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SEPTEMBER 2011

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Jeff Rewerts Jr.
Operator
Mason, Mich.

Always *Learning*

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SEPTEMBER 2011

tpo TREATMENT PLANT OPERATOR

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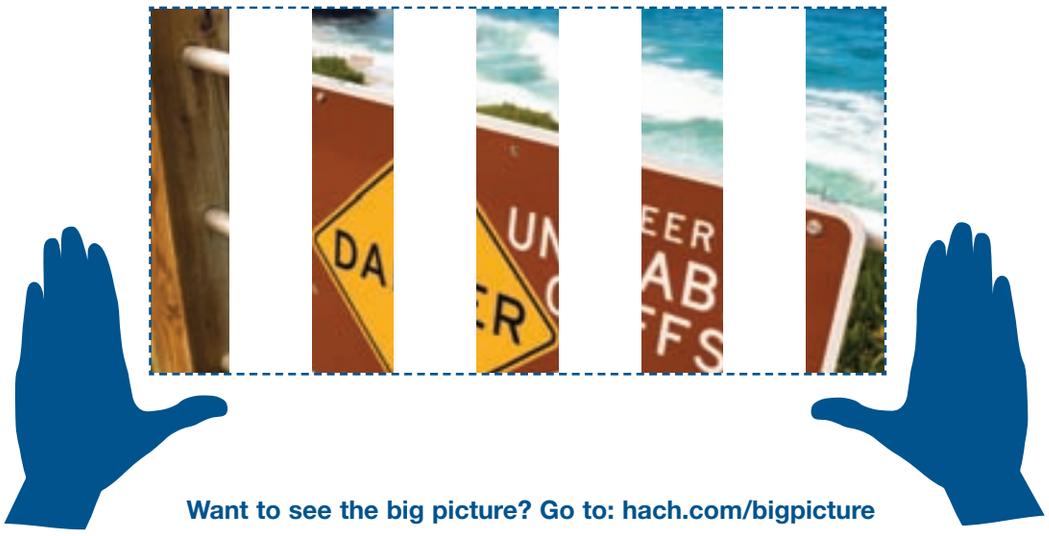

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COMING NEXT MONTH: OCTOBER 2011

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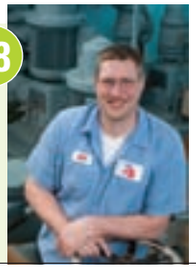
When Jeff Rewerts changed careers six years ago by joining the City of Mason (Mich.) Wastewater Treatment Plant, he set out to learn all he could about wastewater operations. He now holds a Class C license and for 2010 won the Operations Professional of The Year award from his local section of the Michigan Water Environment Association. (Photography by Dave Trumpie)



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WASTEWATER DOES GREAT DAMAGE IF SIMPLY DUMPED INTO RIVERS. BUT LOOK AT ALL THE VALUE IT BRINGS ALONG WHEN MANAGED WISELY.

By Ted J. Rulseh, Editor

Amazing stuff, wastewater. Clean water comes into our homes and businesses. We dirty it up. Then it travels under the streets to a treatment plant where, all of a sudden, this filthy, smelly water becomes valuable.

The more I hang around the treatment profession, the more remarkable wastewater looks to me. Its esteem in my eyes went up another notch when I read this month's article in *TPO* about the Clean Water Services Durham (Ore.) Advanced Wastewater Treatment Facility.

There, they pull nutrients out of the wastewater — ammonia and phosphorus that otherwise might cause havoc in waterways — and turn them into fertilizer. Not only is the product sold commercially: It's used to add nutrients to local streams to help support salmon fry so they have the strength to swim out to sea.

COUNT IT UP

So, let's take a little inventory. What all exactly comes out (or can come out) of that water our cities and villages used to pump in raw form to the nearest river?

Well, struvite fertilizer pellets, as in the case of Durham. Then of course there's biosolids, which some communities still give away and others sell. They sell at a significant loss if viewed strictly as a business proposition, but whether the material is sold or distributed free, it adds value to the community.

We see the value in vigorous crops of corn and alfalfa, in lush, verdant golf course fairways and park lawns, in homeowners' yards and ornamental gardens, in cover material for landfill restoration, in silviculture, and probably many more applications.

Then let's not forget digester methane, aka biogas. That's powerful stuff. Slowly but surely (or maybe not so slowly), the practice of flaring this gas is going away. It gets burned in boilers for space and process heating. It fuels engines/generators that produce steam along with electricity, which can be used in the plant or sold to the power grid.

In New York City, they have a plan to treat the biogas from at least one major clean-water plant and turn it into a clean, high-quality fuel for nearby homes — the treatment plant becomes a part of the gas utility!

THERE'S MUCH MORE

And the water itself? That's valuable, too. It's valuable when it goes back all cleaned up into a river, creek, lake or ocean. It's valuable when it's purified to reclaim standards and sold for irrigating farms and green spaces. Some day it may be valuable as drinking water for stressed communities — the technology is there.

Think for a minute about the combined effect of all the nation's reclaimed water in lowering stress on aquifers and surface sources and reducing water imports.

If you want to look a little deeper, consider the potential of wastewater influent as a power source to turn hydroturbines (though perhaps feasible only in rare cases) and as a source for in-plant cooling in summer and heating in winter.

Looking even farther, at least one company is exploring ways to pull enough energy out of wastewater to run the entire treatment plant — enabling the plant to achieve net-zero-energy input. Who knows what comes next?

The old-time meat processors used to brag that they made use of "every part of the pig except the squeal." It looks as if the wastewater industry is doing something just as thorough and remarkable with the flow that comes into the headworks every hour of every day.

The old-time meat processors used to brag that they made use of "every part of the pig except the squeal." It looks as if the wastewater industry is doing something just as thorough and remarkable with the flow that comes into the headworks every hour of every day.

To people in and around the profession, this may all look fairly routine. But that shouldn't stop us from, once in a while, stepping back and admiring, even marveling. The fact it happens is a tribute to people, to science, to technology, and to communities and their residents whose investments (voluntary or not) make it possible.

Someone has to say it: This is a truly wonderful business. **tpo**

CLARIFICATION

The "Greening the Plant" article in the August 2011 issue of *TPO* included a misleading figure for the cost of a **Capstone microturbine and gas treatment system** at the Willingboro (N.J.) Wastewater Treatment Plant. The figure in the article actually includes additional components purchased for plant improvement projects. We regret any confusion this may have caused.

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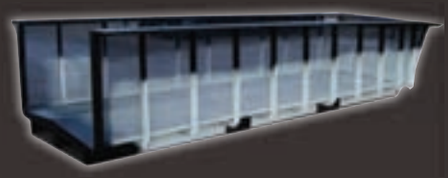

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AN OREGON PLANT USES A PROPRIETARY PROCESS TO EXTRACT NUTRIENTS FROM WASTEWATER AND USES THEM FOR SALMON RESTORATION AND A HIGH-QUALITY FERTILIZER

By Jim Force

Treatment ponds at the Clean Water Services Durham plant with secondary clarifiers in the background. (Photography by Tim Batchelor)

Bob Fitzgerald, left, maintenance supervisor with Clean Water Services, and Noah Harvey, operations supervisor.

NUTRIENTS REMOVED FROM MUNICIPAL WASTEWATER in Oregon are helping to restore the salmon fishery in British Columbia. It's a novel arrangement built around stringent phosphorus and ammonia removal requirements at the Durham Advanced Wastewater Treatment Facility near Portland, innovative technology from Canadian nutrient recovery company Ostara, and the need to counteract overfishing in the coastal waters along Vancouver Island.

Rob Baur, senior operations analyst at Clean Water Services (CWS), the public water resource management utility that operates the Durham facility, explains: "We remove phosphorus biologically because we have strict effluent limits, including the first total maximum daily load (TMDL) for phosphorus on any river in the country. The Ostara process removes phosphorus and ammonia from our dewatering centrate and converts it into struvite pellets, called prills by the fertilizer industry."

The Ostara process removes phosphorus and ammonia from the dewatering centrate and converts it into struvite pellets, called prills by the fertilizer industry.

The British Columbia Ministry of Environment purchases some of the struvite; volunteers bag it and place it in the headwaters of salmon streams where the struvite slowly releases nutrients into the water. The nutrients are critical because overfishing has reduced the population of adult salmon, which normally would swim upstream to spawn and die.

In the natural cycle, their decaying carcasses nourish the larvae and algae required to sustain the new salmon fry. Without the imported nutrients, the fry would struggle to grow strong enough to make it to the ocean and back again. "For 35 years, I've been removing phosphorus and ammonia from wastewater," says Baur. "It's hard to believe that now I'm putting them back into a river."

"For 35 years, I've been removing phosphorus and ammonia from wastewater. It's hard to believe that now I'm putting them back into a river."

ROB BAUR

LOOKING BACK

When the Durham facility was completed in 1976, it used high lime treatment as best available technology to achieve about two parts per million of phosphorus in the effluent, before release to the Tualatin River. In 1993, after the imposition of the phosphorus TMDL, the facility began using alum to remove the phosphorus with lime addition to adjust alkalinity. Durham later transitioned to biological phosphorus removal, dramatically reducing chemical usage and saving ratepayers money.

Today the plant, in Tigard, Ore., is designed for an average flow of 20 mgd (up to 100 mgd during wet weather) and includes a number of innovations besides the struvite process.

A new influent pump station has achieved the first LEED Silver certification for a pump station in the nation from the U.S. Green Building Council. The station has a peak capacity of 180 mgd and has a self-cleaning wet well. Each pump (ITT Water & Wastewater — Flygt) has a 1-ton flywheel to keep the pumps spinning while the check valves close to prevent water hammer.

In the updated headworks, Vulcan 3/8-inch continuously cleaning bar screens remove debris and trash, and the material is sluiced by water to a washer/compactor. A Smith & Loveless PISTA grit removal system follows. Primary tanks are covered, and primary effluent is pumped to the biological system. A surge basin helps the plant deal with wet-weather flows.

FLEXIBLE SYSTEM

In the face of widely varying seasonal flows and seasonal nutrient removal requirements, the biological system is highly flexible. The first two cells are anaerobic. Cells three and four are anoxic, using mixed liquor recycle to denitrify and recover alkalinity and oxygen. Cells five and six are aerobic. The first six cells represent 50 percent of the basin volume.

The second half of the basin is a serpentine plug-flow system that enables cost-effective nitrification during summer. During high flows, the primary effluent is sent to cell three, while cells one and two are 100 percent return activated sludge (RAS) to reduce the solids load on the clarifier. At extreme flows, contact stabilization is accomplished by sending the primary effluent to cell seven so that 50 percent of the aeration basin is RAS. The required weekly median is 0.2 mg/l for ammonia from May to November. (The phosphorus limit is 0.1 mg/l monthly median.)

After the secondary clarifiers, the treated water passes through three tertiary clarifiers where alum is added. Then a series of three chlorination units disinfect the water before it is filtered in a battery of 13 mixed-media units,

followed by dechlorination before discharge. Between 1.5 and 2.0 mgd of purified effluent is recycled for irrigation use on community golf courses, parks, schools and athletic fields.

"It's unusual to disinfect before filtration, but we're set up that way to avoid additional pumping costs," says Nate Cullen, CWS engineering division manager.

Before 1994, biosolids were incinerated, but today the waste activated sludges are thickened in Sharples centrifuges (Alfa Laval) and anaerobically digested, and the digested material is dewatered in Humboldt centrifuges (Andritz). The 23 to 25 percent solids cake is a Class B product.

In winter, the material is trucked to the arid regions of eastern Oregon to support alfalfa crops. In summer, it is spread on farmland in the nearby Willamette Valley. Digester gas generates electricity plus hot water, and both are used within the plant. The plant is in design for a fats, oils and grease (FOG) receiving system and new cogeneration facility.

RECOVERING NUTRIENTS

The centrate from the dewatering step is where things get really interesting. About two years ago, the utility contracted for Ostara's proprietary fluidized bed reactor system to recover phosphorus and ammonia from the dewatered sludge centrate. When magnesium chloride (purchased by Ostara) is added to the mix, the nutrients form struvite, which precipitates out of the system in pure white prills, 1.0 to 3.5 mm in diameter.

Capturing the centrate phosphorus as struvite results in a 20 percent reduction in the phosphorus load to the plant. Operations analyst Mike Mengelkoch, responsible for operating the complex plant, explains, "Removing all that recycled phosphorus is like having an additional aeration basin removing phosphorus."

The prills are stored in a hopper, then bagged in 1-ton sacks. Ostara buys all the product, trucks it away and markets it as Crystal Green slow-release fertilizer. "It is approved by the Department of Agriculture as a commercial fertilizer, but it's an order of magnitude lower in heavy metals than mined phosphorus," says Baur. "It measures 5-28-0-10. That means 5 percent nitrogen, 28 percent phosphorus as P205 (12.6 percent as P), zero potassium, and 10 percent magnesium."

The Durham plant is the first in the nation to successfully employ the Ostara technology. The $2.5 million system produces about 300 tons of Crystal Green fertilizer a year. In addition to the amount sent north to enrich the salmon streams, the product is marketed to landscapers, turf farms and container nurseries.

"The slow release results in deep root development and green, healthy growth," says Baur. "People really like it, especially in sandy soil conditions." Operation of the Ostara system has been fairly simple since startup in May 2009, and the payback has been encouraging.

ABOVE: The Durham plant is the first in the nation to successfully employ the Ostara technology. The $2.5 million system produces about 300 tons of Crystal Green fertilizer a year. RIGHT: Operator Brett Laney loads prills for shipment using the Spiroflow conveyor with Siemens control panel and fabric silo from Contemar Silo Systems.

CONTROLLING QUALITY

"We were the first of the lot, so it was new to everybody," says Baur. "Some bugs popped up, and we had to do some thinking on our feet. We tried two different kinds of knife gates and changed some piping, but once we got to a steady state, things ran smoothly." The system was installed in an existing building.

profile Durham Advanced Wastewater Treatment Facility, Tigard, Ore.

BUILT:	**1976**
AREA SERVED:	**Communities of Beaverton, Tigard, Sherwood, Tualatin, Durham, and King City, and portions of Clackamas County**
POPULATION SERVED:	**250,000**
FLOW:	**20 mgd (average, dry weather)**
TREATMENT LEVEL:	**Tertiary with nutrient recovery**
TREATMENT PROCESS:	**Activated sludge/mixed-media filtration**
RECEIVING WATER:	**Tualatin River**
BIOSOLIDS:	**Anaerobic digestion and centrifuge dewatering; cake to land application**
ANNUAL BUDGET:	**$4.5 million (operations)**
AWARDS:	**U.S. EPA Best Operated Plant, 2005; Pacific Northwest Pollution Control Association Outstanding Reuse Facility, 2006; Lower Columbia Section Plant of the Year, 2004**
WEBSITE:	**www.cleanwaterservices.org**
GPS COORDINATES:	**Latitude: 45°24'4.85"N; Longitude: 122°45'45.29"W**

Durham Advanced Wastewater Treatment Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	SUMMER PERMIT	WINTER PERMIT
BOD	200 mg/l	<2.0 mg/l	5.0 mg/l	10.0 mg/l
TSS	200 mg/l	<2.0 mg/l	5.0 mg/l	10.0 mg/l
Total P	6 to 8 mg/l	<0.1 mg/l	0.1 mg/l	NA
NH3-N	25 mg/l	<0.1 mg/l	0.2 mg/l	NA

TRAINING REGIMEN

Besides conducting onsite training on new processes like the Ostara system, the Durham Advanced Wastewater Treatment Facility management team makes training available to its operating staff in several ways. Operators are encouraged to attend a three-day short course on wastewater treatment at the local Clackamas Community College. They earn CEUs for course completion, and they learn a lot through contact with operators from other plants.

"Quite a few of our own staff make presentations," says Noah Harvey, Clean Water Services operations supervisor. "We support it with a lot of staff, both presenting and attending."

Wednesdays are "overlap days" at the Durham facility. The graveyard staff is held over in the morning for that session with part of the day shift, while the training is repeated in the afternoon so that the swing shift and the rest of day shift operators can attend. One-hour classes are devoted to safety, process training, and other important topics.

The staff also attends the CWS College of Clean Water training courses, and in the past the plant has invited a retired chemistry teacher to teach chemistry to the staff using plant processes as the examples.

"We were the first of the lot, so it was new to everybody. Some bugs popped up, and we had to do some thinking on our feet. We tried two different kinds of knife gates and changed some piping, but once we got to a steady state, things ran smoothly."

ROB BAUR

Ostara controls the recipe via a Web-based system and is responsible for the quality of the end product. The Durham staff handles startup and shutdown, preventive maintenance, repair and cleaning. "We haven't had to add any operators," Cullen notes.

Durham uses Grundfos digital dosing pumps for hypochlorite and caustic and specified them for magnesium chloride in the Ostara system. "The pumps are now part of Ostara's standard design because of their smooth delivery and Profibus control link," says Baur.

A NEXTChem online analyzer measures phosphorus in the Ostara effluent, which is basically centrate. "In spite of all the solids in the sample, the NEXTChem analyzer does not use a filter," says Baur. "The turbid sample, which could not be analyzed colorimetrically, is measured with a titration using a pH electrode.

"The sample is titrated to pH 4 and lanthanum nitrate is added. The lanthanum reacts with the phosphorus to release nitric acid, and the pH drops. The sample is titrated back up to pH 4. The amount of titrant is proportional to the initial phosphorus concentration. The online data is used to monitor reactor operation."

In fact, Baur and Cullen say the only issue with the Ostara process was tying the remote operation of the system into the plant's SCADA network. It was necessary to work around stringent internal security protocols that do not allow Internet access to the plant SCADA system.

Maintenance technician Dennis Wolfe tweaks the Watson-Marlow Bredel hose pumps.

INVENTED HERE

Staff members at the Durham Advanced Wastewater Treatment Facility don't just implement innovative processes — sometimes they invent them. The UFAT (Unified Fermenter and Thickener) process, recipient of a patent from the U.S. Patent Office, is an example.

Senior operations analyst Rob Baur is the inventor. The process consists of two gravity thickeners in series that allow independent fermentation and thickening of primary sludge before it is fed to the plant's anaerobic digester. As a result, volatile fatty acid (VFA) production is increased when stripped out by elutriation. The VFAs improve the phosphorus release by bacteria in the secondary biological processes and are required to make biological phosphorus removal work at Durham.

UFAT saves the Durham plant more than $100,000 a year in chemicals, biosolids processing, transportation, and energy, according to plant estimates. License for use of the process is available for $1 from Clean Water Services, since CWS wants to promote biological phosphorus removal.

Baur says the city of Bozeman, Mont., has taken up the offer and is working on installing the UFAT process at its municipal wastewater treatment plant.

A more recent Baur patent granted to CWS is called WASSTRIP (Waste Activated Sludge Stripping To Remove Internal Phosphorus.) "It was developed and patented by CWS to convert nuisance struvite in digesters to revenue in the Ostara reactors," Baur says.

Waste activated sludge is mixed with VFA from the UFAT fermenter, causing phosphorus and magnesium to be released just as in the anaerobic zone of the biological process. When the WAS is thickened, the phosphorus and magnesium in the digester feed are reduced and moved to the centrate, which is fed to the Ostara reactor, where it makes struvite.

"Every 100 pounds of magnesium diverted from the digester to Ostara represents 1,000 pounds of struvite not forming in the digester," says Baur. "Rather, it's now available to make revenue as struvite captured in the Ostara reactors." WASSTRIP has been licensed to Ostara.

The Durham facility is highly automated, using GE-Intellution iFix software and ChemScan analyzers (ASA Analytics) to measure nitrites, nitrates, ammonia and phosphorus in the secondary effluent. Sixteen critical alarm signals, with voice-over, are annunciated over the facility's radio system.

RETURN ON INVESTMENT

The plant receives revenue from the struvite, and Baur anticipates a seven-year payback on the system. Other benefits are already apparent. The plant is using 40 percent less alum for phosphorus removal, since the Ostara system recovers about 85 percent of the phosphorus in the centrate. Biosolids contain less phosphorus and are easier and less expensive to manage.

Ostara provided 30 days of concentrated training to acquaint staff with the operation of the nutrient recovery system. "They had staff on site, conducting formal training with each of our shifts," Baur says. "They had to make 20 tons of product within the 30-day period for substantial completion of the construction contract.

"Brett Laney, one of our operators, really got involved with it, so we now have him dedicated to the process. He stays in touch with Ostara, giving them feedback and interfacing with them. Brett is also involved with piloting and implementing modifications to the nutrient removal system.

"We used to treat the same phosphorus over and over again due to the heavy recycle load. But not anymore. The system has improved our biological phosphorus removal, it's reduced our operating cost, and it's producing revenue. It's been fun." **tpo**

Rob Baur, senior operations analyst, checks the ChemScan analyzers (ASA Analytics). They measure nitrites, nitrates, ammonia and phosphorus in the secondary effluent. Sixteen critical alarm signals, with voiceover, are annunciated over the facility's radio system.

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ALWAYS LEARNING

JEFF REWERTS JR. TAKES HIS BUSINESS SERIOUSLY, WHETHER CHAIRING HIS STATE ASSOCIATION SECTION OR RIGOROUSLY MAINTAINING AN OLDER WASTEWATER TREATMENT PLANT

By Trude Witham

JEFF REWERTS HASN'T ALWAYS BEEN A WASTEWATER TREATMENT OPERATOR, but when he changed careers six years ago by joining the City of Mason (Mich.) Wastewater Treatment Plant, he set out to learn all he could about wastewater operations.

He immediately joined the Michigan Water Environment Association (MWEA) and obtained his Class D license as soon as possible (Michigan regulations require a year of industry experience before an operator can earn that license).

"I had worked in construction for three years, and then I saw a job listing for wastewater treatment operator in Mason, and I applied for it," he says. "I didn't get the job, but then four or five months later another position opened up, and I got it."

He now holds a Class C license and is chairman of his local MWEA section. In 2010, he won Operations Professional of The Year from that organization for dedication to his employer and the MWEA, professional excellence, consistently generating good-quality effluent, and publicly promoting the profession.

His work with the MWEA includes helping to set up monthly meetings and coordinating all local section events. The section communities meet monthly to network and hear outside speakers, and the section organizes a yearly golf outing and chicken barbecue. Rewerts promotes the profession by letting people know the benefits of the job. The MWEA sends out letters to people who have just earned their first wastewater license, letting them know that the organization is there to help them.

"The MWEA provides great opportunities to learn and to network with your peers," Rewerts says. "I was surprised to get the 2010 award, but I try to do the best I can at everything I do. I don't consider it a job, but a career."

Lab work is part of the regular work regimen for Jeff Rewerts, operator at the Mason treatment plant. (Photography by Dave Trumpie)

That attitude has served him well at the plant, which consistently meets effluent requirements and has earned the Michigan Rural Water Association (MRWA) 2010 Wastewater Utilities of the Year Award. The plant also won the American Public Works Association (APWA) Southwest Michigan Branch Project of the Year: Environment Less Than $2 Million Award in 2009 for reuse of its final effluent.

"Jeff is an excellent operator," says Sam Bibler, superintendent at the Mason plant. "He is willing to do any job that's required and is always looking for a better way of doing things. Being an older plant, we don't have sophisticated equipment like a lot of other plants, but Jeff always steps up."

PART OF THE TEAM

Although Rewerts has been rewarded for his efforts, he credits the entire operations team for the plant's success. "They're a great group of guys, and everyone strives to be the best they can be," he says. "And, teamwork is huge. We all have strengths and weaknesses, and we all help each other."

Besides equipment operation, the plant's four operators do the bulk of the lab work, rotating every fourth week. They test for BOD, pH, phosphorus, ammonia, chlorine, total residual chlorine, TSS, fecal coliform, mixed liquor suspended solids, and return activated sludge total solids/volatile solids. Metals testing is sent to an outside laboratory.

They also maintain the equipment and do all the grounds work on the plant's five acres. Rewerts oversees the lab operations and helps train new

Jeff Rewerts gives back to the industry through extensive involvement with the Michigan Water Environment Association.

"The MWEA provides great opportunities to learn and to network with your peers. I was surprised to get the 2010 award, but I try to do the best I can at everything I do. I don't consider it a job, but a career."

JEFF REWERTS

profile

Jeff Rewerts Jr., Mason (Mich.) Wastewater Treatment Plant

POSITION:	**Operator**
EXPERIENCE:	**6 years**
RESPONSIBILITIES:	**Plant operations, oversees the lab**
CERTIFICATION:	**Michigan Class C, wastewater treatment**
MEMBERSHIPS:	**Water Environment Federation, Michigan Water Environment Association**
GOALS:	**Earn Class B and Class A certification, earn drinking water certification, attain supervisory position**
GPS COORDINATES:	**Latitude: 42°35'14.06"N; Longitude: 84°26'37.79"W**

The Mason Wastewater Treatment Plant team includes, from left, operator Jeff Rewerts, plant superintendent Sam Bibler, Department of Public Works superintendent Martin Colburn, and operators Dave Fuller, Mike Prater, and Paul Rupright.

KEEPING IT RUNNING

On a given day, operators at the Mason Wastewater Treatment Plant may spend 10 to 15 minutes twice a day, depending on flows, manually cleaning the steel grate on the bar screen with a pitchfork. Or they may replace pump seals, grease valves or change filters. Sometimes they manually clean the rags and hairballs out of the digester piping.

"Most of the equipment at the Mason plant dates to 1957, including the blowers, sewage pumps and main pumps," says operator Jeff Rewerts. "It takes constant maintenance to keep things operating properly." The operators do 90 percent of equipment maintenance themselves.

"My operators' greatest challenge is operating and maintaining an older system," says Sam Bibler, plant superintendent. "But even with the older equipment, we get good-quality effluent, and that's because of our excellent preventive maintenance program."

Bibler estimates that operators spend 10 to 20 hours a week on routine maintenance. They grease the equipment and take pump pressure readings every week, and exercise all the valves once a month.

"Our bar screen is wider than most plants have," says Bibler, "and sometimes material gets in there and builds up, and we have to physically take the pipe or pump apart and clean it out. This happens maybe four or five times a year."

Rewerts would like to see equipment upgrades in the future: "I would love to get new headworks equipment, as that would make our job easier."

operators. "When we get a new employee," says Bibler, "Jeff will work with him in the lab. Because that person will be part of the rotation and will be working a solo shift, he needs to know everything that happens in the plant. He won't be trained by just one person, but by me, Jeff, and Dave Fuller who has been here 21 years."

For much of his success, Rewerts credits his former supervisor Jim King, who hired him and trained him on the outdoor equipment and in the lab, and Bibler, his current supervisor.

"I learned a ton from Jim," Rewerts says. "He had 30-plus years in the business, and although he's retired now, he is still a big part of MWEA. Sam, who I've worked for during the past five years, has a huge wealth of knowledge."

HANDS-ON PLANT

The 1.5 mgd City of Mason treatment facility is a conventional activated sludge plant using fine-bubble aeration and tertiary treatment. Built in 1957, it was upgraded in 1975 with sand filters and new pumps and compressors. A new junction box for the return and waste activated sludge was installed in 2010.

In the secondary treatment system, return activated sludge is removed by hydraulic pressure from the clarifiers to an airlift center, where Dresser Roots blowers lift it to the aeration tanks. A Dayton grinder pump (Grainger) with Allen-Bradley flow controller (Rockwell Automation) allows the plant to waste over a 24-hour period.

Two variable-speed Crane Deming pumps transfer the wastewater to four tertiary sand filters, which have two backwash pumps and two backwash return pumps (also Crane Deming). The three tertiary pumps are controlled with a Square D Class 6520 thyristor pump controller (Schneider Electric).

The wastewater is disinfected with chlorine gas, then treated with sodium metabisulfite for dechlorination.

The plant reclaims a portion of the effluent as a chemical carrier water for ferric, polymer and chlorine feed. After installing a submersible pump to reclaim effluent to a pressure tank, the town of Mason is saving an average of 212,000 gallons of potable water a month. Effluent that is not reclaimed is discharged to Sycamore Creek. Biosolids are anaerobically digested and land-applied.

An operator is on call around the clock, and an automatic dialer alerts that operator to any problems. There is no SCADA system. The lab technician takes dissolved oxygen and settleometer readings in the morning, and the operators walk through the plant in the afternoon to check on the equipment and take activated sludge readings.

Rewerts sees both disadvantages and advantages to working at an older plant. "There are some wastewater processes that we don't have that other plants have that I would like to learn about. And we have to be diligent about

Jeff Rewerts greases one of the plant's Dresser Roots blowers.

maintenance. This is a very hands-on plant, but that's great for learning. For example, Dave Fuller, who has been here for 21 years, trained me on how to repair and rebuild pumps, and that is a very good skill to have."

FUTURE GOALS

Rewerts says his greatest achievement has been getting his Class C license and with it extensive knowledge of the business. This year, he hopes to obtain his Class B license. "The state requires that whoever signs the monthly operating reports must have a Class B, since we are a Class B plant," he says. "My supervisor signs the reports now, since he has his Class A, and eventually I would like to obtain mine, too, so I can expand my knowledge and skills."

He foresees that the Mason plant will have to undergo a major upgrade at some point. "Mason is a growing community," he says. "Our plant is designed for 1.5 mgd, but we're averaging 1.0 to 1.2 mgd now."

His plans include continuing his involvement with MWEA and WEF, and perhaps becoming a supervisor someday. For now, he is content. "I love this job," he says. "It's kind of out of the public eye, but it's a very huge part of public health.

"I'm always learning something new, and I really like that — it's never boring, never dull." His advice to operators just starting out: "If you're a new guy coming in, listen to the guys who have done it. Never try to think you know everything, because you're going to learn something every single day." **tpo**

"I love this job. It's kind of out of the public eye, but it's a very huge part of public health. I'm always learning something new, and I really like that — it's never boring, never dull."

JEFF REWERTS

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Outside the Box

AN AWARD-WINNING RECYCLING PLANT RELIES ON THE INGENUITY OF ITS OPERATORS TO PROVIDE EXCELLENT-QUALITY WATER FOR ITS COMMUNITY WHILE HOLDING DOWN COSTS

By Trude Witham

THE PADRE DAM MUNICIPAL WATER DISTRICT HAS been treating and recycling wastewater since the early 1960s — long before sustainability was a common buzzword.

"We were the first plant in the world to treat and recycle," says Gary Canfield, plant manager at the facility in Santee, Calif., near San Diego. "The facility was built to decrease the district's reliance on imported water from the Colorado River and delta."

Today, the Padre Dam water plant has five operators who make sure it consistently meets California Title 22 reuse requirements. They also use their skills to save the plant money.

Their work has led to many awards over the years, including the 2010 Plant of the Year Award from the San Diego Section of the California Water Environment Association. The CWEA also recognized three of the operators for innovations that are saving Padre Dam ratepayers tens of thousands of dollars a year.

RECYCLING FOR RECREATION

The Padre Dam facility receives 5.2 mgd from Santee, El Cajon and Lakeside. Sixty percent of that waste is diverted to the City of San Diego Metropolitan Wastewater Department system for treatment at the Point Loma Wastewater Treatment Plant and offshore discharge into the Pacific Ocean.

The other 40 percent (2 mgd) is treated at the recycling plant and distributed to customers for irrigation and commercial reuse, and to maintain the Santee Lakes Recreation Preserve's seven man-made lakes.

Each day, one million gallons of dechlorinated water flows from the recycling facility into the lakes to offset evaporation. The remaining one million gallons is distributed to 217 customers to help pay for treatment costs and reduce demand for imported water by 12 percent. The recycled water is used for parks, athletic fields, golf courses, public and commercial landscapes, ornamental water features, freeways, medians, construction and industrial purposes.

"The lakes have become internationally famous, as they were the world's first example of how a community's wastewater can be reclaimed and reused by people, with full public acceptance," wrote Leonard A. Stevens in his book, *The Town that Launders its Water.*

The Padre Dam Water Recycling Facility. (Photography by Jon Tiffin)

profile

Padre Dam Water Recycling Facility, Santee, Calif.

BUILT:	1962
SERVICE AREA:	Santee, El Cajon, Lakeside
EMPLOYEES:	9
FLOWS:	2.0 mgd design, 1.9 mgd average
TREATMENT LEVEL:	Advanced tertiary
TREATMENT PROCESS:	Five-stage Bardenpho, deep-bed sand filtration
RECEIVING WATER:	Excess recycled water discharged to Santee Lakes
WEBSITE:	www.padredam.org
GPS COORDINATES:	Latitude: 32°53'5.63"N; Longitude: 116°59'46.12"W

The Padre Dam Municipal Water District team includes, from left, operations supervisor Robert Northcote, lab technician Phillip Stevens, plant manager Gary Canfield, operator 3 Ryon Dawson, and operator 3 Travis Tomlin.

Canfield observes, "The water that goes to the lakes is clean enough to allow public access." The Santee Lakes Preserve sees more than 600,000 visitors a year for boating and fishing, camping, picnicking, fitness and special events on the lakes and 190 surrounding acres. Funded by camping and user fees, the preserve is hailed as a model for how communities might use recycled water to provide tax-free parks and recreation.

When rainfall is sufficient to reduce the need for irrigation, the excess recycled water is dechlorinated and discharged through the Santee Lakes into the San Diego River.

TREATMENT PROCESS

The influent flows to two rectangular primary clarifiers, a five-stage Bardenpho biological nutrient removal process designed by Dr. James Barnard, and two rectangular secondary clarifiers. From there, the water goes to two flocculation and sedimentation basins, four deep-bed sand filters (Tetra Tech) for denitrification, and finally to a chlorine contact basin for disinfection.

> "I think the tours are a great thing, because they help people accept and support recycling."
>
> **GARY CANFIELD**

The original 1.0 mgd plant was built in 1959 at the south end of the property to meet local development needs without paying to transport wastewater to the San Diego metropolitan water system. The lakes were built one by one to use as oxidation ponds. Percolation beds were built with an underdrain system to collect the processed water to feed the lakes.

WINNING ACCOLADES

The Padre Dam Water Recycling Facility has earned multiple recognitions over the past 33 years, including:

- 2010: CWEA San Diego (Region 9) Plant of the Year
- 2010: CWEA Operator Innovation: Donald Denniston, Ryan Hughes, Robert Northcote
- 2005: CWEA California Plant of the Year
- 2005: State of California Small Plant of the Year
- 1977, 1978, 1981, 2000, 2003, 2005, 2007: CWEA San Diego Plant of the Year

The recent CWEA Plant of the Year Award was based on 16 performance criteria, including regulatory compliance, process controls, maintenance levels, innovation, operating efficiency, and employee training and safety.

"The CWEA takes into account every aspect of the plant, including how the plant is operated, and how well kept it is," says plant manager Gary Canfield. "The guys really do a good job in making sure the equipment is working properly and that it is painted. We give a lot of plant tours, and you can't give those unless the plant looks good."

The plant has had no compliance violations, and in fact is doing better than the Title 22 standards for recycled water. Operating and maintaining the system is no small task, as it includes 32 miles of recycled water mains, a 1.5-million-gallon reservoir tank, and 10 acres of property. The staff accomplishes it all with hard work, sharing of ideas, resourcefulness and ingenuity.

"It's OK to use manuals from your designers, but every plant has its own personality. A biological system is a living thing, and you need to be intimately involved in how it responds to adjustments."

GARY CANFIELD

In 1968, the plant was moved three miles north to its current location, and three oxidation ponds were added with a total capacity of 40 million gallons for the secondary treatment process. Eleven percolation ponds were added for the effluent.

The water passed through percolation ponds and then was captured from underdrains, chlorinated, dechlorinated, and discharged to the lakes. The plant was upgraded again in 1997 to treat 2 mgd using the Bardenpho process. The recycling facility no longer needs the oxidation and percolation ponds.

Treating wastewater to the tertiary level takes about 24 hours. Computers monitor and control the treatment process, flow levels and water quality, and log the data. The operators analyze the data and make daily adjustments to ensure that everything is working properly. "We are not only meeting the Title 22 standards, but are regularly outperforming them," says Canfield.

A WINNING TEAM

The Padre Dam plant has a staff of nine. Besides Canfield, there are five operators (Robert Northcote, Donald Denniston, Ryan Hughes, Ryon Dawson and Travis Tomlin) and three laboratory technicians (Debbie Schultz, Phillip Stevens and Jessica Bertasso).

Canfield, Northcote and Denniston are Grade 5 operators, Dawson and Tomlin are Grade 3, and Hughes is Grade 2, working on Grade 3. The lab technicians handle testing for the water recycling plant and the potable water system. For the recycling plant, they test for BOD, COD, TSS, volatile suspended solids (VSS), pH, conductivity, nitrates, nitrites, ammonia, phosphorous, bacteria and chlorine residual. Contract labs perform tests for metals, grease and oil, asbestos, cyanide, methyl tertiary butyl ether (MTBE) and trihalomethanes.

The operators do all the maintenance and share their skills. They have learned how to use the tools in the shop and can all step in and do repairs. Training is important, and Canfield encourages his staff to pursue professional development. He also recommends that each operator attain Grade 3 certification.

Employees attend classes at Cuyamaca College in nearby Rancho San Diego, which has a wastewater treatment plant operator certification program. They also take one- and two-day seminars offered by the CWEA and many companies. Operators are required to complete as many as three Web-based training programs a month, and they also take part in hands-on Level A safety training, conducted by outside consultants.

Besides the day-to-day plant operation, the staff members give tours of the facility. In 2010, they gave 25 tours for about 450 people, including a two-day tour for 50 engineers and plant operators from Mexico. "Rob Northcote is in charge of that, and we have elementary school kids, college students, park visitors," says Canfield. "I think the tours are a great thing, because they help people accept and support recycling."

The plant's greatest challenge is operating the system at 100 percent performance, 100 percent of the time. "It's our goal, but we run into problems, since rain can affect the biological process," Canfield says. "We had a lot of rain in January and February this year, and when the rainwater gets into the system, the microbes don't like that."

To offset biological system upsets, they use chemical treatment (aluminum sulfate and methanol). "The challenge is to keep water quality at a high level all the time while keeping costs as low as possible," Canfield says.

OPERATOR INGENUITY

Three of the plant's operators won the 2010 CWEA award for innovation. Operations supervisor Northcote and operator Hughes won the Gimmicks

Lab technician Phillip Stevens checks water samples.

TOP QUALITY

The Padre Dam plant's recycled water meets Title 22 Standards (California Code of Regulations, Title 22, Division 4, Chapter 3), which means it is approved for nonrestricted recreational use, including swimming and waterskiing. The chart compares the quality of the plant's recycled water to state and federal drinking water standards.

Primary Standards (Mandatory Health Standards)	State or Federal Drinking Water Standard	Padre Dam Recycled Water Quality
Clarity	0.3 NTU	0.8 NTU
Total coliform	5.0%	ND*
Barium	1,000 ppb	.05 ppb
Copper	1.3 ppm	0.004 ppm
Fluoride	0.7-1.3 ppm	0.2 ppm
Nitrate	10 ppm	5.8 ppm
Uranium	20 pCi/l	ND*
Chlorine	4.0 ppm	5.0 ppm

**Not Detected*

and Gadgets Award for a screening system they designed, fabricated and installed using spare parts like motors, gears and piping.

"During the plant upgrade in 1997, we decided to continue operating without a screen, since we were able to operate so many years without it," says Canfield. "We annually took the plant offline and manually removed the rags from the tanks, pumps and piping." The screening system Northcote and Hughes built is an 18-inch-wide rubber belt with quarter-inch holes spaced one inch apart.

The belt is driven around two 6-inch pipes spaced eight feet apart. That allows the belt to travel through the flow stream, pulling out rags and larger material. The screenings are sent to a waste pipe and returned to the main sewer system, which carries the material on to San Diego's Point Loma plant. The system cost $3,500, versus $60,000 for a commercial system, not including installation.

"The main cost was for the belt and a concrete structure that needed to be cleaned, rebuilt and epoxy-coated before putting the system together," says Canfield. "The rest of the equipment was pretty much on hand at no cost."

Northcote recalls, "It took us a month or so to complete, and the longest

Grade 3 operator Travis Tomlin makes modifications to a clarifier.

time was waiting for the concrete to be coated by an outside company." Says Hughes, "We enjoy doing these types of projects, and we like to do them at the lowest possible cost."

NITRATE ANALYZER

Operator Denniston won the CWEA Peter B. Fiedler Award for creating a portable nitrate analyzer that lets plant operators monitor nitrate levels and maximize nitrogen removal anywhere in the treatment process.

Canfield explains, "Don used an existing analyzer that was permanently mounted on one of our tanks. He wired a transmitter into the analyzer and then found a location in the treatment plant where a receiver could be mounted and connected to our SCADA system. He also had to build a clamping system that allowed the unit to be moved from tank to tank."

The analyzer cost $2,600, most of which was for the transmitter and receiver, versus $45,000 for a commercial system. It took Denniston a few weeks to acquire the equipment and a week or so to put it together, between his normal daily tasks. "I was given the task of making this portable analyzer, and I enjoyed the reward of creating it. It's unique to our treatment plant," says Denniston.

Canfield adds, "Our operators are always thinking outside the box in trying to optimize plant operation. Rob, for example, is very good at building something out of nothing, and he enjoys doing it. He has trained the rest of the staff on how to fabricate."

Canfield stresses that the plant is successful not only because of innovation, but because the staff enjoys their work. "Our weekly pizza parties help with that," he says.

THE FUTURE

The Padre Dam plant is conducting a feasibility study on expanding to 4.4 mgd to keep up with the community's demands for recycled water. At some point, the staff would like to expand the facility to 10 mgd to provide recycled water treated to an advanced level for two groundwater recharge projects.

Gary Canfield, plant manager.

In the meantime, Canfield and his crew will keep striving for excellence. His advice for other operators is to think outside the box. "It's OK to use manuals from your designers, but every plant has its own personality," he says. "A biological system is a living thing, and you need to be intimately involved in how it responds to adjustments."

Many years of wastewater experience have helped the Padre Dam team. Canfield has 29 years, Denniston 27 and Northcote 14. "Most of us have grown up here," says Canfield. "We know when our bugs aren't happy, and we respond!" **tpo**

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WEST LAFAYETTE AND PURDUE UNIVERSITY COLLABORATE ON A PROGRAM TO FEED DIGESTERS WITH CAFETERIA SCRAPS, BOOST METHANE PRODUCTION AND SAVE MONEY

By Doug Day

Many wastewater treatment plants use biogas for energy. Most haven't won EPA awards for their work. And it's a good bet to say most aren't dumping 20 tons of food waste into their digesters every month. Both can be said of the West Lafayette (Ind.) Wastewater Treatment Plant.

"The main project was to rehabilitate our aging digesters, to use biogas and two microturbines to produce electricity, and to use the waste heat for the anaerobic digesters," says utility director Dave Henderson.

In 2007, the $8.4 million project won an EPA PISCES award for protection of environmental health and water quality. It was the only PISCES award in Indiana and one of just 29 in the country that year. The project included a FOG receiving station to supplement biogas production for the 9 mgd conventional activated sludge facility.

The FOG station would later turn out to be the key to helping Purdue University save money and reduce landfilling while providing the plant with a new source of energy.

IN WITH LEFTOVERS

"I read an article in Purdue's Exponent student newspaper that said the food courts were sending 20 tons a month to the landfill," recalls Henderson. "Someone was wishing there were some other way to deal with the food waste."

Henderson figured his treatment plant, right across the street from the campus, could make that dream come true. He made a few phone calls and then toured the Purdue facilities to learn about their process. After looking at 35-gallon totes filled with ground-up food waste collected at the five dining courts on campus, he told the Purdue staff, "It looks like baby food for the digesters."

There were two weeks left in the spring 2009 semester, so Henderson and the university decided to give it a try. "We fed the food waste into the same tank we use for FOG," says Henderson. "We just opened an access hatch and dumped in the totes and it worked pretty well."

After a full year, hauling leftovers across the street instead of miles to the landfill saved money for Purdue, not to mention the environmental benefits of recycling the waste. And it gave the plant an additional source of biogas at minimal cost — just the purchase of a lifting cart for the portable totes.

BRANCHING OUT

Purdue's food grinder could only handle food and paper napkins

PHOTOS COURTESY OF WEST LAFAYETTE WASTEWATER TREATMENT PLANT

A 35-gallon tote of food waste from Purdue University is dumped into the digester by operator David McKinley at the West Lafayette Wastewater Treatment Plant. The lifting cart was the only expense involved in creating a renewable energy source from what used to be garbage.

Purdue University sends up to 20 tons of food waste a month across the street to the West Lafayette Wastewater Treatment Plant, saving itself money in disposal costs and increasing biogas production at the plant.

What's Your Story?

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

that used to go from plates to the garbage. Using that in the digesters worked so well that in fall 2010 Henderson bought a $50,000 food grinder so the plant could also process kitchen waste from producing meals, such as banana peels and food trimmings. That could double or triple the amount of food waste going to the digesters.

The program has created a buzz in the community, and there may be more food waste on the way to the digesters. "It has struck a chord," Henderson says. "Now I'm talking with some students at West Lafayette High School about doing a pilot project with their ecology club. I've had a couple of hotels contact us."

Glycerin, a byproduct from biodiesel production, has also been brought in by a local business that makes the fuel for its trucks. "We're just looking at what sorts of high-strength waste we can identify and try out in the digesters," Henderson says.

His advice for others is to go slowly. "It makes sense to start small and work with places with large concentrations of people where it can be done easily," he says. It also requires a level of oversight. A few knives and forks mixed with the food and grease trap waste have not been good for the digesters' pumps.

"We make sure there's always an operator present when they're offloading FOG or food waste," Henderson says. "We also have to keep a close eye on the digesters and the way they respond to the different feedstock we're putting in."

"We make sure there's always an operator present when they're offloading FOG or food waste. We also have to keep a close eye on the digesters and the way they respond to the different feedstock we're putting in."

DAVE HENDERSON

CREATING POWER

The original biogas project, designed by Kennedy/Jenks Consultants, replaced two 50-year-old anaerobic digesters and added a Unison Solutions cogeneration system with two Capstone microturbines to burn the methane. Waste heat from the microturbines heats the digester, replacing a natural gas boiler. Henderson says the normal digestion process produces around 37 cubic feet of biogas per minute. Adding FOG doubles that, and food waste may add another 10 percent if the plant can maximize that source with its new food grinder.

In 2010, the treatment plant generated 15 percent of its electricity — 728,000 kWh — for a savings of $50,000 over the local utility price. Using the waste heat from the microturbines has reduced natural gas use by 40 percent, saving $50,000 more. That adds up to a savings of about 2 percent of the plant's total operating budget. FOG has also created a new revenue stream through tipping fees charged to grease haulers.

Henderson and the plant staff are looking at other ways to cut the plant's energy use. The addition of inline dissolved oxygen monitors in the aeration tanks has helped reduce blower use. Operators use the data to decide when they can manually turn off one of the blowers. "We're looking at replacing a centrifugal blower with a turbo blower and controlling it with the inline DO meters," Henderson says.

Electric vehicles may also be in store for the treatment plant and other city departments. To prepare for that, a few charging stations were installed during the construction work on the digesters. "Things have changed on us very quickly in the last few years," says Henderson. "It all adds up, and in this day and age, any place you can find a little bit to save is good." **tpo**

PHOTO COURTESY OF VILLAGE OF LYONS WASTEWATER TREATMENT PLANT

Constructed of multilayer pregrown modules, the 1,000 square-foot green roof reduces stormwater runoff by capturing up to 30,000 gallons per year and recycling it through a 2,500-gallon buried holding tank.

Catching the Rain

A GREEN ROOF IS JUST PART OF SUBSTANTIAL EFFICIENCY AND SUSTAINABILITY AT THE VILLAGE OF LYONS TREATMENT PLANT

By Jeff Smith

A Green Improvement project at the wastewater treatment plant in the Village of Lyons, N.Y. (population 4,000), shows you don't have to be big to do big things. The installation of a green roof on the plant's solids building, combined with other energy-savings upgrades, will save the plant about 15 percent in future energy costs.

"Although it can't be seen from ground level, the rainwater impact of the green roof adds to the overall operations and maintenance savings of the plant," says Mark Chadwick, foreman of the contact stabilization/aerated activated sludge plant (0.75 mgd design flow, 0.35 mgd average).

LESS RUNOFF

Constructed of multilayer pregrown modules, the 1,000-square-foot green roof reduces stormwater runoff by capturing up to 30,000 gallons per year and recycling it through a 2,500-gallon buried holding tank. From there, the runoff is used for irrigation, cleaning equipment, and other nonpotable purposes.

> "Although it can't be seen from ground level, the rainwater impact of the green roof adds to the overall efficiency of the plant."
>
> **MARK CHADWICK**

Each 3- by 6-foot premanufactured module contains self-sustaining layers of soil and attractive plants and grasses. The roof requires no maintenance or mowing. In addition to harvesting rainwater, the greenery also lightens heating and cooling demand, while protecting and extending the life of the roof's waterproofing membrane.

The $607,000 improvement project was made possible through a 90 percent grant from the New York Environmental Facilities Corporation Green Innovative Grant Program, says village mayor Corrine Kleisle. In-kind services, such as excavation and grading, were provided by village employees. "We are very fortunate to have such an outstanding crew in our Department of Public Works," she says.

BLOWER CONTROL

Other elements of the project will contribute significantly to energy savings, says Chadwick. Original plans called for retrofitting two 40 hp and one 50 hp aerator blowers with variable-speed drives controlled through dissolved oxygen sensors. This approach will enable airflow based on demand. At present, at least two blowers run constantly at full capacity regardless of dissolved oxygen content in the aeration basins.

The village is also considering installing a 50 hp turbo blower to handle the entire load for even greater efficiency, says Chadwick. The two 40 hp centrifugal blowers would be kept for backup. Either upgrade would be the project's largest contributor to energy savings.

To achieve further savings, the village replaced incandescent light bulbs with LED fixtures in the main control building, and installed motion sensors now control the lighting. Exterior lights were fitted with sensors to provide dusk to dawn lighting.

LOOKING TO THE SUN

Another big contribution to energy savings comes from solar panels. The 40 kW array of photovoltaic panels is the most obvious change to the plant's appearance: It can be seen from the roadway in front of the plant. The panels are expected to reduce treatment electric utility demand by 8 percent and save the village about $5,000 a year.

Three years ago, village officials surveyed all the municipal buildings in search of upgrades that would provide sustainable benefits, and they chose the wastewater treatment plant. "This was an excellent project, but it's too soon to determine exactly the overall efficiencies we will gain," Kleisle says. "That will take a few years." **tpo**

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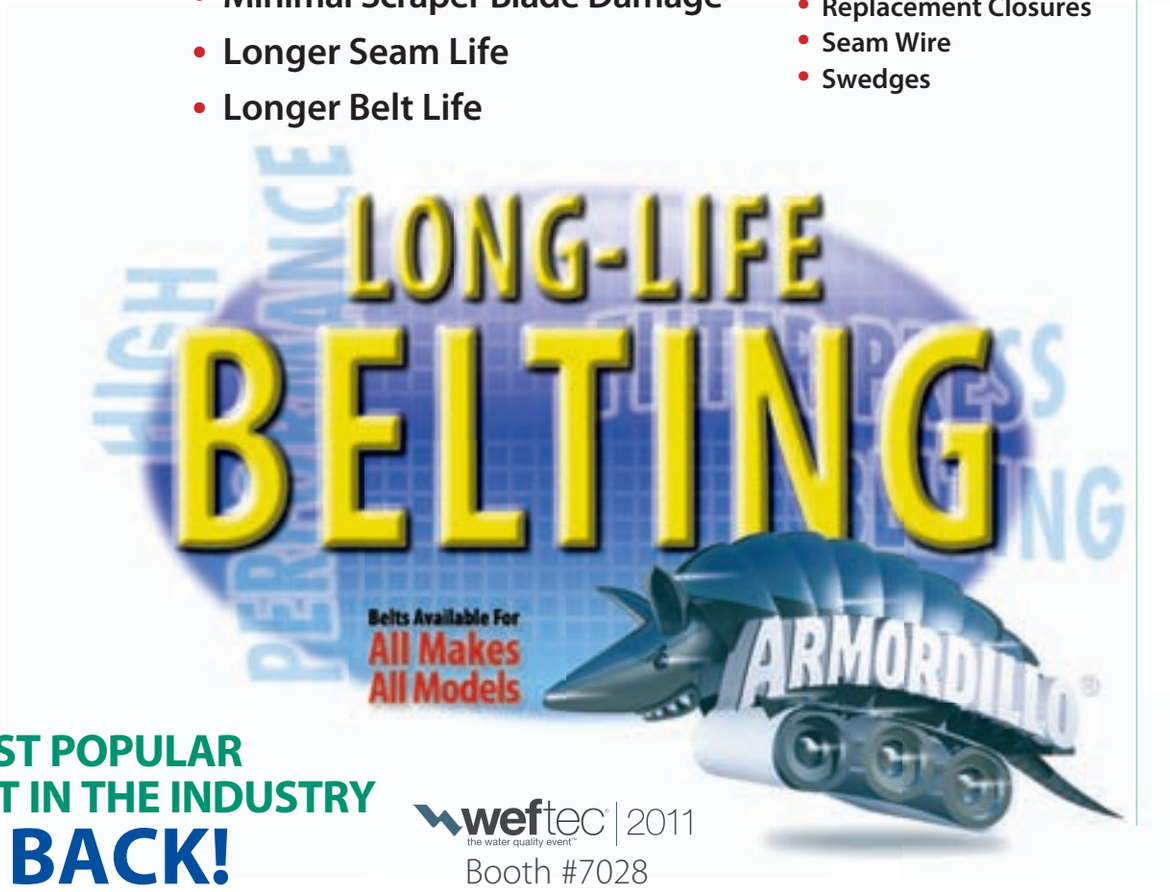

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 By Scottie Dayton

Rapid application development

Problem

Managing data at the 1.8 mgd Plover (Wis.) Wastewater Treatment Facility involved entering information into multiple files in different formats. Transcribing and compiling reports was time consuming, and the village could not employ a system analyst and database developer. Plant superintendent Rich Boden decided to develop his own system and searched for rapid application development tools.

Solution

Boden selected **MaintenanceVIEW and ReportVIEW software from IntelliSys Information Systems.** He configured real-time data collection, report templates, laboratory quality control, energy management, maintenance, and regulatory reporting.

Every hour, the program collects and imports statistically reduced data for processes, maintenance, energy management and pump stations from SCADA and stores it in central SQL databases. The information provides an engineering database with peak hourly data and operational reporting. The maintenance staff use it for predictive maintenance reports and forensic analysis.

The software also collects information from laboratory instruments. Electronic bench sheets allow the laboratory technicians to calculate results and perform quality-control functions, then save them to the database. Other data such as trucked waste receiving and industrial wastewater discharger data is managed in the same database.

RESULT

Boden handles all data management needs in the SQL database while minimizing software, development, and training costs. **800/347-9977; www.intellisys-is.com.**

Highest motor potential

Problem

A lift station for the Sheboygan (Wis.) Regional Wastewater Treatment Facility had three 75 hp motors drawing 96 amps at full load, and protected by bimetallic overload relays. The plant's SCADA system monitored the flowmeters, but technicians went down 30 feet to check the pumps and motors. Superintendent Dale Doerr turned to **Eaton Corp.** for a better, safer way to monitor them.

Solution

The plant retrofitted the motor disconnect panels with **Motor Insight** overload relays, remote displays, and Modbus communication modules. "I was impressed by how easy it was to learn and program," says controls engineer Steve Meifert. "I snapped in the modules, wired them up, and they were talking with our SCADA system."

The door-mounted LED display puts diagnostic and fault codes, submenus, and cryptic descriptions at the technician's fingertips, while the door protects him from line voltage. The type 1, 12 and 3R remote display uses the same interface as the base unit. The programmable relay allows independent actuation for differing fault types to weigh their importance. A low-power feature protects pumps against starved or dead-headed conditions.

RESULT

Soon after installing the devices, the maintenance supervisor noticed that two pumps were drawing 50 kW, but the third was closer to 75 kW. The responding technician found a rag wrapped around the impeller. If left undetected, the extra power draw would equate to an additional $10,900 in annual energy costs, assuming a 50 percent duty cycle.

"We now have the ability to find and resolve a situation before it becomes a failure, potentially saving us thousands of dollars annually," says Meifert. **877/386-2273; www.eaton.com.**

Septage receiving station tracking

Problem

The Anchorage Water and Wastewater Utility had no record of what haulers discharged at two septage receiving stations, both 25 miles from the facility. "We only had a gate access system with no backup capabilities," says John McAleenan Jr., customer service division manager. "We needed a reliable, automated solution."

Solution

The utility purchased the **PortALogic on-site hauler access station with integrated software from EleMech.** The automated system provides secure hauler access via a swipe card or PIN. Hauler data, stored in a secure database, includes site and truck IDs, receipt number, date and time, waste type, load volume, sample pH and alarms.

The utility can view the data in real time, edit and sort it, or create custom reports. The system also enables the facility to set waste type rates, create billing statements, and manage haulers with debit- or credit-based accounts.

RESULT

"Using volumetric data to charge haulers was only a dream several years ago," says McAleenan. "PortALogic made it a reality." **630/499-7080; www.portalogic.info.**

Collection system monitoring

Problem

Engineers at the City of South Bend, Ind., needed a way to use data from storm events to characterize a 20-square-mile combined sewer system and identify the inefficiencies.

Solution

The city chose the **EmNet suite of analysis tools** to monitor 36 outfalls, 17 locations on the single interceptor line, 42 locations on the trunk line, and five retention basins. The technology integrates level, flow, precipitation, and water quality information with the collection system. The tools work with monitoring tools such as LogiCover and RainBox. Playback and real-time modes allow users to easily identify developing hydraulic issues and compare past events. They can use Profiler for pre- and post-verification, operations and maintenance, and design.

RESULT

The city's dry weather overflows dropped by 65 percent, enabling maintenance crews to quadruple the number of annual sewer inspections and clean problem areas once per week, providing benefits of more than $200,000 per year. Real-time monitoring identified inadequacies in the collection system and reduced the need for additional infrastructure from $500 to $120 million. **574/855-1012; www.heliosware.com.**

Alarm detection and notification

Problem

The 24,000-foot-long concrete and cast-iron Lake Oswego (Ore.) interceptor sewer had insufficient capacity to handle development and peak wet-weather flows, resulting in surcharged manholes. Part of the gravity-flow system traverses the 405-acre Oswego Lake.

The 9,700-foot-long buoyant middle section floats 14 to 21 feet below the surface. On either end are 5,200 feet of submerged pile-supported pipe. The city needed a reliable bypass system while replacing and upsizing the interceptor with another in-lake gravity-flow system.

Solution

A pump manufacturing company rented portable bypass pumps to the project. To avoid an ecological nightmare in case the system should fail, the pumps arrived with **AlarmAgent.com units from RACO Mfg. and Engineering Co. Wireless.** Web-enabled remote thermal units continuously monitor and collect data from equipment for viewing on a simple dashboard screen.

The notification system accommodates cell or landline phones, text messages, emails and pagers. Users can assign alarms to specific groups, making sure the proper team responds. The information is easy to set up, manage and use. With it, project managers need only one person on site instead of 14.

RESULT

The system enabled the contractor to avoid potential backups and complete the project on time. **800/722-6999; www.racoman.com.**

New monitoring system

Problem

The Natick (Mass.) Water and Sewer Division had to replace an aging monitoring and control infrastructure, which was difficult to use and maintain. Operators wanted a SCADA system that communicated with the programmable logic controllers (PLCs) and remote telemetry units (RTUs) already monitoring the reservoirs, sewer lift stations, and water treatment plants. They also wanted simple built-in tools to help them better use historical data.

Solution

The town's engineering consultants, Haley and Ward, invited Ian Technology Solutions in Hampstead, N.H., to develop a new system using **VTScada software from Trihedral.** Ian engineers duplicated the functionality of the existing system, and the integrator added new sites, replaced older RTUs, and updated plant functionality. Operators ran both systems side by side for several months to test the new application before shutting down the old one.

RESULT

The system is easier to use with more features for trending, reporting and viewing alarm history. Operators can construct trends based on specific sets of values and save them. "Trending screens allow us to quickly access enormous amounts of information for troubleshooting system failures and reducing costly repairs," says treatment plant/GIS supervisor Anthony Comeau. "It's been a good investment for us." **800/463-2783; www.trihedral.com.** tpo

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Locations of the weather station and eNoses that are parts of the OdoWatch monitoring system are shown on an aerial photo of the Hampton Roads Sanitation District treatment plant.

A Case for Transparency

THE LATEST MONITORING TECHNOLOGY HELPS THE HAMPTON ROADS SANITATION DISTRICT TAKE SUBJECTIVITY OUT OF THE EQUATION WHEN ASSESSING ODOR ISSUES

By Mark Feltner

The concept of transparency today reminds us that government is always accountable to the people. A brief Internet search reveals a rapid trend toward making government data available and user-friendly for private citizens.

Transparency is often associated with financial accountability (think Sarbanes-Oxley Act of 2002). Moving forward, though, transparency has become much broader. In the case of publicly owned wastewater treatment plants, transparency extends to all of our operations.

How does that relate to odor management? In many metropolitan areas, neighborhoods are being built closer and closer to treatment plants. Over the last 20 years, this is especially true for plants built near coastal waters and rivers to minimize the distance for discharge. These plants now sit on prime real estate.

With treatment plants and residential neighborhoods close together, odor management becomes very important. The perception of odor can vary greatly from one person to another — what one person considers unpleasant or a nuisance might not bother or even be detected by someone else. This can lead to disagreements and undermine trust.

The Hampton Roads district manages odors at its treatment plants with help from OdoWatch technology from Kruger Inc.

Providing transparency in odor management means having the tools for the job and being able to take subjectivity out of the equation as much as possible. The Hampton Roads (Va.) Sanitation District is doing that by installing the OdoWatch odor monitoring system, supplied by Kruger Inc., a Veolia Water Solutions & Technologies company.

MAKING IT MEASURABLE

A key to monitoring and managing odors is to use standardized units of measure so that odors can be viewed objectively. This means developing "odor units" or "dilutions-to-threshold" for the known sources of odor at a wastewater treatment plant.

That in turn requires robust sampling of odor sources. The samples then must be subjected to the industry-proven standard of olfactometry (ASTM E679). Several professional labs in the United States perform odor panel analysis to provide the data needed for odor-control studies and, ultimately, odor management.

However, to take that information to the next level and operate transparently, especially with respect to off-site impacts, it is necessary to measure and monitor odors continuously. This relatively new concept is gradually being adopted by treatment plants in the U.S., Canada, and abroad. The OdoWatch system represents the latest technology, providing continuous odor monitoring in real time.

The system was developed by odor science specialists at Odotech in Montreal. The technology begins with the sampling and olfactometric analysis of source odors. Then, the monitoring system works by transmitting data on real-time odor fluctuations from each source by way of electronic sensors (eNoses) specially programmed to recognize the odors, coupled with on-site meteorological data.

By reviewing the outputs, plant operators can observe the projected on-site and off-site odor plumes coming from individual process units and the plant as a whole. Dozens of specific locations can be flagged to alert staff when odors begin to cross a preset threshold. These alerts give facility staff the best chance to control the odors before they become a problem.

By reviewing the outputs, operators can observe the projected on-site and off-site odor plumes coming from individual process units and the plant as a whole. Dozens of specific locations can be flagged to alert staff when odors begin to cross a preset threshold. These alerts give facility staff the best chance to control the odors before they become a problem.

Share Your Idea

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The OdoWatch system uses electronic sensors, programmed to recognize specific odors, at strategic points in the treatment processes. Information from these sensors (eNoses) is then coupled with on-site meteorological data.

odors begin to cross a preset threshold. These alerts give staff the best chance to control the odors before they become a problem.

ARE THERE RISKS?

Some may perceive downsides to tracking odors so closely. For example, could documenting odors in this way give regulatory authorities and local residents credible evidence against a treatment plant in an odor dispute? Potentially, yes.

On the other hand, it could be argued that if a treatment plant cannot clearly demonstrate what is going on with an odor, then all the staff can do is claim some degree of ignorance that will only postpone the inevitable.

What is the cost of not knowing? We may be contributing to odors that we have the existing capability to control. And if we don't measure and ultimately control odors, we are not properly serving our communities and ratepayers.

If we are uninformed, we might not be operating the plant as effectively and efficiently as we could, and we might be missing opportunities to save the public money. Finally, if we don't measure odors with the best available technology, we leave that up to others, who will likely use cruder technologies or more subjective methods to rate plant odor performance.

At the Hampton Roads Sanitation District, we take our responsibility to the public seriously. We have well-trained plant operators and technical staff who seek the best methods to maintain optimal air and water quality for the environment, our neighbors, and all the people we serve in Southeastern Virginia.

BEING ACCOUNTABLE

For that reason, and because nuisance odors can be a personal and emotionally charged issue, we have begun managing odors at our treatment plants with the OdoWatch technology, exclusively provided in the United States by Kruger Inc. In the process of operating the system at HRSD's Chesapeake-Elizabeth plant for the last 18 months, we have shown that we can effectively monitor and reduce odors while saving money. The technology enables us to know more about our operations and helps us mitigate potential off-site odors.

As communities and our neighbors demand to know and expect more from their public employees and governments, we as treatment plant operators can provide transparency that gives a full account of our performance. When we operate to those standards, the people know we are doing our best to be good neighbors.

ABOUT THE AUTHOR

Mark Feltner is an environmental scientist with Hampton Roads Sanitation District, Virginia Beach, Va. **tpo**


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A CONTINUOUS-FILL, INTERMITTENT-DISCHARGE SEQUENCING BATCH REACTOR PROVIDES HIGH PERFORMANCE IN BIOLOGICAL NUTRIENT REMOVAL IN A TREATMENT PLANT FACING HIGH INFILTRATION

By K. Khier Chibani

The Town of Essex in southwestern Ontario upgraded its facultative lagoon treatment systems with an alternative wastewater treatment plant — a continuous-fill, intermittent-discharge sequencing batch reactor (CFID-SBR), targeting even higher effluent quality.

The new treatment plant is composed of three CFID-SBR reactors with a total average capacity of 1.2 mgd (flow rate estimated for the next 20 years). Provision has been made to expand plant capacity by 33 percent by building a fourth reactor to treat an ultimate design flow of 1.6 mgd.

The plant of Essex Sewage Works was commissioned in early January 2006. Since then, the CFID-SBR system has consistently met its effluent requirements. Six months after a successful startup of the first two reactors, process-performance testing began. The warm-period testing started in the last week of July and continued through October, followed by cold-period testing from November through February.

GRAPHICS AND PHOTOS COURTESY OF PREMIER TECH AQUA

The plant has three continuous-fill, intermittent-discharge sequencing batch reactors.

The Essex Sewage Works was commissioned in early January 2006, and since then the CFID-SBR system has consistently met the effluent requirements.

Having passed the two testing periods with two reactors in operation, the testing continued at higher flow due to inflow and infiltration (I&I) through March and April 2007 with only one reactor in operation. The system demonstrated that it could efficiently handle a constantly changing flow with high-rate I&I.

Premier Tech Aqua designed the CFID-SBR process and provided major process equipment. Stantec Consulting of Windsor, Ont., designed the plant and provided all engineering for construction. The plant is operated by Ontario Clean Water Agency.

Wastewater Characteristics and Effluent Design Criteria

	INITIAL DESIGN (20 YEAR)	ULTIMATE DESIGN (FUTURE)	SUGGESTED DESIGN EFFLUENT	EFFLUENT MONTHLY AVERAGE NONCOMPLIANCE
Average dry-weather flow (ADWF)	4,590 m^3/d	6,120 m^3/d	-	-
Peak wet-weather flow (PWWF)	14,400 m^3/d	17,630 m^3/d	-	-
$CBOD_5$	830 kg/d 181 mg/l	1,105 kg/d 181 mg/l	- 5 mg/l	- 10 mg/l
TSS	920 kg/d 200 mg/l	1,225 kg/d 200 mg/l	- 5 mg/l	- 10 mg/l
Total P	40 kg/d 8.7 mg/l	50 kg/d 8.2 mg/l	- 0.3 mg/l	- 0.5 mg/l
TKN	140 kg/d 30.5 mg/l	185 kg/d 30.2 mg/l	- -	- -
NH_3-N	95 kg/d 20.7 mg/l	125 kg/d 20.4 mg/l	Freezing/ Non-Freezing 2.0/1.0 mg/l	Freezing/ Non-Freezing 3.0/1.5 mg/l
Chlorine residual	-	-	0 mg/l	0.01 mg/l
***E. coli* (after UV disinfection)**	-	-	150 CFU/100 ml	200 CFU/100 ml
Dissolved oxygen	-	-	> 5.0 mg/l	n/a
Wastewater temp.	10-24° C	10-24° C	-	-

SBR DESIGN APPROACH

The main treatment objectives for the CFID-SBR were to reduce BOD5, TSS, ammonia and total phosphorus. Chemically assisted phosphorus removal ensures consistent compliance with the total phosphorus requirement.

Biological process simulation using BioWin (EnviroSim Associates) as a platform was part of the process design. The simulation considered the cycle time and the particular hydraulic management of the CFID-SBR and followed the variation of the concentrations of pollutants being treated.

The scenarios that were checked showed the CFID-SBR response first to the effect of low temperature (46 degrees F) compared to the design temperature (59 degrees F). The effluent quality for ammonia and BOD remained below the limits.

The second effect assumed 50 percent higher flow per reactor, lasting one week, as would occur if one of the three reactors were suddenly put out of service for one week. All the parameters were kept as design conditions at normal average flow. The simulation results confirmed that the CFID-SBR system as designed would meet the targeted effluent criteria.

FIELD DATA AND RESULTS

Daily precipitation data for the Windsor area (from Environment Canada record) showed a perfect match between precipitation spikes and daily flow peaks throughout the test period (Figure 1). For March and April 2007, the one-reactor configuration faced a continuous, extremely high hydraulic load, most likely due to I&I.

The average design flow per reactor was exceeded by more than 70 percent, and the maximum treated daily volume was on average 4.6 times the design average daily flow. The hourly peak flow reached 40 gps, 8.5 times the average design flow per reactor.

The influent pumps were equipped with variable-frequency drives. As the influent intensity progressively increased and decreased, the CFID-SBR sequence did not simply jump between two modes (normal and storm). Instead, it continuously and smoothly adjusted every five minutes to the variation of inflow. Treatment steps were automatically and progressively shortened or extended depending on influent variations. Consequently, the system was able to optimize the process equipment at all times.

Even at low temperatures, total ammonia in the effluent remained well below the target concentration of 1 mg/l … Inherently, the CFID-SBR system provided partial denitrification despite a lack of mechanical mixing.

The SBR mixed liquor temperature was significantly affected by influent temperature, and both the SBR and influent temperatures were affected by ambient temperature.

Average monthly ambient temperatures for March and April were 40 and 47 degrees F. Because the SBR was roofless and exposed to the weather, influent and ambient temperatures during those months contributed to cooling down the SBR, which tends to hinder treatment performance. Although January and February were the coldest months, the impact on the SBR was less visible because of low precipitation, thus low I&I.

With excessive incoming flow, the time for the treatment cycle is reduced considerably, meaning the Static-Fill step is skipped on a regular basis and the Fill-Settle step is reduced progressively. This may well have contributed greatly to gradually diminishing the effectiveness of the biological selector effect, thus raising the sludge volume index number.

Analyses of effluent TSS removal (Figure 2) for March and April confirmed the suspicion about settling deterioration under stress conditions. Total phosphorus in the effluent displayed the same trend as TSS despite alum dosing. Chemical sludge made up about 8 percent of total sludge, and that may have contributed to maintaining relatively good settling sludge.

Organic matter concentrations expressed as BOD (Figure 3) showed that the plant had no difficulty demonstrating excellent performance. Even with only one reactor in operation, BOD was consistently below 5 mg/l.

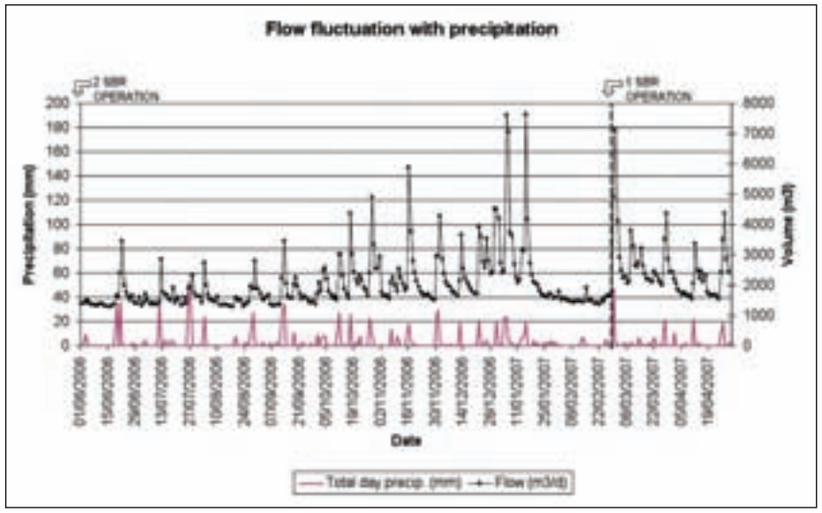

FIGURE 1.

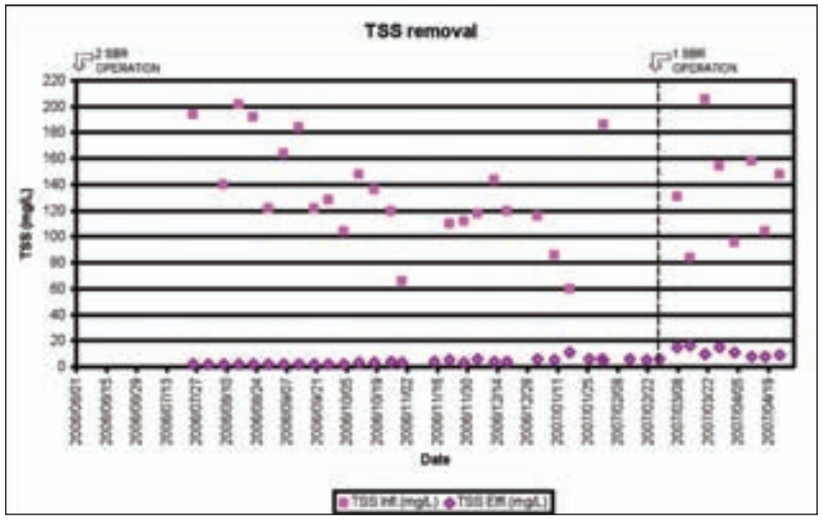

FIGURE 2.

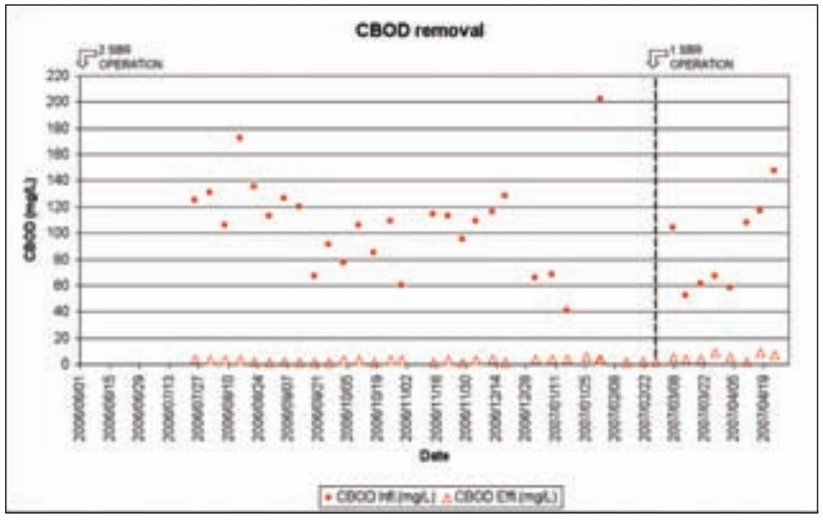

FIGURE 3.

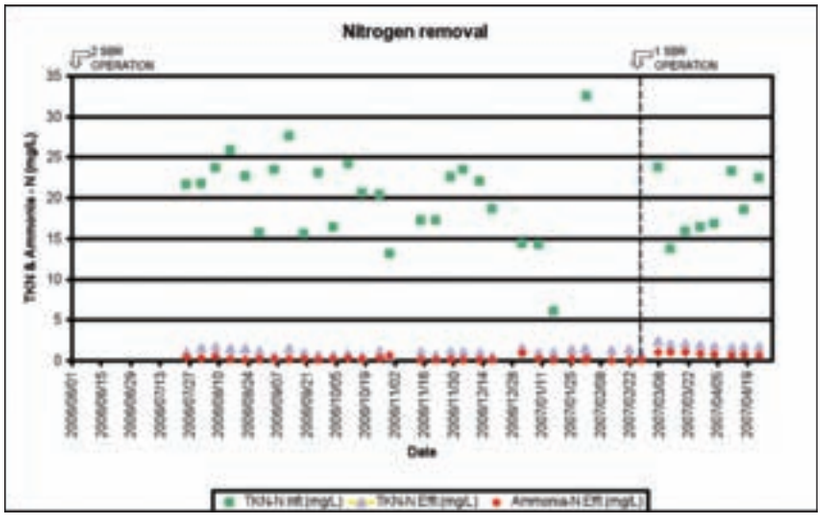

FIGURE 4.

Full nitrification was observed. Even at low temperatures, total ammonia in the effluent remained well below the target concentration of 1 mg/l (Figure 4). For the last three months of testing with one reactor in operation, total ammonia did not exceed on average 0.6 mg/l. This means the treatment cycle as engineered provided enough aeration time to complete the nitrification reaction. Another important aspect is that filling with wastewater during settling and decanting did not affect effluent quality, thanks to the baffle wall.

Nitrate (NO3) and nitrite (NO2) concentrations in the influent were monitored regularly. In general, total influent concentration (NO2 + NO3) on average was below 0.25 mg/l, and thus the impact of these constituents on the total balance was not significant.

The percentage removal of total nitrogen during the warm period and with both reactors in operation was 70 percent on average. In the one-reactor configuration, removal dropped to 60 percent. The average BOD loading for March and April was about 440 pounds of BOD per day. The synthesis of new biomass and nitrogen assimilation could not have been responsible for more than 25 percent removal. Therefore, the excess nitrogen removal can only be attributed to the denitrification process.

CONCLUSION

Process-performance testing started in July 2006 and continued through April 2007. The CFID-SBR system performance was excellent and consistently in compliance with the effluent quality criteria suggested for design.

Analyses of BOD5, TSS, ammonia and phosphorus concentrations in the effluent were consistently very low and almost never exceeded the discharge limits. Full nitrification was observed. Inherently, the CFID-SBR system provided partial denitrification despite a lack of mechanical mixing.

The CFID-SBR, with its added flexibility, allowed the treatment process to provide more than satisfactory results in particularly challenging conditions where only one reactor was in operation with a high I&I rate.

ABOUT THE AUTHOR

K. Khier Chibani, M.Sc., is an SBR process designer with Premier Tech Aqua. He can be reached at khik@premiertech.com. **tpo**

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Data Does It

FOR A SOUTH CAROLINA AGENCY, A CENTRALIZED DATA MANAGEMENT SYSTEM PAYS DIVIDENDS IN COMPLIANCE, MAINTENANCE, BUDGETING AND PROCESS DESIGN

By Chuck Scholpp

GRAPHICS COURTESY OF HACH COMPANY

Good and timely data supports efficiency improvements. Area managers can use personalized dashboards to access data in minutes and avoid the cost of visiting sites.

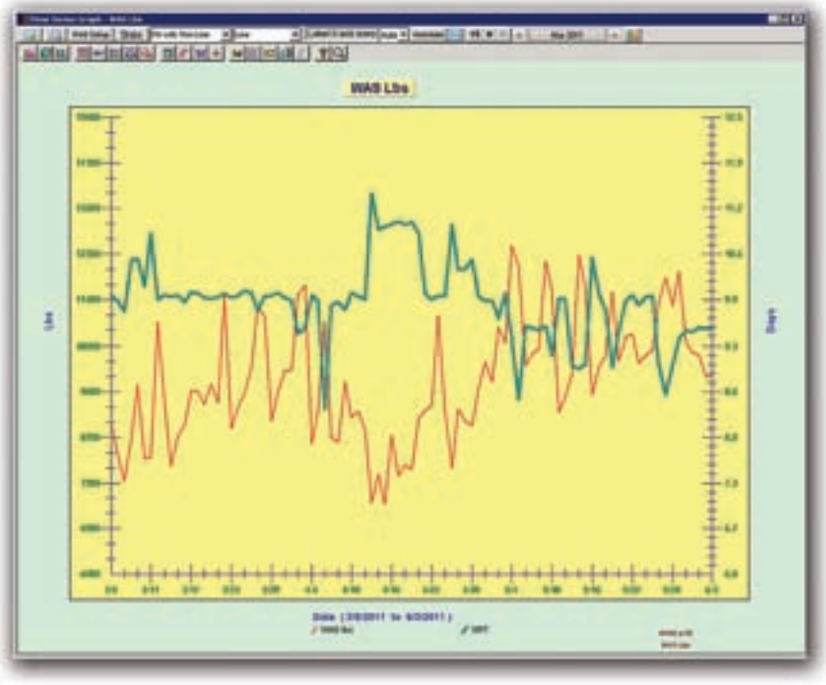
Renewable Water Resources (ReWa) in Greenville, S.C., operates nine wastewater treatment plants and provides water reclamation to more than 400,000 people in five counties in a 296-square-mile service area.

The agency was an early adopter of data management software and in 2003 installed the Water Information Management Solution (WIMS) from Hach Company at all the treatment plants. While it improved the individual operations by automating and streamlining data entry and making data available locally, it was difficult to share information and maintain consistency across the plants.

As a work-around to get a complete picture, the staff used spreadsheets to collect data from each facility. This meant traveling to each site to gather the information, causing delays and introducing data errors. Staff struggled with multiple software versions, which included multiple installations, updates and upgrades, and SCADA links.

"Historical data is essential to optimized daily operations," says Blake Visin, director of information services. "I was counting on operators to verify that the backup was complete and the data was safe. I often found myself wondering if we had adequate redundancy in place."

Even though each plant could monitor and track trends through the WIMS, the full capacity of central management and optimization had not been realized.



The pretreatment group uses WIMS to spot trends. By getting timely data, the group can correlate information to specific industrial discharges and work with the industries toward solutions.

CENTRAL MANAGEMENT

To solve the problem and build a multifacility network, ReWa procured a stand-alone server for its central operations office that hosts the WIMS software and is the primary location for its Microsoft Structured Query Language (SQL) database, housing all plant data and allowing remote access.

The server increased security, enabled easier backups, and provided a database that all authorized staff could access via secure logon. Information Services controls the network and license management, including updates from the central location. Servers at the other facilities provide redundancy.

The central network provides timely data that drives efficiency and improves decision-making. It also automates reliable transmission of accurate data and establishes a secure backup and recovery alternative.

The WIMS tool has improved insight into operations across all facilities and the system as a whole. Eleven years ago, ReWa incurred more than 100 NPDES permit noncompliance issues. In 2011, all facilities earned National Association of Clean Water Agencies awards, including four Platinum awards for zero noncompliance in the past five years.

TARGETING ZERO

The system fits with ReWa's *Zero Non-Compliance* approach to quality. *"Zero Non-Compliance* is a top priority preceded only by employee safety," says Randy Boyette, senior process control officer. "We used to focus on money and budgeting. That has changed, and as a result of focusing on operations, managing the budget has gotten easier."

ReWa began using WIMS to build dashboards that identify the

key areas plant operators need to monitor daily. Alarms warn when any process data goes into the red so that operators can take quick action.

The pretreatment group uses WIMS to spot trends. Monitoring phosphorus, ammonia and pH may indicate influent problems. By getting timely data, the group can correlate information to specific industrial discharges and work with the industries toward solutions.

Good and timely data also supports efficiency improvements. Area managers can use personalized dashboards to access data in minutes and avoid the cost of visiting sites.

In addition, the biosolids manager can use a dashboard to review tank levels and adjust transportation schedules across the system, freeing time for more critical tasks of quality control and customer relations. Trending data also helped the biosolids team to adjust the digestion and dewatering processes to increase solids content from 3 percent to 4 percent, cutting solids management costs by 20 percent ($200,000).

Finally, WIMS data enables operators to provide the maintenance team with long-term trend data showing when efficiency has dropped as equipment ages. The data shows the return on investment for replacing aging equipment and performing preventive maintenance.

BETTER BUDGETING

WIMS data has enhanced the budgeting process. Previously, budget reports took each plant days to complete, and historical data was difficult to obtain. "We used Excel spreadsheets, one for each month," says Kevin James, east division manager. "Now, instead of manually reviewing spreadsheets every 30 days, we can just run a report."

The WIMS lets the staff create automatically populated entry sheets for every plant that show all expenditures in real time. Timely data helps plant managers track trends, plan budgets, and make confident operating decisions.

They can also develop budgets with actual data, examining budget spreadsheets, identifying adverse trends, and formulating in-depth root cause analysis. For example, David Skyles, Lower Reedy plant foreman, watches chemical usage through WIMS daily. "By monitoring actual use of chemicals, like lime, we can identify usage that is out of the norm and adjust quickly," he says. "By doing just that, I can save as much as $32,000 a year with minimal effort.

"We can perform quality assurance/quality control quickly and immediately see if something is out of whack. It tells us if we have a process that's not within specification, equipment running poorly, or a little bit of human error."

Staff estimates the streamlined data access saves at least 20 hours per plant, or 200 hours per year, in budget reporting alone. Operators also benefit by having historical data that they can review annually to see the year-over-year seasonal variations and make process adjustments.

DESIGN SUPPORT

Data from the WIMS is also helping with the design of a combined heat and power system using digester methane. By identifying how much gas can be created under alternative scenarios, the staff can determine the size of the generators.

At one plant involved in a pilot study, a gas flowmeter was malfunctioning and entered an incorrect reading into the database. Using WIMS, the facilities foreman identified the error, which would have resulted in an undersized generator.

"That historic data is critical from an engineering perspective when we are considering an upgrade or change in a process," says Boyette. "I can't estimate the physical time it would take to pull that history otherwise." The system also helps the staff easily fulfill requests for data from consultant and engineering firms. Boyette now can respond while the consultants are still on the phone, saving significant time.

ReWa also uses the WIMS for training plant operators. The tool inspires new operators to look at the data for insights and trends. The process control group provides on-site advanced WIMS training once a year to help each facility learn how to use the tools effectively.

> "By monitoring actual use of chemicals, like lime, we can identify usage that is out of the norm and adjust quickly. By doing just that, I can save as much as $32,000 a year with minimal effort."
>
> **DAVID SKYLES**

In addition, through WIMS, operators receive training monthly to keep skills sharp. The visual tools allow trends and correlations to be laid out easily so that trainees can quickly see plant operating data and history.

"I think it speeds up the learning process greatly," says David Collyer, plant foreman for the Gilder/Durbin facility. "WIMS helps trainees look at raw data, manipulate it, and be proactive. Because they can see it, they learn much faster. It's not just a set of data points. It gives meaning to the data points, and it gives them a way to apply the data."

ABOUT THE AUTHOR

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TPO welcomes news about interesting methods or uses of technology at your facility for future articles in the How We Do It column.

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Joining Hands

CAN PARTNERSHIPS BETWEEN THE PUBLIC AND PRIVATE SECTORS PROVIDE RESOURCES TO HELP MAKE UP THE SHORTFALL IN INFRASTRUCTURE INVESTMENT?

By Ted J. Rulseh

The United States faces a huge shortfall in funding for renewal of water and wastewater infrastructure — while at the same time public money is scarcer than ever. Under these conditions, how will cities, towns, villages and water authorities find the money to upgrade treatment plants and repair decaying underground piping?

Consensus is growing that part of the solution lies in public-private partnerships. Such partnerships provide municipal and utility agencies with access to private capital, operational resources, or both, so that they can accomplish their goals while investing their own limited dollars in other priorities.

The partnership concept has been widely used in Europe and elsewhere but has seen limited application in the United States. The current fiscal climate has helped bring the idea of partnerships to the forefront.

Two representatives of American Water, a private water services provider that also designs, builds and operates wastewater and water facilities for public-sector clients, discussed the concept in an interview with *Treatment Plant Operator*.

Kathy Pape is president of Pennsylvania American Water and is responsible for the financial and operational performance of the company's systems in 36 counties and 390 communities, representing about 650,000 water and wastewater customers. Mark Strauss is senior vice president of strategy and business development at the company's corporate headquarters in Voorhees, N.J.

"It's important first of all that the private and public sectors be able to sit down at a table and talk about how to find a solution. Depending on what the issue is, between what the public and private sectors can offer, you can come up with a solution. But first you have to be talking about it."

KATHY PAPE

Kathy Pape

Mark Strauss

tpo: Why are public-private partnerships getting greater attention today?

Strauss: The financial pressures governments are facing have sparked a renewed interest in public-private partnerships. There is not much dispute about the existence of a shortfall of investment in water and wastewater in the United States.

When Congress was funding the Clean Water Act, a lot of our infrastructure was delivered in the 1970s, 1980s and early 1990s. But that has dried up and, bluntly speaking, a lot of that infrastructure is wearing out. What are we going to do about replacing it while addressing new needs? Public-private partnerships are an avenue that can be followed to leverage private-sector financial and operational resources and help public agencies do what needs to be done.

tpo: Is it a misconception that these partnerships amount to a takeover of what historically have been public functions?

Strauss: Yes. It's important to note that in such a partnership the public entity does not surrender oversight and control of the assets. They bring in the private sector to help define the objectives of the facilities they need to have operated and let the private sector go to work to make that happen.

The public agency sets the standards and objectives and then monitors the private entity's compliance and progress. This lets the public entity free up financial and managerial resources to focus on those big-picture issues, rather than having to drill down into the day-to-day of every detail. It's not a question of competency — many municipal treatment plants are very well run.

tpo: If times are so hard, and there is "no money," and we "can't afford" this or that, and we're "broke," how can public-private partnerships help?

Pape: That's the issue: The money is not there, so what are we going to do about it as opposed to just wringing our hands? Over time, the private sector has shown that it can bring efficiencies and innovation, and most important it has access to capital and can bring that to many of the wastewater projects that need to be done.

It's important first of all that the private and public sectors be able to sit down at a table and talk about how to find a solution. You can't use a cookie-cutter approach. Depending on what the issue is, between what the public and private sectors can offer, you can come up with a solution. But first you have to be talking about it.

tpo: In general, what do public-private partnerships look like?

Pape: A variety of arrangements are possible. One of them is to use a public-private partnership to regionalize to resolve issues. Once you invest the capital, the more customers you have to spread those costs over, the more the per-unit cost goes down.

On the surface it appears the public sector should be able to do that, but in many cases, communities are not willing to work together and regionalize to solve water and wastewater issues, even if they know that could be one of the ways to keep rates lower.

Many times it goes back to very local issues and rivalries, like who beat whom in a football game a number of years ago. Many times it gets down to a question of who's going to have control of the facility.

This is where sometimes a private-sector owner or operator can come in and bring together three or four communities, put a plant in and provide service, and it seems to be all right. In this scenario, the communities are happy to join together.

Strauss: There's a model that's referred to as a concession approach where a private-sector entity provides the financing for a project, in return for which they receive a long-term operations contract for, say, 20 to 30 years.

During that time the private company takes on the overall operational responsibility and recovers all the costs in rates. This concept is by no means fully developed in the United States. It's something that's still being explored. It enables the community to monetize some of its assets and apply the funds to support other needs.

tpo: When you say monetize, are you saying the public entity would essentially sell its assets to the private partner?

Strauss: It's more analogous to a lease. The private entity makes an up-front payment. Repayment on that amount gets built into the rate structure. Municipalities have a lot invested in water and wastewater facilities, and here is a way to recover some of that investment and deploy it elsewhere.

Of course, that is only one possible approach. If the municipality is not interested in that kind of financial arrangement, the project could be what is referred to as a design-build-operate. The private entity delivers a facility funded by the municipality and then operates it for an extended time. Here it's simply a case where the public entity believes they can get a lower cost of operation than they could with direct municipal services.

tpo: What would be another example of the public-private partnership model?

Pape: Some large cities in particular built water and wastewater facilities for a population that's no longer there: people have moved out to the suburbs, so the city now has excess capacity. That capacity can be sold to a private provider who has the capital to put in pipe to get it out to the suburban areas where the growth is occurring. So the city monetizes that excess capacity and converts it to an earning asset.

tpo: Who handles all the politics of making these partnerships happen?

Pape: Everybody handles the politics, and sometimes that can be a bigger issue than the capital. You need to have some leadership on the part of the municipality — somebody has to be a champion. Somebody has to see a vision where it will be better for the economy and better for quality of life if you break out of the parochial model and look ahead at what the private sector can bring.

tpo: Can you cite some examples of where partnerships of this kind have been created in the United States?

Strauss: A good example is the city of Fillmore, Calif., north of Los Angeles. They needed to replace their wastewater plant. They were not meeting their permit, with very strict discharge requirements imposed by the state.

> "Capital is capital and facilities are facilities. A deteriorating collection system will have huge impacts on your treatment plant if you have major I&I problems. It might be that the most effective way to address the treatment issue is to address the collection system."
>
> **MARK STRAUSS**

The city decided the best way to approach this was to go to the market and say, "These are the standards we have to meet. You tell us, private sector, what it would take for you to design, build and operate for 20 years a plant that meets these requirements." Being progressive, the city came up with a concept where they would reuse the plant effluent, and the plant had to meet the reuse standards.

Our company delivered a new membrane filtration plant that went online two years ago. It has won several awards. We treat all the wastewater and operate the plant, and they use the water to irrigate parks, open spaces, greenways and neighborhoods and reduce demand on potable water. That's a real partnership. In this case, the vast majority of capital was from municipal financing.

Pape: Another case involved Coatesville, Pa., a high-growth suburb of Philadelphia. They were under a consent order from the state Department of Environmental Protection, and they were under a building moratorium. Rather than apply city capital to address those issues, they sold their wastewater facilities to Pennsylvania American Water, which signed a consent order with DEP.

Last year we placed online a $50 million wastewater treatment plant that enables the community to meet all DEP standards. In addition, now that the treatment plant has adequate capacity, community growth can resume, just at the time we are coming out of the financial crisis and homes are starting to be built.

tpo: Can this type of partnership apply not just to a treatment plant but also to rehabilitating a collection system?

Strauss: Absolutely. Capital is capital and facilities are facilities. A deteriorating collection system will have huge impacts on your treatment plant if you have major I&I problems. It might be that the most effective way to address the treatment issue is to address the collection system.

tpo: What would you say are the top objections to these partnerships?

Pape: One thing we used to see is the idea that somehow the private sector will get its hands on water and wastewater and will own it, and we as the municipality can't let that go. I think that perception is now going away.

Water and wastewater are assets of the commonwealth; the city owns them. As a private-sector partner, we are a steward of those assets. We work hand in hand with our public-sector clients. For example, when doing collection system repairs or water pipe replacements, we coordinate our schedule with the street department so we are only digging up the road one time. There's a binding together, a

cooperation to work for the good of our customers and the city's constituents.

tpo: How do these types of partnerships affect wastewater operators? What's in it for them?

Pape: I think many younger people coming into the field today want to do more than stay with one community for an entire career. With a private company, where jobs all over the country are posted, they have an option to stay in a small town, or they can get experience in a larger system, and that might mean moving to a system in another state. Or they might want to move from the wastewater sector to the water sector, or move up into a supervisor or manager role. A private company affords more of those kinds of opportunities.

Strauss: They can do these things while keeping their length of service and maintaining their ties to the same organization. You're not taking as big a risk, and you have a career track.

tpo: What about perceptions of these partnerships among the customers of the water and sewer systems?

Pape: There needs to be a focus on customer education. That's another way we have been partnering with communities. At the end of the day, this is all about infrastructure that community residents can't see. Sometimes you can get someone to focus on a tank or a treatment plant, but no one wants to think about the pipes because they are hidden.

Many of the assets in water and wastewater are hidden, so it's important for community leaders and a private company to help residents and customers become better informed about what it takes to move water from a source of supply to the tap, and to collect wastewater from the homes and take it away. The better educated the customers are, the more solutions we're going to find to the issues we all will face going forward. **tpo**

VISITORS

Seldom Seen in Town

By Ted J. Rulseh

Everyone was surprised to spot this male bighorn sheep near the driveway entering the treatment plant property at the West Montrose Sanitation District in Montrose, Colo.

"It was a Saturday morning and I was doing my weekend plant check when a county sheriff deputy pulled in and asked me if I'd seen a bighorn sheep roaming the area," reports Garcia, district manager and operator.

"He said a neighbor had reported seeing one in his field. We looked around for a bit and found this guy. Bighorn sheep are not unusual to see in the surrounding canyons or cliffs, but they are rarely seen in town.

"A representative from the Department of Wildlife showed up a bit later and said he must have followed the river out of the canyon." **tpo**

Show us your visitors

***TPO* invites you** to show us the wild creatures that visit your plant property. Mammals, birds, reptiles, amphibians — send a picture or two and a brief description of when and where the visitor appeared to editor@tpomag.com.

Scan the code with your smartphone:

Digital Technology

By Pete Litterski

CHLORINE ANALYSIS

SC400 colorimeter from Orbeco-Hellige

The SC400 colorimeter from Orbeco-Hellige can test two ranges of free and total chlorine — 0.01-2.0 mg/l and 0.1-8.0 mg/l. Users can calibrate the unit against a prepared standard to ensure accuracy or improve results in a specific range. The handheld instrument has heavy-duty construction and waterproof capabilities for use in the field or lab. It has a large backlit display, a real-time clock, 16-point data storage, and a light shielding sample cell that eliminates the need for a separate light shield. This instrument comes with four sample cells, Powder Pack reagents, battery, manual, and carrying case. **800/922-5242; www.orbeco.com.**

SPEED CONTROL

Model EC-2000 digital eddy-current speed control from DSI/Dynamatic

The Model EC-2000 digital eddy-current speed control from DSI/Dynamatic is designed to upgrade any pump manufacturer's existing eddy-current controls. The digital control is compact and includes a programmable keypad, eliminating the need to tune small potentiometers. The control allows local and remote operations. It includes selectable keypad monitoring, four programmable run presets, and 4-20 mA/0-10 volt inputs. **800/548-2169; www.drivesourceusa.com.**

POWER-QUALITY PROTECTION

smARTvar VAR compensation system from Arteche PQ

The smARTvar dynamic VAR compensation system from Arteche PQ delivers transient-free power to equipment that could be subject to failure from rapid load changes and fluctuations in system voltage. The system uses rapid-acting thyristor switches and a subcycle digital controller to improve the power-quality profile. The system uses either detuned or tuned filters. KVAR ratings ranging from 100 through 2,000 are available up to 690 VAC for low-voltage requirements. With the use of a step-up transformer, 15 kV class applications can be accommodated. **262/754-3883; www.artechepq.com.**

PRESSURE TRANSMITTERS

Preciseline from Keller America

The Preciseline from Keller America provides accurate, thermally compensated outputs for use in pump-control and pressure-monitoring applications with pressure ranges to 15,000 psi. It offers analog and digital outputs. Users can choose between 4-20 mA or VDC analog outputs while the digital output provides an RS485 connection that simplifies connection to a PC, user-rescaling of the analog outputs, and retrieval of both pressure and temperature data as provided by a piezoresistive silicon pressure element.

The RS485 output communicates via modified-Modbus protocol, allowing connection to Modbus-compatible control systems. Up to 128 Preciseline pressure transmitters can be individually addressed and connected via a single bus, allowing for simplified installation and central monitoring over multiple installation sites. **877/253-5537; www.kelleramerica.com.**

ELECTRICAL ENCLOSURES

Polycarbonate enclosures from AC/DC Equipment Co.

Polycarbonate enclosures from AC/DC Equipment Co. are designed for control panels or any other indoor or outdoor electrical application. Hinged and non-hinged enclosures are available with clear or opaque lids. All boxes offer mounting feet or mounting flanges, lockable stainless steel latches, adjustable aluminum back plates, and aluminum dead front doors. The UL-listed enclosures are UV resistant and carry NEMA Type ratings of 2, 3, 3R, 4, 4X, 5, 6, 6P, 12 and 13. **419/281-9120; www.acdcequipment.com.**

SAA-V Security Engine from Data-Linc

SINGLE NETWORK

The SAA-V Security Engine from Data-Linc is a bundled solution that supports wireless video and SCADA on a single high-speed (54 Mbps) network. The system allows virtually limitless control via user-selectable external program execution with notification on-screen, by voice, on the phone or by email. It scales up to fit a user's video security and SCADA needs, integrating with industry standard networks, servers, databases and storage systems. It also offers OPC connectivity. **425/882-2206; www.data-linc.com.**

ALARM LIGHT

Smarte Light from OmniSite

The Smarte Light from OmniSite acts as a normal alarm beacon but adds cellular notifications, data storage, and monitoring by the GuardDog Web interface. The light can be remotely controlled via computer or smartphone. It comes with a battery backup, antenna, and radio transmitter. Once an alarm has been activated, a cellular signal contacts customers via text message or email. **317/885-6330; www.omnisite.com.**

CHLORINE ANALYZER

RA-1000 residual chlorine analyzer from Eagle Microsystems

The RA-1000 residual chlorine analyzer from Eagle Microsystems continuously analyzes the residual concentration of free or total chlorine, chlorine dioxide or potassium permanganate in water or wastewater. A sample containing the target chemical is fed to an amperometric-measuring cell with a pH-buffering agent. A small current is developed within the cell, the level of which is directly proportional to the concentration of the target chemical within the sample.

A microprocessor-based digital controller processes the output of the cell and the residual value is displayed on an LCD

readout. The digital controller transmits a 4-20 mAdc signal for recording or remote display. PVC spheres continuously clean the dissimilar metal electrodes of the cell, minimizing recalibration. Temperature compensation of the cell output is provided by a thermistor. All control and calibration functions are digital and adjustments are made via the four-pushbutton keypad on the face of the instrument. The controller display is a two-line by 16-character backlit LCD. **610/323-2250; www.eaglemicrosystems.com.**

REMOTE MONITORING

Link2Site Flex from Siemens

Link2Site Flex from Siemens offers wireless-to-Web monitoring and control to ensure that critical equipment information is remotely available. Capabilities include operating optimization, service notification, and real-time process data. Users can change operating set points, get notification of out-of-bounds operation, view trends, download process data for further analysis, and more, at the click of a mouse. **866/926-8420; www.water.siemens.com.**

VSA series of handheld vibration analyzers from Datastick

VIBRATION ANALYZERS

The VSA series of handheld vibration analyzers from Datastick are designed for conditions-based and predictive maintenance of pumps, fans, and all forms of rotating and reciprocating machinery. DRS PC software is based on Excel, making it easy to create Microsoft Office reports and share data. All models record and display vibration FFT spectra in acceleration, velocity, and displacement, as well as acceleration waveforms. They also record and display overall vibration with color-coded ISO alert levels. Users can set their own alert levels specifically suited to their machines. **888/277-5153; www.datastick.com.**

SCADA CAPABILITY

TCOM panels from Orenco Systems

TCOM panels from Orenco Systems provide low-cost SCADA capability for commercial and community water/wastewater/stormwater treatment systems. Compatible with virtually all sensors and motors, they provide data logging and real-time remote access and control.

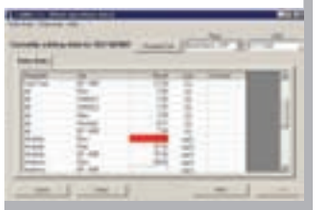
Panels can function independently or can be networked, retaining their independent functions as backup. They can communicate over the Internet with a CAT5 Ethernet IP connection or through a phone line. IP-connected panels can send alarms via numeric pager or caller ID. Operators can access panels on the spot or via the Ethernet network connection or serial port. Touchscreen interfaces are available. **800/348-9843; www.orenco.com/controls.**

PCA 330 chlorine/pH/ORP/temperature analyzer-controller from Hanna Instruments

MULTIPLE PROCESS CONTROLS

The PCA 330 chlorine/pH/ORP/temperature analyzer-controller from Hanna Instruments combines critical process control parameters in one unit. The self-contained NEMA-protected instrument controls free and total chlorine from 0 to 5 mg/l while pH is regulated with two chemical-saving control modes. An available module sends measured parameters and alarms to a cell phone. The advanced Free and Total Residual Chlorine Analyzers continuously monitor wastewater and control the chlorine content in the 0 to 5 mg/l range with an accuracy ±5 percent of reading or ±0.05 mg/l, whichever is greater. **800/426-6287; www.hannainst.com/usa.**

PROCESS CONTROL SOFTWARE



Process control software from LabLite

LabLite process control software serves wastewater treatment facilities that have repetitive processes and testing requirements. Based on user rights, operators see only what they need to do their tasks. When an operator enters a result it is immediately compared to color-coded and named limits for fast recognition. If an operator makes a typing error or enters over-limit results, a red flag alerts them to trouble. The reporting tool enables any user to create professional reports and graphs. The program can be set up to capture instrument or SCADA data and include that information in reports. **888/954-5483; www.lablite.com.**

SCADAPack E controller from Telemetry and Remote SCADA Solutions

DATA RELIABILITY

The SCADAPack E controller from Telemetry and Remote SCADA Solutions, a division of Schneider Electric, provides DNP3 protocol on a scalable platform. Event-driven, time-stamped data storage used by the DNP3 communication protocol makes it suitable for critical wastewater treatment applications that require traceability. The layered protocol stores events in the remote controller until polled or reported, preventing loss of data when communication links go down. The system also reduces trips to the field. **888/267-2232; www.controlmicrosystems.com.**

GAS DETECTOR

OPIR-5 open-path gas detector from MSA

The OPIR-5, open-path gas detector from MSA provides continuous monitoring of methane and propane gas concentrations. The system includes an IR source and receiver that monitors methane in both the 0-5,000 ppm and 0-5 LEL range. A 0-2,000 ppm and 0-1 LEL meter for propane is available. The factory-calibrated detector requires little maintenance, save for a periodic visual inspection, test gas film check and cleaning of the windows to assure dependable performance. **800/672-2222; www.msanorthamerica.com.**

FCL Series free chlorine sensors from Sensorex

FREE CHLORINE SENSOR

FCL Series free chlorine sensors from Sensorex use amperometric technology for real-time measurement. The sensors are available in three measurement ranges: 0-2 ppm, 0-5 ppm and 0-10 ppm. A long-life design reduces maintenance cycles, lowering life cycle cost with less-frequent sensor membrane cap/solution replacement. The series uses a 4-20 mA

(continued)

isolated output signal compatible with programmable logic controllers and distributed control systems. It supports applications from small stand-alone, single-point measurement stations to large plantwide networks with control rooms that monitor numerous points of measurement. **714/895-4344; www.sensorex.com.**

TA-2100 gas detector from Mil-Ram Technology

MULTIPLE GAS DETECTOR

The TA-2100 gas detector from Mil-Ram Technology eliminates false alarms and uses chemically selective sensors to detect toxics, LEL combustibles, oxygen and VOCs. The 3- or 4-wire detectors can detect hundreds of gases using several sensor technologies, including electrochemical, catalytic, infrared, photo-ionization and solid-state. The detectors use self-calibration, which adjusts monthly based on sensor life curve, reducing calibration frequency. **888/464-5726; www.mil-ram.com.**

ELECTROMAGNETIC METERING

Built without moving parts to impede flow, the M2000 electromagnetic meter from Badger Meter delivers precise flow measurement for general-purpose detection. To eliminate remote testing and increase testing frequency, the meter can be field verification tested using a simple handheld device. Advanced processor-based signal conversion allows the meter to achieve accuracy of ±0.25 percent.

M2000 electromagnetic meter from Badger Meter

The meter is available with a hard rubber or PTFE (Teflon) liner. Other features include digital and analog outputs, NEMA 4X enclosure, bidirectional flow sensing and totalization, empty pipe detection, power loss totalization, compatibility with AMR products, nonvolatile programming memory, rotating cover, and enhanced security options. **800/876-3837; www.badgermeter.com.**

ST100 Series thermal mass flowmeter from Fluid Components International

FLOWMETER

The ST100 Series thermal mass flowmeter from Fluid Components International continuously measures, displays and transmits an extensive array of parameters. An LCD display/readout offers a graphical, multivariable display of all process measurements and alarm status. The meter measures gas mass flow, total flow, temperature and pressure depending on the model family, and stores up to five unique calibration groups to accommodate broad flow ranges and differing mixtures of the same gas and multiple gases. **800/854-1993; www.fluidcomponents.com.**

TURBIDITY PROBE

The OBS500 dual turbidity probe with antifouling from Campbell Scientific combines a backscatter sensor (for high turbidity) with a sidescatter sensor (for lower turbidity). It uses multiple antifouling methods to provide accurate measurements in biologically active water.

OBS500 dual turbidity probe Campbell Scientific

The probe incorporates CleanSensor antifouling to ensure accuracy. The method uses a shutter/wiper to protect and clean the optics. The method also includes a chamber filled with a biocide that continuously leaches out over the optics while the probe is in the closed position. A disposable plastic sleeve simplifies cleanup, while an optional copper sleeve can provide additional protection. **435/227-9050; www.campbellsci.com.**

Photometer V-2000 from CHEMetrics

WATER-QUALITY ANALYSIS

The Photometer V-2000 from CHEMetrics offers advanced water-testing technology with pushbutton control. Lightweight and field portable, the microprocessor-based LED colorimeter uses preprogrammed methods to measure 13-mm, 16-mm, or 1-in. cells in concentration, percent transmittance (%T) or absorbance (abs) modes. Updates and new programs are available via the Internet.

The unit can store up to 10 custom programs and can log 100 data points and download them to a printer or PC. Self-filling Vacu-vial reagent ampoules minimize contact with chemicals and provide reliable, accurate and safe water-quality tests in more than 50 preloaded parameters. Intuitive operation reduces the training time. **800/356-3072; www.chemetrics.com.**

POWER-QUALITY METER

The SEL-735 power-quality and review meter from Schweitzer Engineering Laboratories Inc. is fully compliant with IEC and ANSI revenue metering standards. The meter, available in standard and advanced models, offers waveform capture, harmonic measurements, data logging, sample rates and power-quality reports. It integrates into Itron MV-90 billing software, DNP3, Modbus or SEL communication architectures. Multiple communication ports and protocols enable the unit to simultaneously communicate with up to 10 devices. **509/332-1890; www.selinc.com/p131.**

SEL-735 power-quality and review meter from Schweitzer Engineering Laboratories Inc.

Turner Designs' Little Dipper from Walchem

FLUOROMETER

Turner Designs' Little Dipper from Walchem is a single-channel, light industrial fluorometer that installs directly into process streams. It provides an analog signal output proportional to the concentration of the fluorophone being measured. The 24/7 sampling device can be used with data collection systems such as the WebMasterONE to monitor and control the level of treatment chemicals for cooling tower and boiler options. **508/429-1110; www.walchem.com.**

INSERTION FLOWMETER

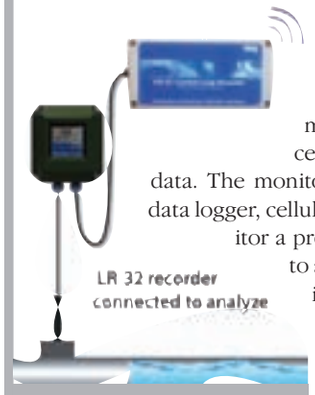
The FPI Mag electromagnetic flowmeter from McCrometer is a multi-electrode hot-tap, full-profile insertion flowmeter, delivering a continuous total flow profile similar to a full-bore magmeter. It installs without interrupting service, dewatering lines, cutting pipe or welding flanges.

The meter's compact insertion design fits in confined spaces with lim-

FPI Mag electromagnetic flowmeter from McCrometer

ited access, offers total accessibility, and is cost-effective for retrofits replacing flowmeters or in sites never metered before. The meter has a multi-electrode sensor design that compensates for variable flow profiles, including swirl, turbulence and low flow. It is available for line sizes from 4 to 138 inches and offers accuracy of ±1 percent. **800/220-2279; www.mccrometer.com.**

WATER-QUALITY MONITOR



iLR-32 current loop monitor from Telog

The iLR-32 current loop monitor from Telog offers simple, economical remote monitoring for gathering water-quality process signals for real-time alarms and trend data. The monitor integrates a 4-20 mA signal conditioner, data logger, cellular modem, antenna and battery. It can monitor a process signal, record the data and forward it to a host computer over the Internet where the information can be presented on a password-protected website.

The real-time alarm captures and forwards alarms via email or text messaging. Telog offers two supporting host applications for storing, presenting and archiving remote data: Telogers for Windows and Telogers Enterprise. The company also offers data hosting for users who prefer a cloud solution. **585/742-3000; www.telog.com.**

I&I REDUCTION


SmartCover sewer monitoring system from Hadronex

The SmartCover sewer monitoring system from Hadronex helps sanitation system operators continuously and remotely monitor water levels in the collection system. Using widely deployed level sensors at strategic locations, inflow and infiltration can be detected and reduced. The ultrasonic sensors provide continuous real-time water level histories remotely through low-earth-orbit satellite communications.

Unusual water levels are detected and alarmed directly to operators' phones or pagers before an overflow, and long-term level histories provide a means to compare hydraulic loadings on the system as a function of precipitation. PowerPacks for the sensors last at least a year. All components are IP67 rated, and communications occur through a low-profile traffic-rated antenna. **760/291-1980; www.hadronex.com.**

ISE ANALYZER


S10 ion selective electrode, compressor and analyzer system from Electro-Chemical Devices

The modular S10 ion selective electrode, compressor and analyzer system from Electro-Chemical Devices includes the AC10 airblast spray cleaner designed for sensor self-cleaning and the multichannel C22 smart controller. The immersion/insertion-style sensor has a stainless steel body with a sensing element, a temperature module and a signal conditioner for the process variable.

Ion-specific cartridges are available for the measurement of ammonium, bromide, cyanide, chloride, sulfide, calcium, potassium and sodium ions and can be configured to measure pH, ORP, DO and conductivity/resistivity. The sensor cleaner helps maintain measurement accuracy in turbid water by preventing the buildup of biofilms and other soft coatings, decreasing sensor maintenance cycles and helping to cut plant operating costs. **800/729-1333; www.ecdi.com.**


ProControl Series 2plus from EOS Research

STRAIGHTFORWARD SCADA

The ProControl Series 2plus from EOS Research puts independent control, data logging, alarm reporting and remote monitoring resources in a control panel with a single device that can be integrated into new or retrofit applications. Available with up to 78 industrially hardened inputs and outputs, it includes built-in communications (landline, cellular or Ethernet), onboard instrument power supplies, integrated data log memory, and relay outputs. Constantly monitoring and optimizing equipment operations, the SCADA unit informs users via fax, pager, text message or email. **603/332-2099; www.eosresearch.com.**

OPTICAL DO METER


ProODO meter from YSI Inc.

The ProODO meter from YSI Inc. provides dissolved oxygen measurements in the field or lab BODs. The optical technology eliminates stirring, membrane changes, anode and cathode maintenance, and electrolyte replacement. The digital-based sensor houses the calibration, allowing the sensor to be placed on any ProODO instrument without having to calibrate again.

Calibrations are stable for many months. The meter has a graphic, backlit display and keypad with on-screen help functionality. Lab features include a small footprint and lab dock, USB connectivity, optional optical BOD probe, and free Data Manager desktop software. **800/897-4151; www.YSI.com/proODO.**

DIGITAL METERING PUMP


Centrac Series digital metering pumps from Milton Roy

Centrac Series digital metering pumps from Milton Roy offer an automatic degassing system and diaphragm integrity alarm. The degassing option, often used when pumping sodium hypochlorite, automatically bleeds the pump head for a short period at startup and at selectable frequencies during operation.

The automatic degassing system does not affect pump flow or capacity. During the bleed cycle, the fluid being bled is channeled to the discharge piping. The digital metering pump has a 30-year design life drive, 45,000-hour diaphragm life, and capacities from 0.06 to 1,100 gph with turndown flexibility. **215/441-0800; www.miltonroy.com.**

SPECTROSCOPY ANALYZER


Real Spectrum Analyzer from Real Tech

The Real Spectrum Analyzer continuous online spectroscopy analyzer series from Real Tech provides accurate, easy-to-use and affordable real-time process monitoring. Scanning across the spectrum of UV and visible light allows rapid detection of many common and emerging contami nants.

(continued)

The analyzer can provide multicomponent measurement and can extract and isolate concentration information about one or more chemical components of concern even when an unknown mixture of other chemical components is also present. The analyzers continuously compensate for the drift and fluctuations of spectral analysis each time a reading is taken. **877/779-2888; www.realtech.ca.**

KPSI Series 705 level transducer from Pressure Systems

LEVEL TRANSDUCER

The KPSI Series 705 level transducer from Pressure Systems has a double-thickness Teflon coating on the sensing area to reduce material penetrating the diaphragm. The nonfouling, submersible hydrostatic level transducer is used in highly viscous applications. The series is available in custom level ranges with analog outputs of 4-20 mA or 0-5 VDC. It is compensated over the temperature range of 23 to 122 degrees F with a static accuracy of ±0.25% FSO. **800/328-3665; www.pressuresystems.com.**

PORTABLE GAS DETECTOR

Model SG1 portable single-gas detector from Detcon

The Model SG1 portable single-gas detector from Detcon uses electrochemical sensor technology to detect and monitor any of five gases: hydrogen sulfide, carbon monoxide, hydrogen, oxygen or sulfur dioxide. The gas detector is controlled by a microprocessor that allows for automatic zero-calibration and span-calibration setup. During normal operation, the backlit LCD screen continuously displays battery life and real-time gas concentration in ppm. Weighing 4.6 ounces, the unit is housed in an ABS enclosure with rubber sleeve for shock absorption. Minimum battery run time without alarm conditions is 4,500 hours. **888/367-4286; www.detcon.com.**

Ultrapen PT1 conductivity/TDS/salinity tester from the Myron L Company

CONDUCTIVITY TESTER

The Ultrapen PT1 conductivity/TDS/salinity tester from the Myron L Company offers the accuracy and stability of benchtop lab equipment with the convenience of a pen. The aluminum tester is fully potted for extra protection. Features include LCD display and one-button menu that enables the user to select from three commonly used standards: KCl, NaCl and Myron L's Natural Water. **760/438-2021; www.myronl.com.**

DISSOLVED OXYGEN PROBE

LDO dissolved oxygen probe from Hach Co.

The LDO dissolved oxygen probe from Hach Co. uses luminescence technology to continuously monitor DO levels. The probe can be integrated with a variable frequency drive or PLC control system to regulate the amount of oxygen being injected. Applications include aeration tanks, collection systems, nitrification and denitrification, aerobic and anaerobic digesters and NPDES permit monitoring. The probe requires minimal maintenance and infrequent calibration. **800/227-4224; www.hach.com/wastewater.**

Q46H Monitoring System from Analytical Technology

DISINFECTANT MEASUREMENTS

The Q46H Monitoring System from Analytical Technology provides continuous measurement of residual chlorine concentration, pH and temperature and delivers data required for ensuring compliance with disinfectant contact-time requirements. The membrane-covered polarographic sensor measures either free chlorine or monochloramine directly without the addition of chemical reagents. The system has no moving parts, resulting in minimal maintenance. Three isolated 4-20 mA outputs are available for interface with DCS or telemetry systems. Digital communications are also available with Profibus-DP, Modbus or Ethernet options. The monitor also provides control options for pumps, valves and other hardware.

The unit comes with three SPDT relays and an option for three additional low-power relays. The system can be wall, handrail or panel mounted. Multiple sensor mounting options are available with either submersion or flowcell designs. The system is also available in an optional pre-assembled, prewired configuration to save on installation time and cost. **610/917-0991; www.analyticaltechnology.com.**

SLUDGE LEVEL DETECTOR

Automatic sludge level detector from Markland Specialty Engineering

Markland Specialty Engineering's automatic sludge level detector can be used in dissolved air flotation tanks, sequential batch reactors, inclined plate clarifiers, decanting tanks and clarifiers. The meter's four power levels automatically adjust for different concentrations of sludge, allowing it to find thick or thin sludge in wastewater treatment plants, and even the very light flocs of some drinking water plants. The detector can be used to find the level of any interface in a liquid, such as salt in brining operations. Its optical beam makes it suitable for location in obstructed or constricted areas. Its all-PVC probe is corrosion-free. Analog, digital and relay outputs are available. Automatic desludge control optimizes sludge density and water removal. **905/873-7791; www.sludgecontrols.com.**

758-915 Bluetooth Ethernet Gateway from WAGO Corp.

BLUETOOTH ETHERNET

The 758-915 Bluetooth Ethernet Gateway from WAGO Corp. wirelessly transfers Ethernet protocols, such as PROFINET, Modbus or Ethernet/IP via Bluetooth 2.0. The system features a 400-meter range and license-free 2.4 to 2.48 GHz ISM band. Engineered for harsh conditions, the IP65-rated system uses M12 cables for automation connections and has a temperature rating of -22 to 149 degrees F. **800/346-7245; www.wago.us/btgateway.htm.** tpo

Moyno Offers Grinder Product Brochure

The grinder product brochure from Moyno Inc. describes the technical innovations, features and benefits of its complete line of single-shaft and twin-shaft grinders, grinder systems, grinder pumps and replacement grinder cartridges. The brochure offers detailed descriptions, key performance benefits, technical information and full-color photographs.

Griswold Launches Product Website

Griswold Pump Co. launched its redesigned product website, www.griswoldpump.com, providing visitors with information on lines of ANSI, end-suction and self-priming centrifugal pumps, and vertical and submersible turbines.

ABB Offers Water Cycle Instrumentation Brochure

ABB offers a 16-page brochure covering the company's portfolio of field instrumentation for water industries: potable water, municipal wastewater and industrial water systems. The brochure includes 3D representation of an entire water cycle. Callouts within the diagram indicate the ABB instrumentation and analyzers available for the various operations. The brochure also provides information on leak detection, flow, pressure and level measurement, energy savings and online process analyzers. To download a copy, go to www.revbase.com/tt/sl.ashx?z=33b57d1d&dataid=263317.

Godwin Pumps Opens Texas, California Branches

Godwin Pumps opened a branch office in Dallas, Texas. The office is co-located with ITT Flowtronics. The company also opened a branch in Poway, Calif., to serve the San Diego area. The 5,000-square-foot California facility, managed by Nate Warren, has two 10-ton overhead cranes, six truck docks and four work stations.

Aquatech de Las Americas Launches Website

Aquatech de Las Americas, subsidiary of Hi-Vac Corp., launched its new website, www.aquatechdelasamericas.com. Headquartered in Bogota, Columbia, Aquatech de Las Americas is a sales, service and training company specializing in sewer cleaning equipment.

Viking Pump Creates Company Museum

In honor of its 100th anniversary, Viking Pump created a museum that enables visitors to share in company history and current technology. The Cedar Falls, Iowa, museum features artifacts, including the original Granddad pump created 100 years ago, and interactive displays that highlight the pump production process from beginning to end.

ITT Names Global Business Leaders

ITT Corp. named Mike Kuchenbrod, head of ITT's China and India business, president of the Water and Wastewater unit in Sweden. Bob Wolpert, president of ITT's Flow Control business, will assume leadership of the China and India business, in addition to his current duties. Both will report to Gretchen McClain, president of ITT Fluid and Motion Control. She will serve as chief executive officer of the new stand-alone water company when it spins off from ITT later this year.

Endress+Hauser Opens Temperature Instrumentation Plant

Endress+Hauser opened a temperature instrumentation production facility in Greenwood, Ind. The 12,000-square-foot manufacturing plant builds temperature sensors, thermowells, transmitters, recorders, flow computers, safety barriers, displays and other products. Endress+Hauser also builds level and pressure instruments in Greenwood and analytical instruments in Anaheim, Calif.

Staco Energy Redesigns Website

Staco Energy Products revamped its website, www.stacoenergy.com, making it easier to navigate and more intuitive to use. Rotating banners call attention to special announcements and product offerings.

Online White Paper Looks at Reduction in Aeration Runtime

A white paper published on the *Treatment Plant Operator* website presents a case study on the installation of seven solar-powered, SB10000 v18 circulation mixers from SolarBee Inc. that enabled the City of St. Helens, Ore., to reduce aeration runtime by 50 percent at its Boise Paper-shared wastewater treatment plant.

In addition to the energy savings, the project, with an estimated two-year payback, also qualified for an electric utility rebate. The plant consists of two ponds: a 3-acre primary lagoon that receives loading from the city and smaller industries and a 40-acre secondary lagoon that receives effluent from the city's primary pond and the mill's primary clarifier. The white paper can be accessed at www.tpomag.com/whitepapers. **tpo**

1. LAROX OFFERS AIR RELEASE/VACUUM VALVE

The air/vacuum valve from Larox Flowsys Inc. automatically exhausts large volumes of air from the system while it is being filled with slurry. Air displaces the fluid and re-enters the pipeline to equalize pressure when the contamination is being emptied, preventing discharge of the medium. When the system is filled and operating, fluid lifts the ball until it closes the orifice, which remains closed until the system is emptied. Air may enter the valve and displace the fluid while the system is operating, but the internal pressure will keep the valve tightly shut. The valve will not re-open until system pressure drops to near atmospheric and the ball is no longer buoyant. Sizes range from 2 to 8 inches in diameter with pressures of 240, 365, 600 and 1,500 psig. **410/636-2250; www.larox.us.**

2. TORREY PINES INTRODUCES DIGITAL HOT PLATE

The HP40A EcoTherm programmable digital hot plate with milled-flat cast aluminum top from Torrey Pines Scientific Inc. is designed for precisely heating solids such as silicon wafers, electronic chips, displays, adhesives and for doing photo-resists. Programming is done through the front panel membrane switch and full-functioned custom liquid crystal display. The unit can store 10 programs with 10 steps each (temperature, temperature ramp rate, time). Each program can be made to repeat automatically. The plate surface can be evenly heated from ambient to 752 degrees F (400° C) in less than 10 minutes. **866/573-9104; www.torreypinesscientific.com.**

3. HEMCO INTRODUCES LE FUME HOOD

The UL 1805 classified LE low-flow, constant-volume fume hood from HEMCO Corp. is available in 3-, 4-, 5-, 6- and 8-foot widths. The hood features a unitized superstructure with nonmetallic, dual-wall construction for chemical resistance, strength and durability. The integral, one-piece fume chamber is glass smooth with covered corners. The VaraFlow baffle system directs air through the fume chamber and through the exhaust outlet with minimum turbulence and maximum airflow efficiency. **800/779-4362; www.hemcocorp.com.**

4. SHELDON INTRODUCES THERMOELECTRIC-COOLED INCUBATOR

The SHEL LAB Model LI20P thermoelectric-cooled incubator from Sheldon Manufacturing Inc. is designed for low-temperature applications, eliminating the need for a refrigeration compressor. The unit can hold up to 300 BOD bottles and features a heavy-duty shelving system that can hold up to 75 pounds per shelf. **800/322-4897; www.shellab.com.**

5. AIRMASTER INTRODUCES TURBO X-TREME AERATOR

The Turbo X-Treme high-efficiency, floating/surface aerator from Airmaster Aerator is powered by a 25-hp motor. Made of stainless steel, it features a turbo blower for high-capacity water movement and maximum aeration and mixing. **888/813-3680; www.airmasteraerator.com.**

6. YASKAWA INTRODUCES A1000 VARIABLE-SPEED DRIVE

The A1000 variable-speed drive from Yaskawa America Inc. is compatible with interior and surface permanent magnet motors. The drive is available in 200-240 VAC three-phase 50/60 Hz (up to 175 hp), 380-480 VAC three-phase 50/60 Hz (up to 1,000 hp) and 500-600 VAC three-phase 50/60 Hz (up to 250 hp) ratings. Features include multilanguage LCD display, parameter storage, application presets and a portable USB copy unit. DriveWizard software delivers configuration, monitoring and tending functions enhanced by direct connectivity through the unit's USB port. **800/927-5292; www.yaskawa.com.**

7. DUST CONTROL TECHNOLOGY INTRODUCES DRIBOSS LINE

The DriBoss line of wastewater evaporation equipment from Dust Control Technology includes ancillary components such as pumps, valves, controls, sensor and automation — all designed to withstand caustic and corrosive environments. The product line ranges from site analysis to remote-operated and computer-controlled systems, including weather stations and customized software. **800/707-2204; www.dustboss.com.** tpo

product spotlight

AquaCritox sustainable sludge destruction and wastewater treatment system from SCFI

Treatment System Uses Heat and Pressure to Destroy Sludge

By Ed Wodalski

The AquaCritox sustainable sludge destruction and wastewater treatment system from SCFI uses super-critical water oxidation (SCWO) to destroy organic waste. The odorless system recovers byproducts such as phosphorus and carbon dioxide without producing hazardous emissions while generating renewable energy. The unit is available in four sizes (A10, A30, A100 and A200) for hydraulic loads from 1.1 to 22 tons per hour.

A sustainable alternative to management methods such as land application, landfilling and incineration, the Irish-based system grows out of 15 years of development. Acquired from Chematur Engineering AB in 2007, the technology was evaluated at demonstration plants in Sweden and Japan from 1998 to 2007. Results showed the technology destroyed organic sludge material, leaving nonleachable inorganic matter. In 2008, SCFI built its first demonstration plant in Ireland. The company has since received an order for a 60-ton-per-day plant in Youghal, Cork, Ireland, that will be operational by the end of the year.

The system works by pressurizing sewage to 3,205 psi and pumping it into an economizer, where it is heated to a super-critical temperature of 705 degrees F. Entering the reactor, heated sludge is mixed with oxygen, raising the temperature to approximately 1,022 to 1,112 degrees F. Excess heat is recaptured for the preheating process. In larger plants, steam can be used to drive turbines for power generation.

Residual effluent, cooled to ambient temperature and returned to atmospheric pressure, passes to the gas/liquid separator where carbon dioxide, nitrogen and oxygen are extracted. Inert and sterile inorganic materials can be treated in a separate step to recover phosphorus, or in the case of drinking water sludge, coagulants.

The remaining water has a COD of less than 5 ppm (better than tap water) and is suitable for discharge or reuse. Plant sizes range from 3,200 square feet (Model A10) to 18,800 square feet (Model A200). Modular systems arrive mounted on skids, fully pressurized and wet-tested. Installation and commissioning takes three months, with an order lead time of 12 to 18 months.

Maintenance is largely confined to the LOX supply area, ensuring there is constant feed to the high-pressure pumps. The system's control unit limits manual intervention and continually monitors off-gas and effluent quality. It also allows for automatic switchover to a clean-in-place system that uses standby heat exchangers on a predicted cycle to prevent scaling and downtime. **www.scfi.eu.**

people/awards

Steve Henderson, a Cassville (Mo.) Wastewater Treatment Plant operator, received a Missouri Water and Wastewater Conference Operator of the Year Award.

The **City of Victorville, Calif.,** received the Commercial/Industrial Development Award of Excellence from the California Redevelopment Association for its industrial wastewater facility.

The **City of Wyoming** (Mich.) Wastewater Treatment Plant received a Clean Corporate Citizen Award from the state's Department of Environmental Quality.

TPO *welcomes your contribution 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

California

The California Water Environment Association has these courses:

- Sept. 1, 8, 15, 22, 29 – Introduction to Wastewater Treatment, Watsonville
- Sept. 7, 14, 21, 28 – Introduction to Wastewater Treatment, Gilroy
- Oct. 5, 12 – Introduction to Wastewater Math, Gilroy
- Oct. 6, 13, 20 – Introduction to Wastewater Treatment, Watsonville
- Oct. 19 – Introduction to Wastewater Treatment, Gilroy

Visit www.cwea.org.

Illinois

The Illinois Water Environment Association has a Laboratory Seminar in Schaumburg on Oct. 20. Visit www.iweasite.org.

Massachusetts

The New England Water Environment Association has a Lab Practices and Microconstituents seminar in Lawrence on Sept. 14. Visit www.newea.org.

Michigan

The Michigan Water Environment Association has these courses:

- Sept. 8 – Collections, Bath
- Sept. 27-28 – Biosolids, Kalamazoo
- Oct. 25 – Health and Safety Seminar, East Lansing
- Nov. 9 – Process, East Lansing

Visit www.mi-wea.org.

New York

The New York Water Environment Association has a Confined Space course in Potsdam on Oct. 11. Visit www.nywea.org.

North Carolina

The North Carolina-American Water Works Association has these courses:

- Sept. 20 – Safety, Clemmons
- Sept. 20 – Automation, Clemmons

Visit www.ncsafewater.com.

Ohio

The Ohio Water Environment Association has a Plant Operations course in Lewis Center Sept. 21-22. Visit www.ohiowea.org.

Pennsylvania

The Pennsylvania Water Environment Association has these courses:

- Sept. 14 – Securing Wastewater Treatment Facilities, Camp Hill
- Sept. 22 – Securing Wastewater Treatment Facilities, Hamburg
- Sept. 23 – Securing Wastewater Treatment Facilities, Pittsburgh

Visit www.pwea.org.

Texas

The Texas Water Utilities Association has these courses:

- Sept. 12 – Safety, Corpus Christi
- Sept. 13 – Utilities Calculations, Carrollton
- Sept. 14 – Management, Corpus Christi
- Sept. 19 – Calculations, Corpus Christi
- Sept. 20 – Wastewater Collection, Victoria
- Oct. 11 – Wastewater Collection, Waco
- Nov. 7 – Wastewater Collection, Corpus Christi
- Nov. 8 – Pumps and Pumping, Gatesville
- Nov. 15 – Wastewater Collection, San Marcos

Visit www.twua.org.

The Water Environment Association of Texas has an Asset Management Workshop in Austin Nov. 2-3. Visit www.weat.org.

Wisconsin

The University of Wisconsin Department of Engineering-Professional Development has a Wastewater Treatment Plants: Processes, Design and Operation seminar in Madison Sept. 13-15. Visit www.epdweb.engr.wisc.edu. tpo

TPO *invites your national, state, or local association to post notices and news items in the Worth Noting column. Send contributions to editor@tpomag.com.*

CALENDAR OF EVENTS

Aug. 30-Sept. 1
Kansas Water Environment Association and Kansas Section-American Water Works Association Annual Joint Conference, Capitol Plaza Hotel, Topeka. Call 785/357-4780 or visit www.kwea.net.

Sept. 14-15
Kentucky Water and Wastewater Operators Association Fall Conference. Visit www.kwwoa.org.

Sept. 14-16
South Dakota Water and Wastewater Association Annual Conference, Crossroads Convention Center, Huron. Visit http://sio.midco.net/sdwwa.website/contact.htm.

Sept. 15-16
New York Water Environment Association 2011 Science and Technical Conference, Hotel Thayer, West Point. Call 315/422-7811 or visit www.nywea.org.

Sept. 18-21
Pacific Northwest Clean Water Association Building Professional Excellence Conference, Hilton Vancouver, Vancouver, Wash. Call 208/455-8381 or visit www.pncwa.org.

Sept. 18-21
Rocky Mountain Water Environment Association Annual Conference, Loveland, Colo. Visit www.rmwea.org.

Sept. 20-23
Western Canada Water Annual Conference and Exhibition, TCU Place, Saskatoon, Sask. Visit www.wcwwa.ca.

Sept. 25-27
Water Environment of Ontario National Residuals and Biosolids Conference, Centre des Congress, Quebec City. Visit www.weao.org.

Oct. 2-4
Atlantic Canada Water & Wastewater Association 2011 Annual Conference, Delta St. John's Hotel and Conference Centre, St. John's, Newfoundland. Visit www.acwwa.ca.

Oct. 4-7
Wisconsin Wastewater Operators Association Annual Conference, La Crosse. Visit www.wwoa.org.

Oct. 15-19
Water Environment Federation WEFTEC 2011, Los Angeles Convention Center, Los Angeles. Visit www.weftec.org.

Nov. 2-4
Nebraska Water Environment Association Conference, Holiday Inn, Kearney. Visit www.ne-wea.org.

Nov. 9-10
New England Water Environment Association North East Residuals, Biosolids and Energy Conference, Seekonk, Mass. Visit www.newea.org.

Nov. 13-16
North Carolina-American Water Works Association and Water Environment Association Annual Conference, Embassy Suites Concord Convention Center, Concord, N.C. Visit www.ncsafewater.org.

Nov. 16-18
Indiana Water Environment Association Annual Conference, Indianapolis. Visit www.indianawea.org.

CLASSIFIED ADVERTISING

SEPTEMBER

BLOWERS

VFC200P-5T, FUJI Pumps, Regenerative Blowers, Ring Compressors. All models, accessories. Authorized distributor. Authorized parts and repair center. Call 888-227-9822. www.carymfg.com. (PBM)

New Roots 27" 1021 PD blower. In stock, ready to ship or install. **www.VacuumSales Inc.com, (888) VAC-UNIT (822-8648).** (PBM)

CONSULTING/ENGINEERING

Meuth Systems Precision water leak detection services for utility districts across Texas. Residential testing within 75 miles of Austin. Phone: 512-450-4992. (o-01)

DEWATERING

20-Yd. Dewatering Filter Box: Complete rollover tarp system, filter media, loading manifold, drain ports and washout ports. interior epoxy coated, exterior polyurethane top coat., $18,000. Polymer system, $9,000. **Call for more info. 863-984-8994 FL** (P09)

DEWATERING

4-year-old (2006) Lely Maximizer in great shape with 2 screens. $24,000. Call 1-866-362-7687 for more info. GA. (P09)

22-yard dewatering box w/steel rolling tops. Does not include filter media or polymer injection system. Asking $23,000. 770-917-0377 GA. (PBM)

EDUCATION

RoyCEU.com: We provide continuing education courses for water, wastewater and water distribution system operators. Log onto www.royceu.com and see our approved states and courses. Call 386-574-4307 for details. (oBM)

MISCELLANEOUS

UV DISINFECTION EQUIPMENT: Attention: Small wastewater treatment plant owners and operators. Very easy installation and affordable. Up to 17 gpm. Brand new product. US patent pending. **www.thefecalfighter.com.** 614-207-9030 or callagher@sbcglobal.net. (oBM)

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MISSION SCADA systems are designed to get you up and running in hours, not days. Our packages start at around $1,000 with a maintenance fee of less than $1 a day. MISSION strives for ease in doing business. Give us a try – no bureaucratic red tape, no huge commitment – if you like it, buy it. If not, send it back. It's that simple.

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