it wouldn't address the problem in the Gulf.

tpo: Are there watersheds where the shares of nutrient contribution are reversed — where point sources are the largest contributors?

Hornback: There are watersheds where we see larger point-source con-

tributions. Long Island Sound is one of those. Certain rivers, such as the South Platte in Colorado, are dominated by wastewater effluent. In cases like those, you're going to have much more significant point-source contribution. So it's not a one-size-fits-all picture.

tpo: Can you cite examples where broadly focused watershed approaches have been effective in reducing nutrients?

Hornback: Those are difficult to find. On Long Island Sound, the treatment plants in Connecticut have formed a nutrient credit trading program. They look at their aggregate discharges into the sound and they manage the loadings among the utilities. Plants that install treatment and exceed their removal requirements may generate credits that other plants in the watershed can purchase to offset their requirements. These are point-source to point-source arrangements.

There is a similar trading program on the Neuse River in North Carolina, but there unfortunately, while the point sources have made dramatic reductions in their nutrient releases, the watershed is not any better because the nonpoint sources have actually increased their discharges.

A utility that has used a watershed approach, though not specifically for nutrients, is Clean Water Services in Oregon. They have to comply with temperature standards on the Tualatin River to meet cold-water requirements for salmon and other fish. They either needed to chill their effluent, which would have been expensive, or go upstream and work with landowners to plant trees to increase tree cover and reduce the temperature naturally — which is what they have done.

tpo: What is being done to engage the agricultural community in helping to reduce runoff and nutrient contributions?

Hornback: Maryland is a rare example of a state with a nutrient management program that does require some programs and practices from farmers. The federal government has significant investments in conservation programs through the Farm Bill that encourage farmers to put conservation practices in place, but those are spread out across the country. We're just getting into newer versions of those programs, where they're trying to target dollars to the watersheds that need them most. But those efforts are not coordinated, and they are certainly not mandated through the Clean Water Act.

tpo: If the focus for nutrient reduction is to shift upstream, who will actually do the work of implementing practices to reduce nonpoint source contributions?

Hornback: That's a challenge because concerns have been raised about utilities taking ratepayer money and going upstream to do work. We need to ask whether we should spend money on improvements upstream that will save us money in the long run, or continue with concrete and steel solutions. The new Farm Bill includes a Regional Conservation Partnership Program (RCP) designed to encourage farmers to partner with a wastewater utility to target watershed-specific needs. The money goes to the farmers, but the partnership creates links to watershed entities to make sure watershed goals are met.

tpo: What is the relative importance of nitrogen and phosphorus in nutrient management?

Hornback: In areas like the Chesapeake Bay and the Mississippi River, the focus is entirely on nitrogen because that nutrient is having the most impact on the estuarine systems. The dead zone in the Gulf and the hypoxia in the bay are caused by nitrogen.

In Wisconsin and Great Lakes states with major freshwater systems, phosphorus is the limiting nutrient and has the biggest impact. The EPA is very much focused on both. They believe that ultimately every state should have numeric water-quality criteria for both nitrogen and phosphorus. In their view, both are equally destructive and need to be addressed on an equal level.

tpo: What can clean-water agencies do on their own to effect responsible progress on nutrient issues?

Hornback: One challenge related to the nutrient issue is a lack of good monitoring data. Utilities are often hesitant to monitor for things they're not regulated for because that could actually lead to regulation. Yet without good

The advertisement features a large, circular, blue-tinted image of a wastewater treatment tank with a central aeration system. In the foreground, three Aerzen blower units are shown: a Delta PD Blower, a Delta Hybrid Blower, and a Turbo Blower. The units are white with blue accents and the Aerzen logo. Text overlays include 'weftec 2014 Booth 5009' in the top left, '150 YEARS of Quality, Reliability & Performance' in a blue box in the top right, and 'PERFORMANCE³. NEW LEVELS OF EFFICIENCY IN AERATION TANK SYSTEMS.' in large blue letters across the center. At the bottom, it lists 'PD BLOWER • HYBRID BLOWER • TURBO BLOWER'.

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monitoring, it's difficult for the point-source community to point to data and say, 'Look, we're only X percent of the discharge — our monitoring shows that there are other bigger sources of nitrogen and phosphorus that we really should be going after.' The lack of data is hurting us in the long run.

The states don't have the resources to do a lot of water-quality monitoring. Understanding where your discharges are in quantities of nitrogen and phosphorus can be a powerful tool as you talk with regulators. Some utili-

ties have made a conscious decision that they're going to monitor for these parameters and arm themselves with good data, both in terms of their own discharge and the water quality in the watershed.

It's good to be involved and engaged early in the process and not wait until the end when the regulators come out with a proposed rule and say, 'Here it is — what do you think?' Getting engaged can be hard for small and mid-size utilities that don't have staff dedicated to regulatory issues. That's where NACWA, the Water Environment Federation, state and regional Water Environment Associations and state utility organizations can keep tabs on things.

“One challenge related to the nutrient issue is a lack of good monitoring data. ... Without good monitoring, it's difficult for the point-source community to point to data and say, 'Look, we're only X percent of the discharge — our monitoring shows that there are other bigger sources of nitrogen and phosphorus that we really should be going after.'”

CHRIS HORNBACK

ties have made a conscious decision that they're going to monitor for these parameters and arm themselves with good data, both in terms of their own discharge and the water quality in the watershed.

tpo: What advice do you have for clean-water agencies as it relates to engaging with the regulatory community?

Hornback: One thing we recommend to our members is to stay in contact with their state regulators and make sure they understand where they are in the regulatory process. For example, when Wisconsin started to develop its phosphorus rules, the utilities there were very engaged and were able to sit down with the regulators and talk them through some of the challenges.

how to partner and engage directly with agricultural interests and work with them to solve problems.

We see communities starting to explore nontraditional partnerships — nothing that's ready for prime time, but people are starting to talk about how to engage farm interests in ways that make them more comfortable coming to the table. There is definitely interest in finding ways to talk to them in their language about working collaboratively toward solutions. We're going to see more of that in the next couple of years. **tpo**

tpo: Do you see progress in nutrient reduction from the nonpoint-source side?

Hornback: We have yet to see true meaningful reductions there. Around the Chesapeake Bay, for example, nonpoint source interests are aggressively fighting any obligations under total maximum daily loads and other Clean Water Act provisions. We continue to see aggressive pushback from national farm groups.

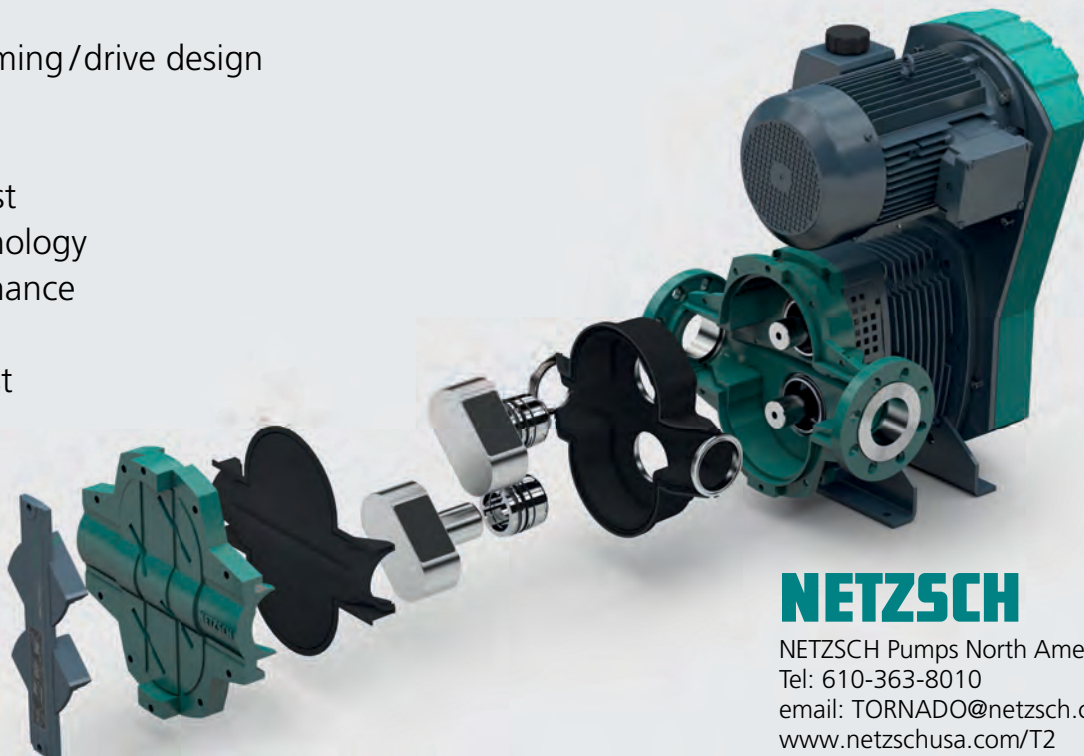
The RCPP is promising. We also see some utilities starting to ask: If we can't get to nonpoint sources through regulatory means, what is another meaningful way? Chicago is really starting to think outside the box and explore

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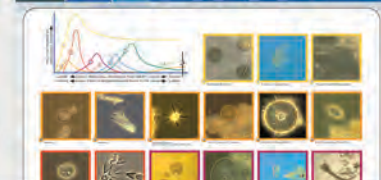
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THE CRITICAL NATURE OF WATER AND WASTEWATER FACILITIES DEMANDS MORE STRINGENT PROTECTION OF CONTROL SYSTEMS TO PREVENT MALICIOUS DAMAGE FROM HACKERS

By Michael Firstenberg

Securing water and wastewater critical infrastructure from cyberattacks can be a tall order, as any system connected to the Internet, even indirectly, is vulnerable.

To maintain day-to-day functions, facilities must connect control system networks to corporate networks to share operational data or allow remote access for support and maintenance. Because these business networks are connected to the Internet, they can easily be breached, exposing critical control systems to all sorts of cyberattacks.

Research from antivirus company TrendMicro in 2013 showed that even a small water system is a realistic target. It clearly demonstrates that skilled attackers have the ability and the desire to hack our water control systems.

When a control system component or network is compromised, the consequences are much greater than a simple file leak or an employee's password being stolen on a corporate network. It means someone else is in control of the facility and the process.

That isn't to say the hacking of a business or personal computer or network is to be taken lightly, as these attacks can have serious consequences to finances and reputation. However, when a control system is taken over, the effects can also be physically devastating. In the case of water and wastewater treatment, a malicious party with full remote control of a system could cause manmade flooding, damage underground infrastructure, cause severe water pollution or contaminate drinking water by altering processes.

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Are firewalls equipped to handle these modern threats? While a firewall is probably enough to deter amateur hackers from accessing vacation photos and music files saved to a personal computer, the same is not true for a critical infrastructure network.

Breaching a firewall can be as easy as looking over the shoulder of someone entering a virtual private network (VPN) password while logging in

If water system operators are to address concerns about network connectivity risks, control system operators and water plant managers need to maintain the highest possible level of suspicion about every piece of data that enters the network connected to a water control system.

remotely. Simply use that login to insert a piece of malware on a control system server, and now the machine's owner no longer controls that machine. And just because VPNs are encrypted doesn't make them secure, as shown by the recent Heartbleed bug revelation, which exposed a vulnerability that allowed hackers to steal credentials.

There are many ways for a hacker of moderate ability to break through a firewall. Firewall technology is inherently designed to permit interaction.



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Water and wastewater facilities need protection against intrusion on their critical networks.

Access is provided to allow clients outside a protected network to send queries and polls to systems inside the protected network.

As you can imagine, there is a serious vulnerability in firewalls in that bad requests can be cleverly disguised as legitimate traffic. For these reasons, and plenty more, it's surprising that firewalls alone are considered adequate protection for a system that, if compromised, could create havoc for hundreds of thousands of people.

Because the biggest risks of cyberattacks relate to the industrial control system being connected directly or indirectly to the Internet, why not simply disconnect the system from all networks? It turns out that water utilities — from large production plants to small wastewater lift stations — benefit

greatly from connecting control systems to business networks to perform business and maintenance functions more efficiently.

Connecting an operations network to a corporate network can make employees more productive at their jobs, give managers more

information about business processes and water quality, and help manage operations from the back to the front office.

Although it is technically possible to operate a water or wastewater facility without connecting critical control systems to a business network, it would not be efficient or business-savvy to do so. The benefits of connection for operational efficiency are simply too great. What is truly needed is a way to reduce firewall risks without reducing the benefits of network integration.

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TOWARD STRONGER SECURITY

To reduce firewall risks, water system operators increasingly deploy stronger-than-firewall solutions in the form of hardware-enforced unidirectional security gateways. Firewalls are intended to provide protection adequate for basic personal and business networks, but they are not secure enough for safety-critical assets such as water and wastewater treatment facilities.

Unidirectional security gateways replicate control system databases, devices and servers to business networks where users and business applications can query the replicas and interact with those replicas in any way they wish, without affecting the original industrial equipment.

The gateway hardware allows information to flow in one direction only and thus eliminates the risk of online attacks from external networks. The result is absolute protection from network attacks originating on business networks and indeed on any external network. The gateways safely integrate industrial networks with corporate networks.

In addition, water control systems are notoriously vulnerable to internal attack due to the widespread use of plain-text communications protocols and the often limited use of antivirus signature updates and host-hardening practices. To complement a unidirectional gateway deployment, control system operators and water plant managers need to maintain a high level of suspicion about every piece of data that enters the water control system's protected network.

This suspicion should extend to everything from software on new machines purchased and installed from third-party suppliers, to every laptop a vendor or integrator brings inside the security perimeter, to even basic data-sharing appliances, such as flash drives. All of these technologies can propagate infections. It was a storage drive, for instance, that ultimately leaked the infamous Stuxnet virus into the Iranian nuclear program's uranium enrichment facility.

When unidirectional gateway technology is deployed in tandem with company policies and procedures to tightly control all forms of data entering networks, water system operators can rest assured that they have taken strong measures to minimize the threat of cyberattacks to their assets and to public safety.

ABOUT THE AUTHOR

Michael Firstenberg is director of industrial security at Waterfall Security Solutions, a provider of unidirectional security gateways for industrial control networks and critical infrastructures based in New York City. He can be reached at michaelf@waterfall-security.com. **tpo**

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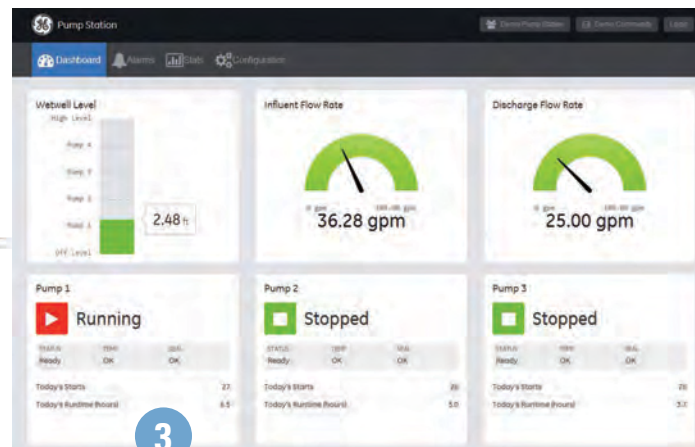


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1) The pump station appliance is designed for easy connection with no specialized knowledge beyond basic electrician skills. 2) The device comes complete in a white enclosure easily mounted inside a lift station. 3) On-screen dashboards give users an at-a-glance picture of pump station operation.



Quick Connection

AN OFF-THE-SHELF APPLIANCE GIVES SMALLER WATER AND WASTEWATER UTILITIES A COST-EFFECTIVE WAY TO MONITOR AND CONTROL PUMPING STATIONS

By Ted J. Rulseh

For years water and wastewater utilities have monitored scattered pumping stations with SCADA systems. But what about communities that have only one or a few pump stations and lack the resources to design, engineer and configure SCADA?

Typically, such utilities have had to monitor pump stations manually, sending a driver to visit each station periodically, inspect its function and record operating data from meters or gauges.

Now, GE Intelligent Platforms offers the Pump Station Appliance, which the company describes as a purpose-built control and monitoring solution that can be purchased online and configured and installed in a day by an in-house or contract electrician.

It's designed as a cost-effective way for smaller utilities to automate station monitoring and operation. Alan Hinchman, infrastructure marketing director with GE Intelligent Platforms, talked about the offering in an interview with *Treatment Plant Operator*.

tpo: What was the thought process behind this offering?

Hinchman: GE Intelligent Platforms has been working in the water and wastewater market for a long time as a supplier of software, controllers and other devices. As we explored where the industry was going, we saw an opportunity for purpose-built monitoring devices that users could order online and easily install and configure. We came up with a few applications, and the first to launch was the Pump Station Appliance.

tpo: What is the basic benefit of this device?

Hinchman: If you look at how rural communities manage their wastewater lift stations, in some cases it's with auto-dialers, and in others it's having technicians drive around to each pump station, doing physical inspections, recording pump run times and start times and other information.

“Customers can go to our website and learn about it, and they can actually order it from the website. ... It includes picture-based instructions that enable an electrician to install it without having any special capabilities. All the wiring and connections are color-coded.”

ALAN HINCHMAN

With our device, all that data is collected electronically. So they save labor because they no longer have to go out and gather that information. The second thing the appliance does is notify you very rapidly when something is wrong — that a pump has failed, that you're overflowing, or that you're underflowing and may be at risk of burning up a pump.

tpo: How would you basically describe this appliance?

Hinchman: It's based on our PACSystems RXi controller and RSTi Slice input/output unit. Customers can go to our website and learn about it, and they can actually order it from the website. We ship it to them in a box, just as you would a computer printer.

The appliance has a white cabinet enclosure. It includes picture-based instructions that enable an electrician to install it without having any special capabilities. All the wiring and connections are color-coded. They mount it and run a single piece of conduit from our cabinet to an existing box or motor starter, and then they connect it to the physical components of the lift station.

tpo: After the appliance is installed, how does it acquire its ability to communicate information?

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Hinchman: Once it is all put together, the unit powers up, and a built-in police-grade encryption modem ties to the Verizon network off a 3G VPN connection. It connects with our server, and through a subscription they can use a smartphone, iPad or Android device and complete the configuration by way of the Web.

We ask just 20 simple questions. What type of level measurement are they using? We can support analog instruments like ultrasonic sensors or floats. How many pumps do they have? We can handle one to four. Do they have influent or effluent flowmeters? Who do they want the alarms emailed to? How long do they want a motor to try to start before it fails? Do they have safety alarms on the pumps like high vibration or high temperature? Once they answer these and the other questions, the Web page interface configures itself and they are ready to operate the device.

tpo: If they have multiple lift stations, do they need an appliance for each one?

Hinchman: Yes. If they buy a second, third or fourth unit, we just stack them up. The main page on the website goes to the street address of which-ever pump station they choose.

tpo: Why is a device like this necessary? Don't most communities have SCADA systems that would enable this kind of monitoring?

Hinchman: In looking at the marketplace, we found that rural communities with one to 10 pump stations and somewhere between 500 and 3,500 people, sometimes upward of 5,000 or 6,000 people — these make up the vast majority of lift station implementations, and very few have SCADA systems. Furthermore, very few have access within 50 miles to a SCADA systems integrator.

And so this appliance makes for a very nice small rural water system solution. We believed that if we offered those utilities a solution that had no specialized IT requirements, that they could order in a very simple manner, without having to do engineering or design, they would be very interested. And that has been the case.

tpo: Does this device have applications in communities that do have SCADA?

Hinchman: For utilities that have SCADA, we offer a version that doesn't include the radio or the subscription-based service. They get the same white cabinet and they can just tie it into their SCADA software. It gives them a factory-built unit where they can install their own radio.

tpo: For these smaller communities, how would you describe the advantages of this solution versus SCADA?

Hinchman: The key advantage is that they don't have to stand up their own SCADA server. They avoid that computer, all the infrastructure around doing a master radio solution, and all the cost and management involved with a systems integrator. They're moving away from programming to simple configuration. We designed the system around operators, who tend to be

“The key advantage is that they don't have to stand up their own SCADA server. They avoid that computer, all the infrastructure around doing a master radio solution, and all the cost and management involved with a systems integrator.”

ALAN HINCHMAN

more mechanically rather than programming focused, and we provided everything in their language.

Finally, because it's pre-built, they know every one they order will be exactly the same, made in the USA, using common stock parts, all UL-approved and in a NEMA 4 enclosure. We believe it's a cheaper, faster-deployment device than the traditional business model folks have been using.

tpo: Do buyers of this system need support from GE to complete the installation?

Hinchman: We spent a lot of time thinking about the customer experience, and we provide really simple instructions, down to pictures of how to install the unit. We provide a one-page document that walks them through all the installation instructions. There's a small manual if somebody wants to go a little deeper into warranties and other information. A typical installation takes about seven hours. We can provide support through our regular call center, but that rarely has been needed.

tpo: Can a utility use this unit to actually operate a pump station remotely?

Hinchman: The online version does not allow for manual operation. It simply cycles the pumps according to the configuration. The version built for SCADA does allow manual operation from the SCADA interface.

tpo: What is the ideal size of installation for this appliance?

Hinchman: The unit is priced at \$8,995, and the annual subscription cost is \$600. There are some quantity discounts, but as you get up to 10 or 12 units, it becomes pretty cost-prohibitive. The sweet spot is where a community needs just one or two units.

tpo: How can prospective users learn more about the Pump Station Appliance?

Hinchman: They can go to www.ge-ip.com/pumpstation. There they can read about the unit and view a demonstration that connects to an appliance that is actually running in a small community in Wisconsin. That will give them a feel for how it works. **tpo**

Digital Technology

By Craig Mandli

Communication Equipment

MOTION-SENSING MAN-DOWN DEVICE

The intrinsically safe TPASS 3 motion-sensing man-down device from Grace Industries helps protect workers during confined-space entry.

It has an audible out-of-range indicator, and workers have the option of deploying a range-extending micro-repeater. The portable work site alarm is placed at the confined-space entry point. The confined-space attendant carries the monitor. The confined-space worker's unit automatically transmits a direct wireless alarm upon lack of motion or by manual activation to the portable work site alarm and to the attendant. A +100 dBA siren and intense strobe light are activated, while the attendant receives the alarm indicating which worker is in alarm. The device can also transmit an evacuation signal to the confined-space worker. 724/962-9231; www.graceindustries.com.



TPASS 3 motion-sensing man-down device from Grace Industries

WIRELESS COMMUNICATION PLATFORM

The Radioline wireless communication platform from Phoenix Contact allows I/O-to-I/O communication without programming software. More advanced configurations, such as high-speed serial communication, network topologies up to 250 nodes, non-

intrusive diagnostics and 128-bit AES encryption, can be accessed using free programming software. The system

is available in 2.4 GHz and 900 MHz, enabling applications to span distances from a few hundred feet to multiple miles. The platform is suited for wire replacement; pump control; sensor, flow and temperature monitoring; and PC/PLC/RTU interface applications. 800/322-3225; www.phoenixcontact.com.



Radioline wireless communication platform from Phoenix Contact

Control/Electrical Panels

SCADA-ENABLED PUMP CONTROLLER

The TCU pump controller from Data Flow Systems combines automated pump control with SCADA communications for fixed-speed and VFD applications. It automates up to three pumps or can be linked in series to accommodate any number of pumps. It has an intuitive operator interface and expandable I/O interface; no PLC knowledge is required. The HOA switches are fail-safe and remain functional even with loss of power. The unit is SCADA-ready with open Modbus RTU and ASCII protocols and is available with integrated radio, networking, auto-dialer or Verizon cellular communications. It comes with a backup battery and charger and configuration software. 321/259-5009; www.dataflowsys.com.



TCU pump controller from Data Flow Systems



MultiSmart pump station manager from Flygt – a Xylem Brand

PUMP STATION MANAGER

The MultiSmart pump station manager from Flygt – a Xylem Brand, combines numerous control panel components from PLCs, RTUs and pump controllers into a single package. It includes preprogrammed logic designed to reduce operating costs significantly. The unit is easy to configure using its setup wizard for

commissioning new stations. It has built-in local SCADA without the added cost of HMI hardware and software. Its remote-control programming reduces maintenance cost and frequency of site visits. 855/995-4261; www.flygtus.com.

AUTOMATED CONTROL PACKAGE

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 amount of dosing needed. Systems are constructed based on a study of the distribution network and historical trend data. An H₂S monitor is installed downstream where septic, anoxic conditions lead to H₂S stripping. A Hydrex line can provide the compatible chemical with the system to prevent odor and corrosion. 919/677-8310; www.krugerus.com.



ThioBox automated control package from Kruger USA

PREPROGRAMMED LEVEL CONTROLLER

The LMS II preprogrammed, transducer-based level controller from Metropolitan Industries has a color touch-screen interface. It allows users to seamlessly alter pump options and transducer options while providing access to basic SCADA features. It comes with integrated help screens. The menu-configurable, constant-speed, pump-down level controller can control one to three pumps, with optional preprogrammed configurations for single/dual level transducers. It can be controlled directly on the touch-screen at a lift station or accessed remotely via laptop. With

an Internet connection or cell modem, MetroMail can send text or email alarm notifications. The unit has an embedded Web page for configuration, allowing users to change the alarm callout list and other settings remotely. 815/886-9200; www.metropolitanind.com.

VFD CONTROL PANEL

OLS Series control panels from Orenco Controls have integrated variable-frequency drives (VFDs) to optimize system operation and reduce energy usage. They also reduce hard starts and water hammer. Multiple drives can be configured through one user-friendly human-machine interface. Each panel, from simple electromechanical panels to complex multi-drive panels with PLCs, can be designed and built for an application. Engineers preprogram user interfaces, making the panel virtually plug-and-play. Maintenance staff can adjust settings and monitor the system remotely. The outdoor-rated panels are housed in a weatherproof enclosure and offer circuit protection, heat dissipation systems (fan or air conditioning), phase and voltage protection, and level controls. 877/257-8712; www.orencocontrols.com.



OLS Series control panels from Orenco Controls



331-SV pump control panel from PRIMEX

PUMP CONTROL PANEL

The 331-SV pump control panel with Station View duplex pump controller from PRIMEX is simple yet versatile for a wide variety of duplex pump applications. One panel covers three phases and has three voltages. It operates with floats, a level transducer or both. A clear graphic display, easy-to-use controller and intuitive menu

allow operators to plug the appropriate overload modules into the starter, getting the pump system up and running quickly. **844/477-4639; www.primexcontrols.com.**

Data Acquisition Systems

CONTINUOUS MEASUREMENT ANALYZER

The 56 advanced analyzer from Emerson Process Management supports the continuous measurement of analytical inputs from one or two sensors. It has a high-resolution, full-color display that provides at-a-glance viewing of process readings indoors or out. Six additional process variables or diagnostic parameters are displayed for quick determination of process or sensor condition. It auto-recognizes each type of measurement board and prompts the user to configure each sensor loop in a few quick steps for immediate live readings. It continuously monitors itself and the sensors for fault and warning conditions. **800/854-8257; www.rosemountanalytical.com.**



56 advanced analyzer from Emerson Process Management



AquaSelect Process Analyzer from HF scientific

INTELLIGENT PROCESS ANALYZER

The AquaSelect Multi-Input Process Analyzer from HF scientific displays the status of up to four parameters on screen simultaneously, offering users a complete picture of process status with a single analyzer. Multi-channel capability means fewer analyzers required and faster installation, maintenance and upgrades. It is compatible with a wide range of analog and digital analytical sensors, including the AdvantEDGE series of measurement probes. **888/203-7248; www.hfscientific.com.**

Drives

WATER AND WASTEWATER DRIVE

The ACQ550 drive from ABB is designed for quick and easy setup and is available in ratings from 1 to 550 hp. It integrates as a NEMA-1, NEMA-12 or outdoor-rated NEMA-3R solution. A library of preprogrammed startup assistants provides commissioning for submersible, centrifugal or positive-displacement pumps, and application macros simplify configuration of inputs, outputs and parameters. **800/752-0696; www.abb.com.**



ACQ550 drive from ABB

Flow Monitoring

AIR/GAS FLOWMETER

The ST100 Flow Meter from FCI – Fluid Components International has a choice of communication options with 4-20 mA analog, frequency/



ST100 Flow Meter from FCI – Fluid Components International

pulse, alarm relays and fully approved digital communications: HART, Foundation Fieldbus, Modbus and Profibus. It combines flow sensing with a thermal mass gas flowmeter. A plug-in card replacement can be changed out in the field to adapt to changing network communication needs. The meter has a graphical, multivariable, backlit LCD display and a readout that continuously displays all process measurements and alarm status. It can query for service diagnostics and includes an onboard data logger with an easily accessible, removable 2 GB micro-SD memory card that stores up to 21 million readings. **800/854-1993; www.fluidcomponents.com.**

DOPPLER FLOWMETER

The DFM 5.1 Doppler flowmeter from Greyline Instruments measures flow from outside a pipe. The clamp-on ultrasonic sensor mounts on any 1/2-inch ID or larger pipe and can be used for wastewater, sludge, slurries, abrasives or any liquid with bubbles or suspended solids. Calibration and startup is simple with a built-in five-button keypad. It has a large backlit display and totalizer, isolated 4-20 mA output and six control relays. Options include a built-in data logger and reporting system with USB output, Windows software, and intrinsically safe sensor. **888/473-9546; www.greyline.com.**



DFM 5.1 Doppler flowmeter from Greyline Instruments



Vantageview process meters and Modbus scanners from Precision Digital

FIELD-MOUNTED METER

Vantageview field-mounted NEMA 4X process meters and Modbus scanners from Precision Digital have an injection-molded plastic enclosure resistant to wet or dirty environments. Loop-powered process and flowmeters, DC- or battery-powered pulse input flowmeters, and DC-powered scanners are available. Most models include Safe-Touch through-window buttons, while select models include RS-485/Modbus serial communications and programming software. Display options include dual-line, large format, and feet and inches with a tank level bar graph. The polycarbonate window makes it suitable for applications with restrictions on glass. **800/343-1001; www.predig.com.**

QUAD-PATH ULTRASONIC WATER METER

The 280W-CI commercial- and industrial-grade ultrasonic water meter from Spire Metering Technology has no moving parts and quad-path ultrasonic technology. Housed in an IP68-rated heavy-duty enclosure, it can replace mechanical water meters, including compound meters. It exceeds ISO4064 Class D/AWWA C750, and its quad-path technology improves accuracy and reduces the straight-pipe run requirement. It has a wide dynamic range, leakage detection and a 10-year battery life. It is unaffected by magnetic interference, and is AMR/AMI ready with pulse, M-Bus, Modbus, 4-20 mA or wireless interface. **888/738-0188; www.spiremt.com.**



280W-CI water meter from Spire Metering Technology

(continued)

Gauges

PRESSURE TEST GAUGE

The 15,000 psi Crystal Engineering XP2i test gauge from AMETEK PMT Products has an accuracy specification of 0.1 percent of reading, with digital temperature compensation from 10 to 50 degrees C. It includes an ISO 17025, NIST-traceable calibration certificate with test data at five temperatures. It has an IP-67 rated, marine-grade enclosure (submersible up to 1 meter), a fast pressure safety valve mode and a leak-free pressure fitting connection. The dual display version adds leak rate, tare mode and differential pressure when connected to a second unit. An optional DataLoggerXP upgrade allows users to record 32,000 data points and export the data to an Excel document. An ultra-low power mode allows more than a year of continuous recording on one set of AA batteries. **800/444-1850; www.crystallengineering.net.**



Crystal Engineering XP2i test gauge from AMETEK PMT Products

Instrumentation

VIDEOGRAPHIC RECORDER



RVG200 videographic recorder from ABB Measurement Products

The RVG200 videographic recorder with touch-screen technology from ABB Measurement Products provides access to process data for on-site operators while enabling secure remote access to that same data from any tablet, smartphone, PC or other networked device. Using icon-based menus or by swiping through the screens, operators can rapidly find the process data they need. They can view data in formats including individual or grouped charts, bar graphs, or digital indicator displays. An integrated Web server enables remote access from a PC, tablet or smartphone. The device is integrated into a plant network through a 100 Mbit/s Ethernet connection and can notify operators via email of process alarms or critical process events. **800/435-7365; www.abb.com/measurement.**

WATER-QUALITY MULTIPARAMETER SYSTEM

The digital IQ Sensor Net multiparameter system from YSI, a Xylem brand, measures DO, pH, ORP, turbidity, conductivity, TSS, NH₄⁺, NO₃⁻, NO₂⁻, K⁺, Cl⁻, PO₄³⁻, COD, BOD, TOC, SAC, sludge level, UVT-254 and temperature.

Each network offers up to 20 measurements; users can extend the network at any time. Simple connectivity makes it easy to replace or add sensors and modules. Each digital sensor can store calibration data and be used along various cable lengths along the network. An optional UltraClean ultrasonic cleaning system keeps the optics free of fouling and provides data quality. **937/767-7241; www.ysi.com.**



IQ Sensor Net multiparameter system from YSI, a Xylem brand

Monitors

MERCURY VAPOR ANALYZER

The portable Jerome J505 mercury vapor atomic fluorescence spectroscopy analyzer from Arizona Instrument has an efficient optical cell

that requires minimal flow to purge the system, allowing it to run at a low flow rate, minimizing sample dilution. It uses atomic fluorescence spectroscopy to read down to 50 nanograms. It needs no regeneration. It has USB data logging and more than 10 hours' battery life. It can switch between units of measurement with the push of a button on the test screen. **800/528-7411; www.azic.com.**



Jerome J505 mercury vapor analyzer from Arizona Instrument

DENSITY MEASUREMENT MONITOR



Dynatrol Density System from Automation Products - DYNATROL Division

The Dynatrol Density System from Automation Products - DYNATROL Division offers accurate measurement of density, specific gravity, percent solids or percent concentration in-line or in vessels. Applications include magnesium hydroxide, caustic soda, soda ash, alum slurry, ferric salts, sulfuric acid and lime slurry. The density cells come in a full range of weather-tight and explosion-proof corrosion-resistant materials. They also serve broad temperature and pressure ratings with no moving parts. The Digital Density CL10HY Converter has an onboard microcontroller and arrives ready to use with no programming required. A two-line LCD displays temperature, density, corrected gravity, product frequency and status. **800/231-2062; www.dynatrolusa.com.**

DUAL-CHANNEL UNIVERSAL TRANSMITTER

The dual-channel T80 universal transmitter from Electro-Chemical Devices measures DO, pH or five other common liquid parameters. Self-configuring electronics provide fast, easy plug-and-play monitoring. A single unit can monitor turbidity, DO, pH, ORP, pION, conductivity or resistivity. It can combine with the Triton TR6 sensor to measure suspended solids or turbidity in four selectable dual ranges with preset low and high ranges from 0 to 4,000 NTU. It measures turbidity in milligrams per liter, parts per million and percent solids. Turbidity measurements are calibrated to the user application. The pH sensors come in an insertion/submersion configuration or a valve retractable configuration with flared end to prevent blowout. **800/729-1333; www.ecdi.com.**



T80 universal transmitter from Electro-Chemical Devices

AMPEROMETRIC RESIDUAL ANALYZER

The FX-CL series microprocessor-based amperometric residual analyzer from Foxcroft Equipment & Service Co. simplifies online chlorine residual monitoring and control. Electrode options include direct bare electrode for free or total chlorine, and reagentless membrane-covered sensors for free and total chlorine, chlorine dioxide and ozone. Users can calibrate and program settings with a 4.3-inch LCD full-color touch screen. The device has configurable high and low alarm levels, flow alarm, fault alarm, auto temperature measurement and compensation. It can handle up to four current outputs, up to eight relay outputs and an RS485 serial port. **800/874-0590; www.foxcroft.com.**



FX-CL series amperometric residual analyzer from Foxcroft Equipment & Service Co.

SUSPENDED SOLIDS DENSITY METER

The Suspended Solids Density Meter from Markland Specialty Engineering monitors sludge and silt concentrations in pipes, clarifiers and

tanks and helps automate biosolids removal. Using ultrasound, it measures primary, secondary, return-activated and backwash sludge. It allows users to program underflow pumps to automatically shut off before sludge becomes too thin and helps operators determine polymer dosages for improved filter press/centrifuge/digester performance. The in-line pipe spool-piece sensor is nonintrusive and simple to install, calibrate and clean. **855/873-7791; www.sludgecontrols.com.**



Suspended Solids Density Meter from Markland Specialty Engineering

VOC GAS DETECTOR



Large Graphics Display Gas Detector from Mil-Ram Technology

The Large Graphics Display Gas Detector for VOC gas detection from Mil-Ram Technology provides user-friendly data, advanced diagnostics and continuous onboard systems monitoring, and has a programmable and easily adjustable calibration reminder. It eliminates shorthand, coded messages. The unit detects VOC gases and vapors using a PID photoionization type detector. Gases detected include benzene, cyclohexane, styrene, methyl bromide, carbon disulfide, chlorobenzene, toluene, trichloroethylene and xylene. UV lamp life exceeds 18 months. The detection range is 0 to 200 ppm or 0 to 2,000 ppm VOC. A Modbus RTU provides multi-drop installation. **888/464-5726; www.mil-ram.com.**

NOISE MONITORING SYSTEM

The ScanMonitor noise monitoring system from Scantek employs a Class 1 or 2 sound level meter, allows for remote data collection from the real-time data logger, and is accessible via wireless or wired LAN or GPRS. It contains an onboard Web server so that sound data, test parameters and operator information are all configurable. Data is stored on high-capacity local memory and can be transmitted in real time by GSM, Wi-Fi or Ethernet. Measurement metrics include Lp, Leq, LE, Lmax, Lmin and five selectable Ln. Ten samples per second can be continuously recorded. Web-based software is provided to process and display results. The device can execute auto-diagnosis procedures and provide alerts when service is needed. **800/224-3813; www.scantekinc.com.**



ScanMonitor noise monitoring system from Scantek

AMMONIA ANALYZER



TL-2800 ammonia analyzer from Timberline Instruments

The TL-2800 ammonia analyzer from Timberline Instruments uses continuous-flow gas diffusion/conductivity cell analysis to determine ammonia levels. The method provides results unaffected by turbidity or color and does not require distillation before analysis. The system introduces the sample via peristaltic pump, reducing filtration, repairs and maintenance. Passing the sample/caustic mixture through an optional zinc reduction cartridge reduces nitrate and nitrite ions to ammonium, allowing measurement of total inorganic nitrogen. The software automates the instrument and sampling system, and the graphical user interface is easy to learn and implement. **303/440-8779; www.timberlineinstruments.com.** (continued)

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OPERATIONS AND MAINTENANCE 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. They have access to all current and 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.**



Operations and maintenance software from AllMax Software

DESKTOP INSTRUMENT MANAGER SOFTWARE



FSDATA Desktop Instrument Manager software from Hach Company

FSDATA Desktop Instrument Manager software from Hach Company helps field crews save time in setup, downloading and maintenance of Hach FL900 Series flow loggers and sensors. Its dashboard helps reduce user interaction time. By displaying both program and real-time information in a single location, users can quickly assess and improve the meter's programming. The software is intuitive, built with extensive input from field crews to mimic actual workflow processes. It

ensures that instruments are properly calibrated the first time. Setup wizards allow even infrequent flowmeter users to accomplish flow logger setup and calibration. With built-in and multi-layered error reduction features, it reduces mistakes. **800/368-2723; www.hachflow.com.**

Process Control Systems

POLYMER DOSAGE CONTROLLER

The Streaming Current Controller from Micrometrix Corp. controls polymer dosage on sludge dewatering equipment such as belt presses and centrifuges. It measures residual polymer charge in the filtrate to monitor how the process is performing. The self-flushing sensor responds to changes in mass flow and solid characteristics and automatically maintains the optimum polymer dosage. It helps produce dryer and more consistent cake, with average polymer savings of 20 to 35 percent. Process upsets are prevented with alarm outputs. **770/271-1330; www.micrometrix.com.**



Streaming Current Controller from Micrometrix Corp.

Remote Monitoring Equipment

PRESSURE/TEMPERATURE MONITORING SWITCH

The One Series Safety Transmitter pressure or temperature moni-

toring transmitter switch from United Electric Controls provides a NAMUR NE 43 standard 4-20 mA analog output. Its programmable, high-capacity solid-state relay enables fast emergency shutdowns. Its "I Am Working" sensor diagnostics with redundant data processing detects open, shorted and plugged sensing elements. Its analog output provides process variable and detected-fault information. Discrete outputs provide a fail-safe (open)



One Series Safety Transmitter from United Electric Controls

emergency shutdown when a fault is detected. Setpoint and deadband (reset point) are 100 percent programmable. It is password protected. LED backlighting enhances viewing of process variables, parameters and status in dimly lit areas. **617/926-1000; www.ueonline.com.**

REMOTE I/O SYSTEM

The u-remote distributed I/O platform from Weidmuller offers a streamlined design and hot-swappable slices, an integrated self-configuring Web server interface and simple plug-in connections. It is an advanced IP20 platform, built for fast installation and setup and designed to improve machine performance and productivity. Using Push-In wire technology, each point is clearly visible with LED status indication. Hot-swappable card slices can be installed, updated and removed without tools. The integrated Web server helps speed up installation



u-remote distributed I/O platform from Weidmuller

and provides real-time network access to the slices/cards connected to a single field bus coupler. Couplers include ProfiNet, EtherCat, Modbus TCP and Ethernet TCP/IP for seamless integration into plant/machine networks. The high-speed system bus works with as many as 256 DI/DOs in 20 microseconds. **800/849-9343; www.weidmuller.com.**

SCADA Systems

MANAGED SCADA SYSTEM

The managed SCADA system from Mission Communications delivers real-time alarms by any combination of voice phone calls, text messages, emails, faxes and pagers, logging each alarm on the Web portal. Because the system is Web-based, enhancements and new features are immediately available at no extra cost. Users can compare pump station flow with local rainfall, analyze pump runtimes for anomalies, or track site access with reports tailored to the water and wastewater industry. Reports assist with preventing noncompliant events, saving money and improving system management. **877/993-1911; www.123mc.com.**



Managed SCADA system from Mission Communications

Sensors

REVERSAL DETECTION SPEED SWITCH

The UDS1000 fail-safe reversal detection speed switch from Electro-Sensors constantly monitors a shaft to ensure that it is rotating in the correct direction. Relay contacts in the unit can be used to electrically

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**UDS1000 fail-safe reversal
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lock out the starting circuit of the pump to prevent accidental startup during reverse rotation. The switch continuously monitors incoming pulses from a speed sensor and a magnetic pulser wrap or disc. A fail-safe relay output is electrically interlocked directly to the motor starter circuit for the pump. If the slightest reverse rotation of the pump shaft is detected,

it disables the pump starting circuit, preventing catastrophic damage. 800/328-6170; www.electro-sensors.com.

ELECTRIC ACTUATOR

BECK electric actuators from Harold Beck & Sons quickly, accurately and consistently track the demand signal, allowing users to maximize a control system's capabilities. They have a continuous-duty no-burn-out motor, and heaters and torque switches are not required for the actuator to operate at full efficiency. Wide-face spur gearing essentially eliminates wear-induced backlash and positioning inaccuracies. Since the gearing is permanently lubricated, the actuators require no scheduled maintenance. 215/968-4600; www.haroldbeck.com.



**BECK electric actuators from
Harold Beck & Sons**

PRESSURE TRANSMITTER

The Valueline pressure transmitter from Keller America uses micro-

processor technology to provide Total Error Band accuracy over a wide compensated temperature range. Available with a choice of electrical connections, custom pressure ranges, and voltage or current outputs, it integrates into new and existing systems, including PLC, VFD, SCADA and most commercially available displays and controllers. When equipped with a 4-20 mA analog output, it includes guaranteed lightning protection. 877/253-5537; www.kellerafrica.com.



**Valueline pressure transmitter
from Keller America**

SCANNING ANALYZER

The Scanning Analyzer from Palintest is EPA-approved for lead testing, while ChloroSense, ChlordioXense, and ChlordioX Plus are EPA-approved for testing chlorine, chlorine dioxide, and chlorite. All products are waterproof, portable, and easy to use. They allow for fast, accurate readings, with data storage and USB computer connection. They are suitable for use in a wide range of applications, such as food processing and cooling towers, as well as public water supplies, and monitoring of total residual oxidants. Kits include reagents and check standards. 800/835-9629; www.palintestusa.com. tpo



Scanning Analyzer from Palintest

Integrated security system installed across all county facilities

Problem

The Department of Facilities Management in Collier County, Fla., maintains and repairs more than 660 county-owned facilities and more than 3 million square feet of building space. County officials wanted to enhance security systems due to continued growth.

Solution

Johnson Controls installed three **P2000 systems** — one for the jail, one for the courthouse and a third for the rest of the county facilities, including the water and wastewater treatment plants. All security points connected to the systems can be monitored from the building operations center, allowing interaction from security personnel when needed. The system controls more than 470 video surveillance cameras, 350 doors, and elevators and gates in four parking structures.



RESULT

The security system has worked flawlessly. “We wanted to use a credible provider and a security system that would give us a lot of room to grow,” says Skip Camp, director of Facilities Management. “Johnson Controls and its P2000 security management system provide us that.” 414/524-7324; www.johnsoncontrols.com.

Noncontact turbidimeter reduces maintenance

Problem

The Russellville Water Treatment facility in Forsyth, Ga., was spending eight hours per week maintaining its turbidimeters. According to Craig Helms, plant superintendent, the traditional contact turbidimeters required cleaning weekly. Particles would periodically get trapped in the instrument, requiring more extensive cleaning. The light source would degrade over time.

Solution

The plant replaced the turbidimeters with **Turbiwell monitors** from **SWAN Analytical USA**. They use a non-contact design, eliminating the need for cleaning. A long-life LED light source with built-in emission intensity monitor eliminates annual replacement and prevents drift.



RESULT

The new meters reduced maintenance, freeing plant employees for other duties. They also saved \$600 per year by eliminating replacement of tungsten lamps. 847/229-1290; www.swan-analytical-usa.com.

Mag flowmeter solves tough application challenges

Problem

The Water Division in Cedar Rapids, Iowa, needed to replace underperforming flowmeters at two booster stations. The existing meters were maintenance intensive and susceptible to electrical and radio frequency interference from station equipment. The booster stations presented additional challenges in space constraints and irregular flow profiles, making accurate measurement even more difficult.

Solution

The city selected the **FPI-X dual-sensor electromagnetic flowmeter** from **McCrometer**. Its dual-sensor configuration is designed to deliver accurate measurement in challenging conditions of severe swirl, multiple pumps, line size variation and interference issues.



RESULT

The meter's insertion-style design allowed simple, quick installation within the tight space requirements. There was no need to interrupt service or use heavy equipment. The flowmeter eliminated maintenance issues, saving labor and time. Reliable and accurate flow data allows the utility to optimize the benefits of its SCADA system. 800/220-2279; www.mccrometer.com.

Shedding flowmeter helps maintain efficient sludge thickening

Problem

In August 2005, Dundee, Mich., opened a new wastewater treatment plant that faced much stricter effluent limits. Due to the constrained site, engineers selected a membrane bioreactor process and a membrane thickener. The MBT allowed operators to easily thicken waste sludge to 5 percent solids or more, doubling storage tank capacity. The process had to be tightly controlled to protect the membranes and maintain efficient thickening.

Solution

A **Universal Flow Monitors CoolPoint vortex shedding flowmeter** was chosen to monitor the sludge thickening and permeate. It provides accurate measurement and a stable 4-20 mA flow signal. It requires no maintenance, is repeatable and durable, and interfaces well with the SCADA system.



RESULT

Plant operators can remotely monitor the MBT process performance and modify the permeate flow as necessary. 866/542-9641; www.flowmeters.com. tpo

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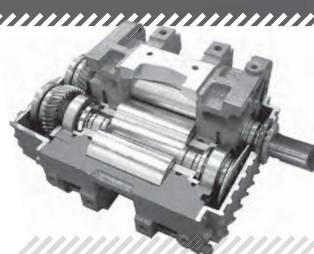
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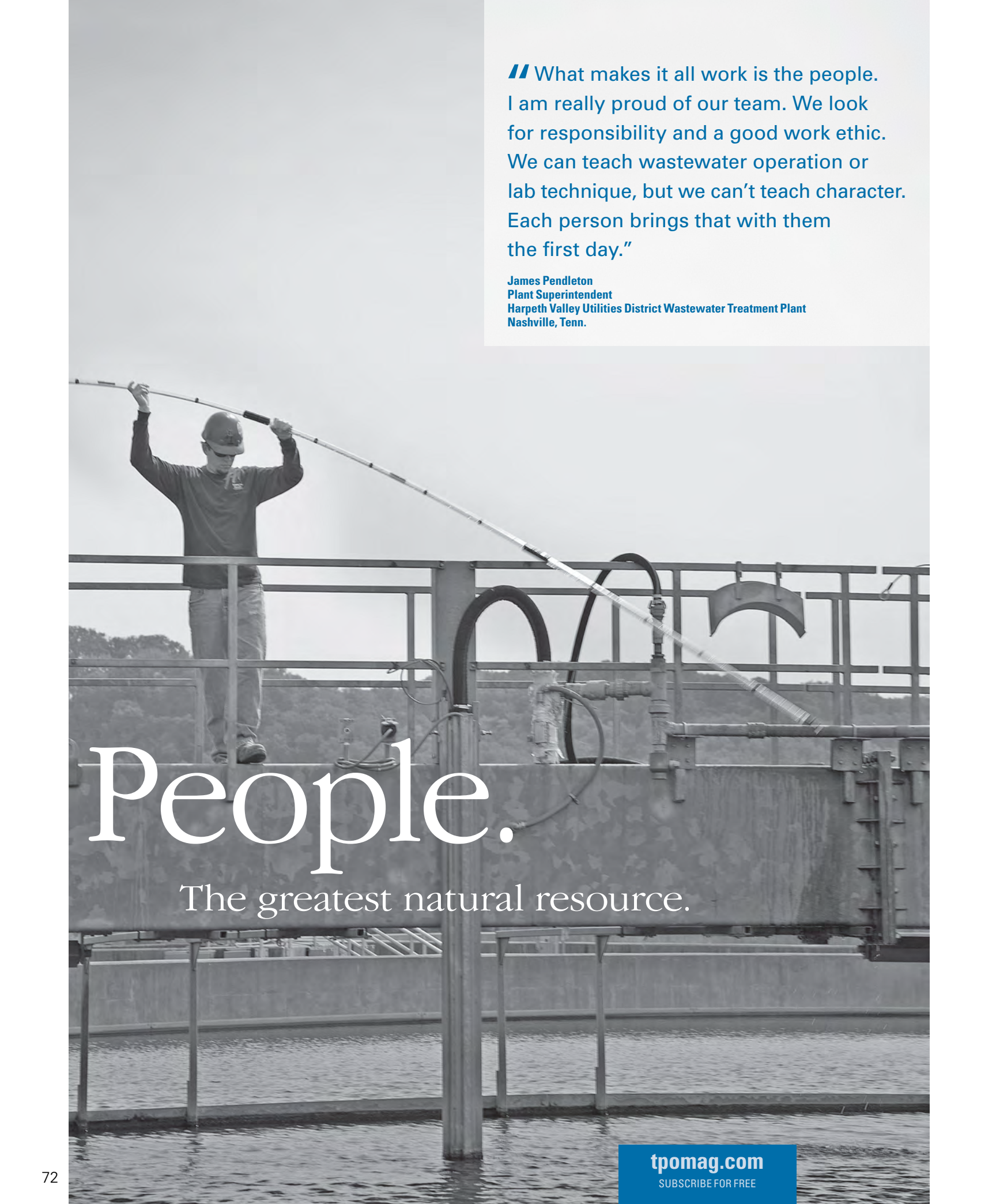
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James Pendleton
Plant Superintendent
Harpeth Valley Utilities District Wastewater Treatment Plant
Nashville, Tenn.

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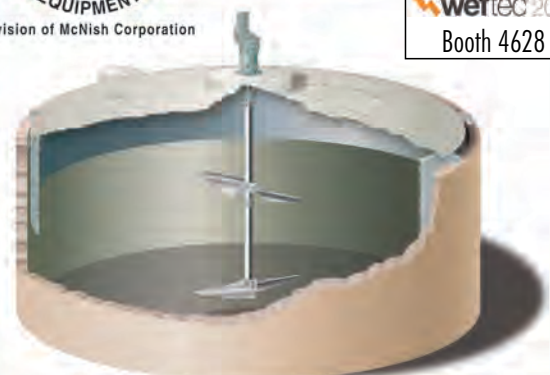


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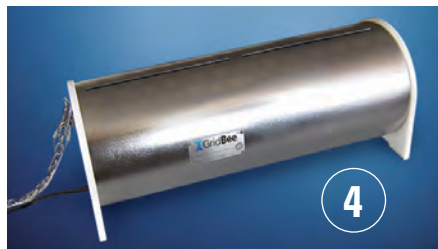
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1. ATLANTIC ULTRAVIOLET WATER PURIFIER

MightyPure water purifiers from Atlantic Ultraviolet utilize germicidal ultraviolet lamps to produce short wave radiation to eradicate bacteria, viruses and other microorganisms. Capacities range from 3 to 20 gpm. **631/273-0500; www.ultraviolet.com.**

2. GATEWAY SAFETY LENS CLEANER

Kleen View lens cleaning products from Gateway Safety feature a fast-drying, silicone-free formula that includes an anti-fog, antistatic ingredient that helps extend the life of safety glasses. The cleaner is available as a spray packaged with nonabrasive tissues or as single-use towelettes. **800/822-5347; www.gateway-safety.com.**

3. BUSCH ROTARY VANE PUMP

R 5 series rotary vane vacuum pumps from Busch Vacuum Pumps and Systems feature high pumping speeds even in low pressure ranges. Designed for continuous duty, the pumps have high-quality rotor vanes for long uptimes and specially designed air exhaust filters. **757/463-7800; www.buschusa.com.**

4. MEDORA GRIDBEE SUBMERSIBLE MIXER

The GridBee GS-9 submersible electric mixer from Medora Corp. is designed for potable water storage tanks up to 1 million gallons (3 million gallons in moderate climates). The mixer is 24 inches long, 11.5 inches in diameter and weighs 60 pounds. It is easily lowered through a 12-inch or larger tank hatch. **866/437-8076; www.medoraco.com.**

5. WESTECH ROTARY TABLE VACUUM FILTER

The Rotary Table Vacuum Filter from WesTech Engineering, designed to handle large flow rates, is an alternative to horizontal belt filters, rotary drum vacuum filters and filter presses. The horizontal orientation enables a thick filter cake to form on the surface. The discharge system uses an extraction screw mechanism to remove dewatered cake from the table and deposit it into a hopper. After discharge, the cloths are washed and the filtration process continues. **801/265-1000; www.westech-inc.com.**

6. VAL-MATIC SWING CHECK VALVE

The swing check valve from Val-Matic Valve & Manufacturing Corp., designed for industrial water and wastewater applications, meets NSF/ANSI 372 standards. Closure options include lever and weight, air cushion, and lever and spring. **630/941-7600; www.valmatic.com.**

7. DEVCON CONVEYOR BELT REPAIR KIT

The Devcon R-Flex belt repair kit from ITW Polymers Adhesives North America, formerly ITW Devcon, is formulated to repair tears, gouges and holes in styrene-butadiene rubber heavyweight conveyor belts. Repaired belts can be returned to service 90 minutes after application. Each kit (available in 4-pound and 1.5-pound sizes) includes resin and curing agent, two-part surface conditioner, mix bucket, wooden paddle, scrub pad, gloves, paper towels and plastic spatula. R-Flex has a two-year shelf life. It mixes as a liquid and becomes a non-sagging, self-leveling putty in three to four minutes. Working time is seven to nine minutes. Functional cure is 1.5 hours. **800/933-8266; www.devcon.com.**



8



10



9

8. KAESER ROTARY SCREW COMPRESSORS

SFC 18S and SFC 22C variable-speed drive rotary screw compressors from Kaeser Compressors feature an airend designed to optimize performance and efficiency. The SFC 18S has a flow range of 33-119 cfm at 125 psig and is available with pressures up to 217 psig. The SFC 22S has a flow range of 33-141 cfm at 125 psig with pressures to 217 psig. 877/596-7138; www.kaeser.com.

9. SIMTRONICS LASER OPEN-PATH GAS DETECTOR

The GD1 laser open-path gas detector from Simtronics, an IST Company, has a path length of 164 to 246 feet. The device can be calibrated to detect H₂S, MOS or EC and is suitable for SIL2 applications. 713/559-9200; www.detcon.com.

10. FLOMATIC STAINLESS STEEL WAFER-STYLE CHECK VALVE

Stainless steel wafer-style check valves model 888S6 and 888S6R from Flomatic Valves are available in 2- to 8-inch sizes with metal-to-metal seating (888S6) or with a Buna-N option (888S6R) for a drip tight seal. 800/833-2040; www.flomatic.com.

(continued)

wastewater: product spotlight

Grinder pump lift station package combines debris destruction with ease of service

By Ed Wodalski

The wastewater packaged lift station with submersible SEG grinder pump from Grundfos is designed for collecting and transferring wastewater from buildings, pressurized municipal sewage systems and industrial applications. The lift station can also be used with SL1/SLV submersible wastewater pumps to transfer untreated sewage.

While new to North America, the lift station package has been used in Europe for about 10 years.

"We've had several generations that we've gone through with this product where we have continuously improved it," says Thomas Morrison, Grundfos water utility sales and business development director for North America. "What we really focused on delivering with this product is not the low-cost end of the market but improving the overall cost of ownership. The way to do that is making a high-quality product that is very reliable, minimizes downtime, and when you do have downtime, make the product very easy to service and get back into operation."

The 2 to 5.5 hp grinder pumps devour diapers, nylon stockings, feminine hygiene products, plastic bags, dish towels, protective gloves, dish cloths, rubber bands and other debris.

One pump delivers up to 160 gpm; capacity doubles with duplex systems.

Pump features include cable connection to the motor via a cable plug filled with a two-component compound for a hermetically sealed cable entry. Other features include a cartridge shaft seal and SmartTrim impeller adjustment for optimum performance.



Lift station



SEG
grinder
pump

"Another unique design feature is the pump volute and motor housing is held together by a stainless steel clamp that you can remove without the use of any tools," Morrison says. "That allows you to quickly and easily inspect the impeller, volute and cartridge seal in the field."

Made of corrosion-free materials, the ready-to-install lift station package includes a polyethylene tank, stainless steel piping, valves and controllers. The modular packages are available with 32-, 40- or 48-inch sump diameters and four standard depths for simplex or duplex pump installation. Tank heights range from 60 to 118 inches. The sump diameter is approximately 8 inches larger than the well diameter to prevent push-up, eliminating the need for a concrete base plate. System modeling is also available. Accessories include sleeves for ducts, ventilation package, level control and monitoring.

"One of the key benefits here is an operator gets the complete system from one vendor," Morrison says. "It's not something that has been pieced together by two, three, four, five different manufacturers and put together by a distributor. This is a complete engineered system from one manufacturer and one vendor." 800/921-7867; <http://us.grundfos.com>.



11. KOCH MEMBRANE HOLLOW FIBER FILTRATION

The MegaPure hollow fiber filtration system from Koch Membrane Systems is designed for high-solids water and wastewater applications, including surface water treatment, high total organic carbon water treatment, reverse osmosis pretreatment and tertiary wastewater treatment. **888/677-5624; www.kochmembrane.com.**

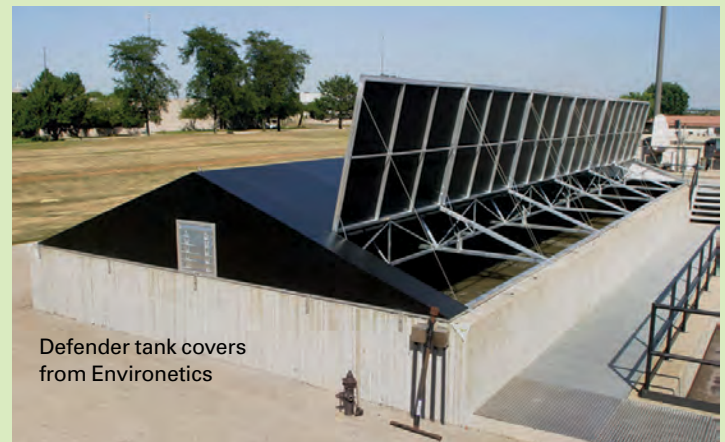
12. XYLEM FLYGT TOP-ENTRY AGITATOR

The 4840 top-entry agitator from Flygt – a Xylem Brand, is designed for nutrient removal, sludge handling, denitrification, flocculation, heat transfer and slurry handling in municipal wastewater and potable water. The agitator features a three-blade, hydrofoil impeller, available in high-alloy steel to withstand high temperatures, or can be configured with Flygt's yellow banana blade impellers. **855/995-4261; www.flygtus.com.**

13. FRANKLIN ELECTRIC SUBMERSIBLE PUMPS

SR Series submersible pumps from Franklin Electric are designed for municipal and industrial applications. Features include fully welded impellers and diffusers. Available in two models, the 6-inch pump delivers up to 400 gpm and the 8-inch pump delivers up to 650 gpm. **866/271-2859; www.franklinwater.com. tpo**

water: product spotlight



Defender tank covers from Environetics

Geomembrane tank covers control odor, algae growth

By Ed Wodalski

Defender tank covers from **Environetics** are custom manufactured to fit the profile of new or existing potable water or wastewater treatment tanks.

Designed for odor containment, thermal retention and algae control, the custom-designed and built covers feature a Series 6000 aluminum frame (not all covers) with light-blocking XR5 UV-resistant geomembrane panels.

"It's a very durable material that provides a low-cost solution for water or wastewater treatment systems," says Richard Winters, vice president.

Applications include sand filters or other types of filter tanks exposed to sunlight and subject to algae growth. While algae can be controlled with chemicals, preventing growth from taking place saves on chemical costs and manpower needed to clean the tanks, he says.

The modular system is built in 8-foot-wide segments for assembly on site; framework attaches to concrete or steel tanks using a mechanical seal.

"All pipe penetration goes through the framework," Winters says. "If there's a need to perform major maintenance, the cover system can be lifted off using a crane and placed to the side so work can be performed, leaving the framework attached to the tank. When work is completed, the cover can be lifted back into place without having to reseal the in-frame pipe penetrations."

Boots are available for installing piping through the membrane cover. Frames include stainless steel lifting lugs for easy cover removal.

A cost-effective alternative to aluminum or fiberglass, the covers require little to no maintenance and are snow-load rated based on local building codes.

"You don't have to paint them. There are no coatings that have to be applied," Winters says. "We've had the geomembrane material in service in the field for over 35 years in outdoor applications without any maintenance whatsoever. There's really nothing you have to do with them. You set them and forget them."

Cover options include locking manway access hatches, hinged equipment access doors, circular inspection and sample ports, and gravity or pressure-operated louvered vents for odor control. **815/838-8331; www.environeticsinc.com.**



Grundfos launches newsletter

Grundfos launched its new customer newsletter, Grundfos NEWS. The pump manufacturer newsletter includes case stories, technical know-how, market trends and product news.

Anua to distribute PekaSys Bubbler

Anua, in partnership with PekaSys, will distribute the Bubbler sequencing batch reactor in North America. The Bubbler, designed for high level treatment, including total nitrogen reduction, can be used for residential or commercial applications, new construction, repair projects or retrofits. The Bubbler is certified to NSF/ANSI Standard 40 and Standard 245 for new installations.

Kaman Distribution completes acquisition

Kaman Corp. completed the acquisition of the B.W. Rogers Co. and select affiliated entities. The acquisition expands Kaman's capabilities in the fluid power and automation and motion control product areas. Rogers, which operates from 21 locations in seven states, is a tri-motion distributor of Parker Hannifin motion and control products. Approximately 240 former employees of B.W. Rogers have joined Kaman. The acquired operations of B.W. Rogers had sales of approximately \$100 million in 2013. **tpo**

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people/awards

The Delaware Rural Water Association named **Robert Slater** of Bridgetown 2013 Water Operator of the Year. **Brian Murphy** of Seaford was named the 2013 Wastewater Operator of the Year.

Gary Hallaert, Algonquin Village Utilities supervisor, and **Jason Meyer**, water operator, won the inaugural Hydrant Hysteria contest for assembling a fire hydrant fastest at the 2014 WaterCon Conference and Exposition in Springfield, Ill.

The **Trenton Municipal Utilities Wastewater Treatment Plant** received the 2013 Biosolids Award for Small Facilities from the Missouri Water Environment Association.

Tim Snyder was hired as wastewater treatment plant superintendent for the City of Atlantic, Iowa.

Brenda Cummins of the Lawrence County (Ind.) Health Department completed requirements in conjunction with the Indiana State Department of Health to be an onsite wastewater professional.

The **Big Bull Creek (Kan.) Wastewater Treatment Facility** received design and construction awards including the Engineering in Excellence Award for Design-Build from the American Council of Engineering Companies of Kansas, the National Recognition Award from the American Council of Engineering Companies, the Kansas Award of Honor in the Design-Build Category from American General Contractors, and the Capstone Award for Infrastructure from the *Kansas City Business Journal*.

The **Fairfield-Suisun Sewer District** received the 2013 California Water Environment Association Award for the state's best collection system of its size.

Jesse Lawson, general manager of Indian Valley Community Services District, was named Wastewater Operator of the Year by the California Rural Water Association.

AAA Wastewater (Franklin, Ohio) received the 2013 Soin Award for Innovation from the Dayton Area Chamber of Commerce.

Gus Collins was named gas and wastewater utilities director for the City of Winfield, Kan.

Alecia Patton, GIS coordinator for the Jacksonville Wastewater Utility, was named 2014 Young Professional of the Year by the Arkansas Water Works & Water Environment Association. The **City of Wilton** received the association's Special System Recognition Award for Wastewater.

Bryant Szymanski was hired as a wastewater operator for the City of Breezy Point, Minn. He replaces **John Monnier**, who retired.

The **Wilson Creek Treatment Plant** and the **West Alexander Treatment Plant** received the South Carolina Department of Health and Environmental Control Facility Excellence Award.

The **Sioux Falls Wastewater Treatment System** received the 2013 Operation and Maintenance Wastewater Treatment Award from the South Dakota Department of Environment & Natural Resources.

The Connecticut Department of Energy and Environmental Protection recognized the **City of Groton** for helping to maintain the environmental integrity of Long Island Sound. The city was recognized for its boat pumpout facilities' removal of significant sewage during the 2013 boating season.

The Minnesota Pollution Control Agency recognized these profession-

als for maintaining a perfect compliance record with wastewater treatment permits in 2013:

- **Jerome Connolly**, City of Belle Plaine
- **Bob Staydohar**, City of Marble
- **Ray Benolken**, Rush City
- **Scott Oberstar**, City of Chisholm

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 courses:

- Sept. 15-Oct. 4 – High-Tech Operator Course 1, online
- Sept. 15-Oct. 18 – Water Treatment Operator Level 1, online
- Sept. 15-Oct. 18 – Water Treatment Operator Level 2, online
- Sept. 15-Oct. 18 – Water Treatment Operator Level 3, online
- Sept. 17-19 – Financial Management: Cost of Service Rate-Making, Indianapolis
- Sept. 24 – Distribution System Issues Part 2 of 3: Water Quality and Asset Management Working Together, online
- Oct. 8 – Disinfection By-Products – State of the Science and Implications, online
- Oct. 15-17 – WATER Technologies Short Course

Visit www.awwa.org.

Alaska

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

- Sept. 15-16 – Basic Electricity for the Non-Electrician, Anchorage
- Sept. 17-18 – Electrical Troubleshooting and Preventive Maintenance, Anchorage
- Oct. 8-9 – Pumps and Pump Systems: Specifications, Installation and Operation, Anchorage

Visit www.awwma.com.

Arkansas

The Arkansas Environmental Training Academy is offering these courses:

- Sept. 16-18 – Intermediate Water Distribution, Fayetteville
- Sept. 16-30 – Basic Water Distribution, online
- Sept. 16 – Basic Water Math, North Little Rock
- Sept. 17 – Applied Water Math, North Little Rock
- Sept. 18 – PWS Compliance, North Little Rock
- Sept. 23-25 – Advanced Water Distribution, Hot Springs
- Oct. 1-15 – Intermediate Water Treatment, online
- Oct. 14 – Basic Water Math, Russellville
- Oct. 15 – Applied Water Math, Russellville

Visit www.sautech.edu/aeta.

The Arkansas Rural Water Association is offering an Intermediate Water Treatment course in Lonoke Sept. 23-25. Visit www.arkansasruralwater.org.

California

The California Water Environment Association is holding a Collection System Training Day Oct. 9 in Apple Valley. Visit www.cwea.org.

The California-Nevada Section AWWA is offering these courses:

- Sept. 15 – Backflow Tester Course, Rancho Cucamonga
- Sept. 16 – D2-D3 Review, Riverside
- Sept. 17 – D2-D3 Math Review, Riverside

(continued)

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- Sept. 17 – D4-D5 Math Review, Riverside
 - Sept. 18 – D4-D5 Review, Riverside
 - Sept. 26 – Backflow Refresher, West Sacramento
 - Oct. 1 - Water Use Efficiency Grade 2 Workshop, West Sacramento
 - Oct. 6 - Backflow Tester Course, West Sacramento
 - Oct. 8 - Water Use Efficiency Grade 3 Workshop, Rancho Cucamonga
- Visit www.ca-nv-awwa.org.

Florida

The Florida Section AWWA is offering an AWWA eLearning course Sept. 30 – Oct. 30. Visit www.fsawwa.org.

Indiana

The Alliance of Indiana Rural Water is offering these courses:

- Oct. 21 – GIS Mapping, Scottsburg
 - Oct. 29 – Lift Station Troubleshooting and Pump Service, Indianapolis
 - Nov. 6 – GIS Mapping, Cloverdale
 - Dec. 2 – Meeting Ammonia Limits in Lagoon Systems, Shipshewana
- Visit www.inh2o.org.

Illinois

The Illinois Section AWWA is offering these courses:

- Sept. 16 – Effective Backflow Programs, Rockford
 - Sept. 24 – Maintaining and Monitoring Water Quality, Morris
 - Sept. 25 – Water Storage Tank Maintenance, Westmont
 - Sept. 25-Nov. 13 – Water Distribution System O&M, Westmont
 - Oct. 2 – Water Operator Exam Refresher Class A and B, Elgin
 - Oct. 9 – Annual Regulatory Update, Elgin
 - Oct. 14 – Telemetry: A Detailed Look at Telemetry, Winnetka
- Visit www.isawwa.org.

Michigan

The Michigan Water Environment Association is offering the following courses:

- Sept. 11 – Collections Seminar, East Lansing
 - Oct. 29 – Health and Safety, East Lansing
 - Nov. 5 – Process Seminar, East Lansing
- Visit www.mi-wea.org.

The Michigan Section AWWA is offering these courses:

- Sept. 18 – Advanced Cross Connection Seminar, Lansing
 - Sept. 22-24 – Distribution System Short Course, Higgins Lake
 - Oct. 14-16 – Distribution System Short Course, Gull Lake
 - Oct. 14-16 – Limited Treatment Short Course, Gull Lake
- Visit www.mi-water.org.

Nebraska

The Nebraska Water Environment Association is offering a Wastewater Training course Oct. 6-8 in Lincoln. Visit www.ne-wea.org.

New York

The New York Water Environment Association is offering the following courses:

- Oct. 23 – Solids Handling and Dewatering, Babylon
 - Oct. 29 – Solids Handling and Dewatering, Bath
 - Nov. 5 – Solids Handling and Dewatering, Syracuse
 - Nov. 13 – Disinfection Optimization, Chautauqua
- Visit www.nywea.org.

The New York Section AWWA is offering these courses:

- Sept. 30 – Controlling Distribution System Water Quality, Norwich
 - Oct. 7 – Water Meter Design and Maintenance, Utica
 - Oct. 13 – Basic Electrical Power Systems and Communications, Melville
 - Oct. 15 – Dam Safety, Kingston
- Visit www.nysawwa.org.

(continued)

events

Sept. 8-11

WaterJAM, joint conference with the Virginia Water Environment Association and the Virginia Section AWWA, Hampton. Call 804/332-5286 or visit www.vwea.org.

Sept. 17-19

AWWA Wisconsin Section 2014 Annual Conference, La Crosse. Visit www.wiawwa.org.

Sept. 17-19:

AWWA South Dakota Section 2014 Annual Conference, Watertown. Visit www.sdawwa.org.

Sept. 21-24:

AWWA New England Section 2014 Annual Conference, Rockport, Maine. Visit www.newwa.org.

Sept. 23-26:

AWWA Western Canada Section 2014 Annual Conference, Regina, Saskatchewan. Visit www.wcsawwa.net.

Sept. 27-Oct. 1

Water Environment Federation WEFTEC Conference, Morial Convention Center, New Orleans. Visit www.weftec.org.

Sept. 30-Oct. 2

2014 AWWA America's Watershed Initiative Summit, Louisville, Ky. Visit www.awwa.org.

Oct. 6-8

National Rural Water Association Annual Conference, Seattle. Visit www.nrwa.org.

Oct. 7-9

AWWA Iowa Section 2014 Annual Conference, Altoona. Visit www.ia-awwa.org.

Oct. 9-10

AWWA Quebec Section 2014 Annual Conference, Quebec City. Visit www.reseau-environnement.com/fr/eau/awwa.

Oct. 12-14

AWWA Alabama-Mississippi Section 2014 Annual Conference. Visit www.almsawwa.org.

Oct. 12-14

AWWA Southwest Section 2014 Annual Conference, Tulsa, Okla. Visit www.swawwa.org.

Oct. 14-16

AWWA North Dakota Section 2014 Annual Conference, Fargo. Visit www.awwand.org.

Oct. 19-22

Atlantic Canada Water & Wastewater Association Annual Conference, Halifax (Nova Scotia) Marriott Harbourfront Hotel. Visit www.acwwa.ca.

Oct. 20-23

AWWA California-Nevada Section 2014 Annual Conference, Reno, Nev. Visit www.ca-nv-awwa.org.

Oct. 26-28

AWWA Water Infrastructure Conference, Atlanta, Ga. Visit www.awwa.org.



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Ohio

The Ohio Water Environment Association is offering a Watershed Workshop in Columbus Oct. 30. Visit www.ohiowea.org.

Oklahoma

The Oklahoma Environmental Training Center is offering the OWPCA Short School in Midwest City Oct. 6-10. Visit www.rose.edu/oklahoma-environmental-training-center.

Accurate Environmental Training is offering these courses:

- Sept. 17 – General Refresher for W Operators, Tulsa
 - Sept. 17-18 – C Water Operator, Tulsa
 - Sept. 23-25 – D Water and Wastewater Operator, Tulsa
 - Oct. 13-16 – A/B Water Operator, Stillwater
- Visit www accuratelabs.com.

Texas

The Texas Water Utilities Association is offering these courses:

- Sept. 16-18 – Valve and Hydrant Maintenance, Gatesville
 - Sept. 16-18 – Utility Safety, Victoria
 - Sept. 30-Oct. 2 – Basic Wastewater, Richardson
 - Sept. 30-Oct. 2 – Activated Sludge, Longview
 - Oct. 7-9 – Utility Safety, San Marcos
 - Oct. 13-17 – Instructional Design and Evaluation, Austin
 - Oct. 14-16 – Basic Water, Victoria
- Visit www.twua.org.

Utah

The Intermountain Section AWWA is offering these courses:

- Sept. 18 – Water System Operator Training, Tooele
 - Oct. 9 – Hydraulic Modeling, PUDs, and Managing Water System Growth, online
 - Oct. 9 – GIS Systems: How they can help the operator reach success, online
- Visit www.ims-awwa.org.

Wisconsin

The University of Wisconsin-Milwaukee School of Continuing Education is offering these courses in Milwaukee:

- Sept. 29-Oct. 1 – Monitoring, Controlling, and Optimizing Operations in Water and Wastewater Treatment Plants
 - Oct. 1-3 – Energy Optimization in Water and Wastewater Treatment Plants
- Visit www4.uwm.edu/sce/program_area.cfm?id=3881.

The Wisconsin Rural Water Association is offering these courses:

- Sept. 17 – Permit-Required Confined Space Entry, Plover
 - Sept. 25 – Winter Operations, Balsam Lake
 - Sept. 30 – Winter Operations, Plover
 - Oct. 2 – Bloodborne Pathogens/Hazard Communication/Lockout-Tagout, Jackson
 - Oct. 2 – Cross Connection Control Assembly Tester Refresher, Plover
 - Oct. 13-17 – Cross Connection Tester Certification, Plover
- Visit www.wrwa.org.

The Wisconsin Department of Natural Resources is offering these courses:

- Sept. 23-25 – Key Processes of Wastewater Transport and Control, Milwaukee
 - Oct. 21-23 – Key Processes of Wastewater Transport and Control, Milwaukee
 - Oct. 28-30 – Fundamentals of Modern Wastewater Treatment Process, Milwaukee
 - Oct. 28-30 – Wastewater Treatment Processes and Technologies, Madison
- Visit <http://dnr.wi.gov>. **tpo**

Send association notices and news items for this column to editor@tpomag.com.

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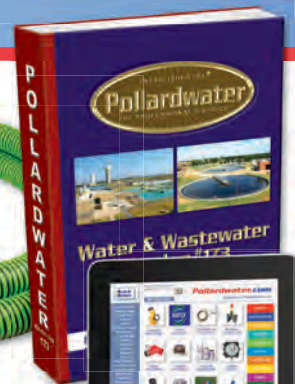
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