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MAY 2011



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Chief operator
Madison, Ala.

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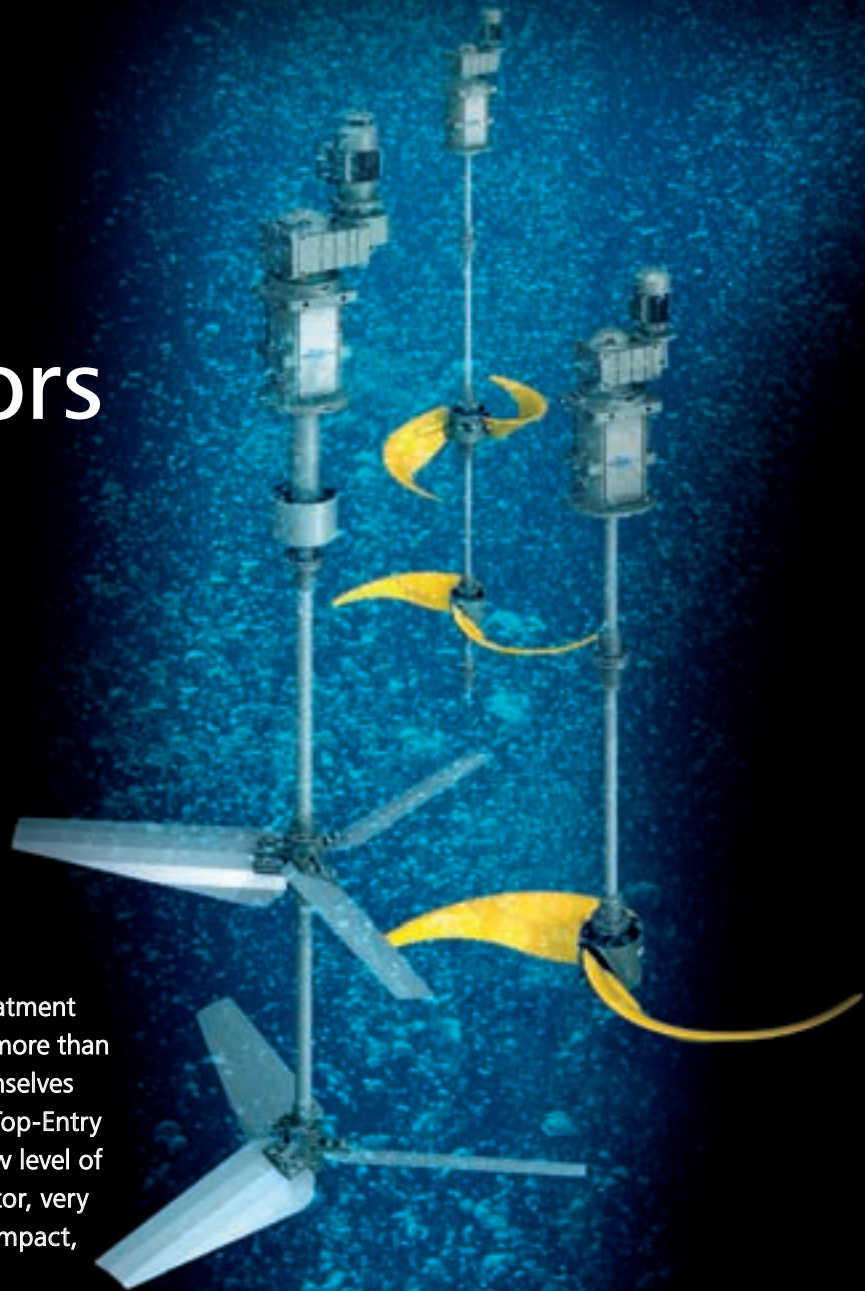


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WASTEWATER PROFESSIONALS

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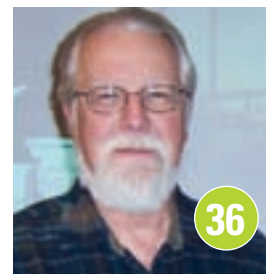
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- Tech Talk: The advantages of in-pipe UV disinfection
- In My Words: A scientific method for measuring and controlling odors

on the cover

The Madison (Ala.) Wastewater Treatment Plant went through a major upgrade just six years after the original activated sludge plant was built. A winning team of operators, led by chief operator Mark Bland, has earned the plant recognition from the Alabama Water & Pollution Control Association (AWPCA) for the past three years. (Photography by Doug Brewster)

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Come On In — The Water's Fine

THESE DAYS A MAGAZINE IS A LOT MORE THAN A PAPER THING THAT COMES IN THE MAIL. IT'S ALSO PART OF AN EVOLVING WORLD OF ONLINE COMMUNICATION.

By Ted J. Rulseh, Editor

I used to brag that I intended to be the technology equivalent of Herb in those old Burger King commercials: The last person on earth not carrying a cell phone.



Then about two years ago, circumstances forced my hand. When on the road, if I needed to call people, I had to use pay phones, and they were getting scarce. Sometimes I had to use a decrepit one in a gas station/convenience store parking lot, amid traffic noise and sometimes in rotten weather.

I broke down and signed up for a smart phone, just like the one my post-college daughter had recently acquired. In her reply to my first text message she said: "Dad — hope you like it here in the future."

HOW THINGS CHANGE

Well, actually, I did, and I do. And "here in the future" means many things. In particular, it means a magazine like *TPO* is not at all the same thing it once was. Sure, you get a bound paper copy that comes in the mail. But you can also read that same magazine — pictures, page layouts and all — at the website, www.tpomag.com.

And the magazine is now part of the vast and growing world of social networking. I once (not too long ago) told a friend, "If I ever tweet, I hope someone shoots me." Now I can tweet (and heaven help me have done so) from the *TPO* Twitter account.

TPO also has a Facebook page where you can sign up to be a fan. The Web page has a link to an editor's weblog (those things actually go by the awful name of "blog") where now and then I post a bit of industry news or an observation or idea. Under the Interact tab, the website also has a Contact form where you can share a comment or ask a question by way of e-mail.

MOMENTUM BUILDING?

So far these networking tools aren't getting a great deal of use, but that's likely to change as more of us adapt to the

new communication channels and — let's face it — as the industry's workforce gets progressively younger with retirements of operators who got their start at the time of the first Clean Water Act.

A magazine today is much more a living, breathing organism than it was half a dozen or even two or three years ago. Through these new communication channels, you have opportunities to embrace it, to shape it, to be part of a better-connected community of readers.

So here's a challenge to you. Perhaps if you're in my age group (and I am old enough to have been part of the first wave of operators, had I chosen that career), you resist the new ways of communicating and some of the new communication devices. I hereby encourage you to try them out.

A magazine today is much more a living, breathing organism than it was half a dozen or even two or three years ago. Through these new communication channels, you have opportunities to embrace it, to shape it, to be part of a better-connected community of readers.

Think about it. A few years ago, if a magazine article interested you, and you wrote a letter to the editor in response, you would wait a couple of months to see it in print. Now, if you send that letter by e-mail or through our Contact function, there's a chance you could see it on my editor's blog the next day.

If you sign up to "follow" *TPO* on Twitter, you can get clued in to what's coming in the next issue of the magazine or to something just posted on the blog. There's also a Discussion Forum on the website (again under the Interact tab) that we wish more operators would use (though we realize there are other online forums).

GETTING THE KNACK

The beauty of all these communication technologies is that they are incredibly easy to use. When I brought home my smart phone after getting a quick demo in the store, I thought I was doomed to spend a day or two poring over the manual and pecking at the keyboard. Not so. I picked up the basics in a few minutes, barely even looking at the manual, and I was off and running.

So it is with tools like Facebook, Twitter and YouTube — only more so. You don't even need to read a "For Dummies" book. Just go out there and get to work. Maybe ask a tech-savvy friend a few basic questions and you'll know what you need to get started.

In most of these instances I'll be feeling my way along the same as you are, getting used to the idea of what it means these days to edit a magazine, as you get used to what it means to read one. In the end I believe we'll all like it fine "here in the future." Even if at first we don't, we must accept that these new ways are here to stay, and we have to embrace them if we want to stay in the loop.

As Bob Dylan put it somewhat ominously, "You'd better start swimmin' or you'll sink like a stone ..." **tpo**



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Hands-on Education

AN OHIO DISTRICT GIVES HIGH SCHOOL STUDENTS AN UP-CLOSE LOOK AT WASTEWATER TREATMENT AS A CHALLENGING AND REWARDING CAREER

By Pete Litterski

What started out as a jobs program for inner-city students in the Cleveland metropolitan area has evolved into an education program and possible recruiting tool for the Northeast Ohio Regional Sewer District.

The Wastewater Prep program still includes a summer work component, but rather than do basic chores such as mowing and painting hand railings, students now can learn and perform a variety of operations and maintenance duties in the district's three wastewater treatment facilities, serving more than a million people in 60 communities.

Ed Haller, assistant superintendent at the district's Southerly Wastewater Treatment Plant, launched the program several years ago working with students from one Cleveland high school. The program expanded to involve all three treatment plants and students from several high schools.

TWO BECOME ONE

Haller, who has a chemical engineering degree and is the author of *Simplified Wastewater Treatment Plant Operations*, teamed with the Urban League and Collinwood High School in Cleveland to identify students interested in a program that went beyond the typical summer job. In the first year of Wastewater Prep, four of the 12 stu-

Wastewater Prep (and Collinwood High School) students Jozlyn Bell and Noel, repainted a series of dike walls behind the Eastern Administration Building in 2009.

dents in the summer jobs program chose to take a 17-week class on wastewater treatment operations during the next school year.

The class was based on Haller's book and mirrored a class he teaches for district employees who want to gain state certification as operators.

In the second year, Westerly Treatment Plant maintenance manager Jim Santiago joined the program, which expanded to include students from Max S. Hayes High School, a career and technical school.

Since then, Wastewater Prep has merged with the summer student program, and the standards for entry are higher. Students entering Wastewater Prep now can rotate through a variety of maintenance and operations jobs. They work with mechanics and operators, handling basic electrical tasks, working on pumps, doing light welding, and taking lab samples and instrument readings.

"They even work with management," Santiago says. "They get a full experience, and they are able to actually work."

LEADING TO JOBS

During their job rotation, students are given a list of questions and are expected to talk to operators or mechanics to get the answers. "They have to keep log-books, too," Haller says. "And when we review them, we often find some



What's Your Story?

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

"They learn they actually have a talent they can work on. They are actually really excited to come to work."

JIM SANTIAGO



PHOTOS COURTESY OF NORTHEAST OHIO REGIONAL SEWER DISTRICT



FAR LEFT: The Northeast Ohio Regional Sewer District's Aquabots program is a hit with many grade 6-8 students in the Cleveland area. **LEFT:** Antonio Stinson, a participant in the first year of Wastewater Prep, is now a full-time employee at the Northeast Ohio Regional Sewer District.

good questions we hadn't even thought of."

One of the most important lessons has less to do with plant operations than with life: "They learn they actually have a talent they can work on," Santiago says. "They are actually really excited to come to work."

Now in its fourth year, the program has produced one full-time employee on the district payroll: Antonio Stinson at the Easterly plant. Haller says four students from the past summer's program are strong candidates for positions now. Even if many of the students pursue careers in other fields, Haller sees the impact that Wastewater Prep can have. "We had one young lady who was studying law, but now she is more interested in studying environmental law," he says.



ABOVE: Students from the 2009 class of Wastewater Prep tour the Northeast Ohio Regional Sewer District Easterly Wastewater Treatment Plant. LEFT: A competitor in the Aquabots program makes last-minute adjustments to a robot she and her team programmed to perform a task at a treatment plant.



Mardele Cohen, community outreach specialist at the district, says it's important to look for prospective employees among the students because the workforce is aging and many will soon retire. By getting students involved in Wastewater Prep, the district can present itself as a career option students might not otherwise think about.

"We want to give them a good perspective on who we are and what we have to offer," Cohen says. "We want them to know you can start in custodial and move into maintenance or operations." Completing Wastewater Prep does not qualify students to become treatment operators, but it "gives them a good idea of what's coming and what they need to learn."

SOURCE OF HOPE

Santiago says the program serves as a source of hope for inner-city students. "We want to give these kids a chance to come and see their options and see they may have a better chance," he says. "If they see that after a year with us they can get tuition reimbursement, they may see a way toward education."

Haller thinks the combination of education and experience can

lead to a better workforce at the district. "With my degree in chemical engineering, I never would have thought I'd end up in wastewater treatment," he says. "But now, I see it's a perfect fit."

The Wastewater Prep program is just one educational program the district offers. Another is the Aquabots program for grades 6-8. It begins with tours to one of the treatment plants and their labs. Then, after 12 hours of instruction about wastewater treatment, students are given robotics kits and are asked to design a robot to assist the district in its job.

The district also takes part in the Student Technical Enrichment Program (STEP) with the City of Cleveland and MWH, an international engineering and consulting firm. Here, students in grades 7-8 meet one Saturday a month for site tours and interactive programs that expose them to technical careers involving math, science, engineering and other fields. **tpo**

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SLUDGE PLANT IN MADISON, ALA.

By Trude Witham

THE MADISON (ALA.) WASTEWATER TREATMENT PLANT WENT THROUGH A MAJOR UPGRADE JUST six years after the original activated sludge plant was built. The upgrade solved the plant's capacity needs, biosolids hauling problems and sporadic daily fecal coliform and TSS compliance issues.

But it's a winning team of operators that has earned the plant recognition from the Alabama Water & Pollution Control Association (AWPCA) for the past three years. The plant's five operators handle it all, from lab testing, maintenance, cleaning and grounds work to monitoring 25 lift stations in the collection system.

It wasn't always that way. "From 2007 to 2009, we had seven full-time operators, but we've reduced staff through attrition and promotion," says Mark Bland, chief wastewater operator. "So that means we're jacks-of-all-trades here. We do all the maintenance, including minor electrical. It takes a really good team to do what has to be done in the time that they're here, and I'm proud of that."

GROWING TOO FAST

Completed in 2003, the original plant was designed for an average daily flow of 6 mgd and a peak daily flow of 18 mgd. It included headworks with a

"From 2007 to 2009, we had seven full-time operators, but we've reduced staff through attrition and promotion. So, that means we're jacks-of-all-trades here."

MARK BLAND

The Madison (Ala.) Wastewater Treatment Plant grounds.
(Photography by Doug Brewster)

The Madison treatment plant team includes, from left, chief operator Mark Bland, and operators Tim Moody, Chris West, Johann Caris and Kevin Tipton.

profile

Madison (Ala.) Wastewater Treatment Plant, Madison Utilities

BUILT: 2003
SERVICE AREA: City of Madison, population 40,000
EMPLOYEES: 5
FLOWS: 8.25 mgd design, 5.1 mgd average, 24 mgd peak
TREATMENT LEVEL: Secondary
TREATMENT PROCESS: Activated sludge
RECEIVING WATER: Tennessee River
BIOSOLIDS: Class B, land-applied
WEBSITE: www.madisonutilities.org
GPS COORDINATES: Latitude: 34°33'59.97"N; longitude: 84°45'56.39"W



Operator Johann Caris checks the sludge blanket depth in a clarifier.



REWARDING EXCELLENCE

The Madison Wastewater Treatment Plant has won two consecutive awards from the Alabama Water & Pollution Control Association: Best Operated Plant in 2010 in the category for mechanical plants, 5.1 to 10.0 mgd; and an Award of Excellence in 2009.

Says chief wastewater operator Mark Bland, “The AWPCA looks at everything from aesthetics to proper safety equipment, lab operations, how many certified operators we have, whether proper signage is posted, and how the plant is running.”

The plant applies for the Best Operated Plant award, and an AWPCA inspector visits the plant and spends anywhere from four hours to a day. The judges compare the plant with others in the same division, and all plants receive a score.

According to the AWPCA website, the Award of Excellence is given to a plant that scores an average of 90 percent or better of the winning plant’s score. One Best Operated Plant and one Award of Excellence are awarded per category.

Krebs Architecture & Engineering, which designed the plant, won the Honor Award for the 2011 Engineering Excellence Awards Competition from the American Council of Engineering Companies of Alabama. The award is for “engineering achievement that demonstrates the highest degree of innovative design, engineering merit and ingenuity.”

Parkson mechanical screen and Smith & Loveless PISTA grit chamber, Ovivo oxidation ditches and clarifiers, Gorman-Rupp return activated sludge (RAS) and waste activated sludge (WAS) pumps, and UV disinfection. The plant was on course to exceed capacity by 2008, as the city’s population averaged 4 percent growth per year.

Also, the state issued a consent order for fecal coliform and TSS violations, caused in part, by the plant’s solids handling protocol, and made worse by wet weather in 2005 and 2006. In addition, the disinfection system couldn’t keep up with the load.

“We were producing Class B biosolids that we were having a contractor haul away in liquid form, in four to six tractor trailer trucks per day,” recalls Bland. “It was 25 miles one way to some of the fields. It got to the point where it wasn’t profitable for the contractor, and he stopped doing it.”

The plant was also having problems with its vacuum prime pumps, and the staff had to repair them frequently. Also, the existing RAS pumping station had insufficient capacity for higher flows and needed to be upgraded.

SOLUTION IN UPGRADE

The upgraded plant design, by Krebs Architecture & Engineering, began in 2006, and construction started in 2007. During the design stage, the staff evaluated all process equipment for performance and energy efficiency and pre-selected the major new process equipment based on proposals that included purchase price, power usage and maintenance costs. The analysis of biological treatment (aeration and mixing) processes had to account for the cost of retrofitting the existing basins.

The new plant went online in phases beginning in 2008 and was completed in 2009. It consists of:

- A third Ovivo oxidation ditch for biological treatment.
- Low-horsepower submersible mixers and variable-speed drives on the aerators to reduce energy usage during periods when little or no aeration is needed.
- New self-priming Gorman-Rupp centrifugal pumps, which replaced the vacuum prime pumps in the grit chamber.
- Two JDV conveyors to eliminate the two rolling dump containers — the screenings and grit are now placed into a roll-off container.
- A new, larger RAS/WAS pumping station that consists of a dry pit enclosed by a building. All RAS/WAS pumps are now easily accessible. Piping restrictions were removed, larger piping was provided, and the new pumping station was designed to give operators flexibility to return or waste solids from individual clarifiers or waste at variable rates. This helps operators balance solids blanket levels in the clarifiers.
- A third clarifier (Siemens’ Tow-Bro).
- An Andritz biosolids centrifuge.

“When a new guy comes in, I go through the plant process with him and say, ‘This is what you do when this happens, or that happens.’ Then, when it does happen, they know what to do.”

MARK BLAND

- A seepex progressive-cavity biosolids cake pump, chosen instead of a conveyor because it provides flexibility to pump biosolids cake to trucks, bins, or a temporary storage area. The cake pump can move 20 percent solids cake up to 250 feet and can be easily modified for future needs.
- New Ozonia UV disinfection system (Degremont Technologies) Aquaray 3x low pressure, high intensity, including a second UV channel for redundancy when maintenance or cleaning is required.
- SCADA modifications to incorporate new process equipment, and to allow operators to choose the equipment to be operated on standby power during power outages.
- A new 1,200-square-foot maintenance building to provide a place for equipment and vehicle maintenance, and for storing fuels, oils and parts.

(continued)

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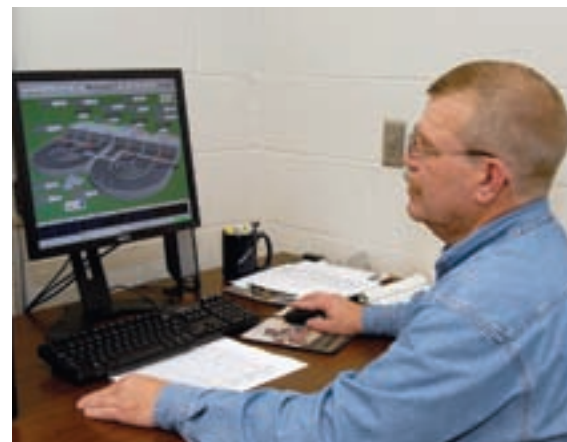
Operator Kevin Tipton performs preventive maintenance on the Andritz centrifuge.

"I encourage them to be part of the whole operation, and to make suggestions about how to improve things, including equipment upgrades. I empower them as individuals to be part of the team."

MARK BLAND

Operator Tim Moody checks the plant SCADA system.

Madison Wastewater Treatment Plant PERMIT AND PERFORMANCE		
	PERMIT	EFFLUENT (monthly average)
TSS	30 mg/l	4.2 mg/l
CBOD	25 mg/l	3.5 mg/l
Ammonia	20 mg/l	0.42 mg/l
Fecal coliform	2,000	62.1
TKN	Monitor	2.04 mg/l
Total P	Monitor	2.37 mg/l
Nitrate + Nitrite	Monitor	4.6 mg/l



The upgraded plant is permitted for an average daily flow of 8.25 mgd and can handle peak flows of 24 mgd. The new UV system consistently meets or exceeds fecal coliform limits, and the new solids handling facilities provide better control of solids inventory.

The plant now produces Class B cake biosolids, hauled away and applied to pasture and cropland. Recently, when a solids-hauling contractor was unable to keep up with production, the digesters filled and the plant had to recirculate a high volume of activated sludge.

"We had four full digesters and very high clarifier blanket levels," says Bland. "Now that we have a contractor that is doing a much better job, we have the blanket levels down and also one empty digester."

TEAMWORK MATTERS

While the upgrade helped the plant accommodate growth, four full-time operators and one part-timer make sure it stays in compliance. Lab tests for CBOD, TSS and pH are performed in-house three days a week, and all other testing is sent to an outside lab.

"It's hard to accomplish everything with such a small staff," says Bland. "The operators work seven days on and seven off, and we have one operator per shift, with two shifts." Bland, considered a supervisor and not a working operator, is at the plant Monday through Friday from 7 a.m. to 4 p.m. and fills in as operator when needed.

He credits the operators' can-do attitude for the plant's success. "I probably have four of the best full-time operators in the state," he says. "My guys are always busy, in the lab, doing maintenance, mowing the lawn, or cleaning floors and windows.

"For four guys, what they do is pretty amazing. Most of our equipment is outdoors. When it's raining, they're outside. When it's cold, they're outside. When it's 105 degrees, they're outside."

In a recent example of teamwork, the operators stepped up when full-time operator Chris West was out for surgery, covering his shift without Bland having to assign someone. "I posted a schedule with the date and times that needed to be covered. The operators worked it out themselves, sharing the overtime for those that wanted it," says Bland.

As another example, the construction contract and consent order required multiple milestones and completion dates for the new facilities. The operators went above and beyond to make sure the transition was smooth and that there were no permit violations. "We actually had to change the way we run the plant four different times to allow for takedown and startup of old and new equipment," says Bland.

The new UV system was placed into service in October 2008, followed by the new solids dewatering facilities in January 2009, and the new aeration basin, clarifier, and RAS/WAS pumping station in September 2009. The existing aeration basins were returned to service in October 2009. Each startup required the operators to develop a detailed plan for maintaining treatment while the new facilities were placed into service, and long hours were required to closely monitor and adjust the new facilities.

Each shift does its share, and if one shift has a problem and doesn't complete the scheduled work, the next shift makes sure it gets done. "Our operators take a lot of pride in the plant, and they keep it looking good all the time," says Bland. "The Madison Utilities board members visited the plant and were impressed. As a result of the board's visit, a newspaper article was written about us. The takeaway from this is that you can come through this plant anytime, and I will not be embarrassed by what you see."

MANAGING FOR SUCCESS

As chief operator with 18 years of service, nine of them at Madison, Bland believes in empowering his operators. "I encourage them to be part of the whole operation, and to make suggestions about how to improve things, including equipment upgrades," he says. "I empower them as individuals to be part of the team."

For instance, Bland held a contest to allow the operators to come up with the plant's mission statement. He allowed each operator to take part in the new plant design process, from suggesting things that were needed, to reviewing the drawings and specification book. He encourages them through goal setting to make suggestions on how to make the plant run better, and then sits down with them to discuss whether those are viable options.

Operator Johann Caris has been at the plant from the start. Chris West



Operator Chris West pulls a UV module from the Ozonia disinfection system for maintenance.

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was a meter reader supervisor before he went to work at the plant in 2007. Operators Tim Moody and Kevin Tipton have been there since 2007. Tipton moved over from lift station maintenance in 2009. Part-time operator Bryce McCreless started in 2010.

"Three of the four full-time operators have obtained their Grade 4 certification," says Bland. "They attended limited training classes and also received one-on-one training here at the plant from me or other operators. Although several of the associations offer operator training, there is no college or trade school program in the state that offers a program that will enable a graduate to operate a plant effectively."

Bland feels hands-on training is essential for operators to be effective. "They test you on what is in the manual, but not for real-life situations," he says. "When a new guy comes in, I go through the plant process with him and say, 'This is what you do when this happens, or that happens.' Then, when it does happen, they know what to do."

MEETING FUTURE NEEDS

Bland hopes the plant can eventually hire more operators and return to the previous staffing level. In the immediate future, he is thinking of hiring high school or college students part-time to help with grounds work and cleaning.

The plant may need to upgrade again in less than 10 years to keep up with rapid growth. Madison is a bedroom community for Madison County, home to some of the nation's large defense contractors. "Our town is one of the fastest growing in Alabama, and our wastewater plant is already averaging 5 mgd this year, so we may need to upgrade in as little as five years if the economy turns around," says Bland.

In the meantime, Bland is optimistic that his operators will continue to excel and the plant will continue its success. "Overall, being a wastewater treatment operator is a good job," he says. "I love my job, and I think everyone here does too." **tpo**

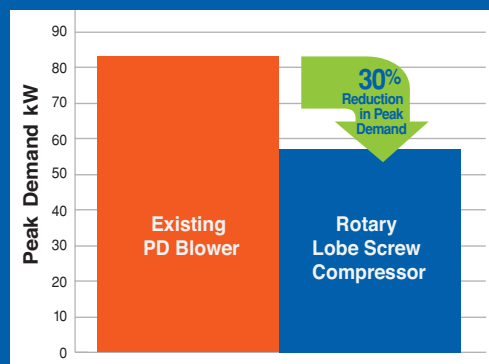
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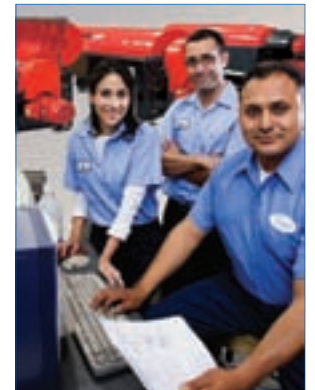
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OPERATIONS STAFF ENGINEERED A REVIVAL THAT CHANGED THE TARPON SPRINGS TREATMENT PLANT FROM A PROBLEM FACILITY TO A MULTIPLE-AWARD WINNER

By Jim Force

At the Tarpon Springs facility, an Ovivo Bardenpho process accomplishes biological treatment and nutrient removal. (Photography by Jeff Laine)

profile

Tarpon Springs (Fla.) Advanced Wastewater Treatment Facility



BUILT:	1984, upgraded in 1992 and 2009
FLOWS:	4.0 mgd design, 2.0 mgd average
POPULATION SERVED:	25,000
TREATMENT LEVEL:	Tertiary/water reclamation
PROCESSES:	5-stage Bardenpho (biological nutrient removal)
RECEIVING WATER:	Anclote River
BIOSOLIDS:	Cake to private fertilizer manufacturer
STAFF:	14 (operations)
AWARDS:	Florida WEA Reuse Plant of the Year (2010) and Top Ten Safety Award (2005); Florida DEP Plant Operations Excellence Award (2004, 2007)
ANNUAL BUDGET:	\$2.4 million (operations and personnel)
WEBSITE:	www.ctsfl.us
GPS COORDINATES:	Latitude: 28°9'7.95"N; longitude: 82°45'11.86"W

IN BARELY 10 YEARS, THE TARPON SPRINGS (FLA.) ADVANCED WASTEWATER TREATMENT FACILITY has gone from “the little plant that couldn’t” to “the little plant that can” — and does.

That’s how utilities superintendent Ray Page and director of public services Paul Smith describe the progress they’ve made at the 4.0 mgd (design) plant. They compare multiple operator-driven process improvements to the train engine in the old children’s story that found it could achieve success if it reminded itself: I think I can.

“In 1999, we were under a consent decree,” recalls Page. “But most of what we’ve done to improve treatment here, we’ve done on our own.” They’ve accomplished a lot. From developing sophisticated SCADA systems, to devising fail-safe water recycling procedures, to cutting power and staffing costs, the Tarpon Springs staff has simply redone the plant.

Plagued with permit-violating conditions a decade ago, the facility now provides pure recycled water to about 1,000 customers and has garnered state and professional awards for treatment effectiveness and efficiency. Now, the Florida Department of Environmental Protection (FDEP)

refers professionals from other cities and counties to Tarpon Springs for ideas and solutions to compliance issues.

AUTOMATED PROCESS

About 2 mgd on average flows into the plant from a community of 25,000 people on the Gulf of Mexico in the Greater Tampa-St. Petersburg metropolitan area. Two Myers submersible pumps and a tandem of above-ground pumps (ITT Water & Wastewater) boost water from the wet well to the headworks, which are equipped with a pair of Huber bar screens.

The pumps replaced old screw pumps that were less efficient and consumed more power. A Fluidyne vortex-type unit removes sand and grit.

An Ovivo Bardenpho process accomplishes biological treatment and nutrient removal. The system consists of a five-stage complete-mix sludge process with alternating stages of anoxic and aerobic conditions.

In the first (fermentation) stage, influent mixes with return activated sludge. After contact, the liquid moves to the anoxic zone, where it is mixed with nitrates from the nitrification zone. Nitrates are reduced to nitrogen gas in a second anoxic zone before the water passes to a re-



Operator trainee Mike Swits (left) and chief operator Robert Marcincuk discuss the treatment system's overview display.

Tarpon Springs Advanced Wastewater Treatment Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT (annual average)
NH3	27 mg/l	0.02 mg/l	N/A
CBOD3	172 mg/l	4.0 mg/l	5.0 mg/l
TKN	38 mg/l	0.8 mg/l	N/A
Total P	5.3 mg/l	0.3 mg/l	1.0 mg/l
Total Nitrogen	n/a	1.6 mg/l	3.0 mg/l
TSS	179 mg/l	2.0 mg/l	5.0 mg/l
pH	7.4–7.7	6.9–7.9	6.5–8.5

aeration zone, where mixed liquor dissolved oxygen is increased so that phosphorus is not released in the 80-foot-diameter final clarifiers.

The process is automatically controlled by the facility's state-of-the-art SCADA system. "We're getting good annual results," says chief operator Rob Marcincuk. "We use a minimal amount of aluminum sulfate to aid in clarifier settling."

Two Ovivo automatic backwash filters remove remaining suspended solids before the water passes to the chlorination-dechlorination process. The plant uses gaseous chlorine, followed by sodium bisulfite and sulfur dioxide, to meet its requirement of zero chlorine in the final effluent when discharging to the Anclote River, which flows into the Gulf of Mexico.

Page explains that the dechlorination process is redundant to ensure that the residual requirement is met consistently. "Either sodium bisulfite or the sulfur dioxide could do the job on its own," he says. "But this way, if one doesn't work, the other will. If we have a sulfur residual in the effluent, we're certain there's no chlorine." The vertical chlorine contact chamber has been modified with a cascade aeration system to air-strip and remove trihalomethanes.

A Siemens centrifuge dewater biosolids to cake at 20-plus percent solids at about 100 gpm, using a specific polymer blend. The centrifuge replaced an old belt press that was achieving only 12 to 14 percent solids at 40 gpm. At a loading station on site, a private fertilizer manufacturer picks up the cake for hauling it to a central processing facility.

Another Siemens technology called PRISC, controls plant odors using a combination of Odophos and concentrated hydrogen peroxide. A portable odor logger measures air quality before and after treatment. When the PRISC system was started in March 2008, influent hydrogen sulfide levels spiked as high as 240 ppm but now have been reduced to less than 12 ppm as a peak. Averages are much lower.

USING A RESOURCE

If any plant in the nation is serious about reuse, it's Tarpon Springs. In fact, the plant won the Florida Water Environment Association Reuse Plant of

A BOOST TOWARD LEED

The Tarpon Springs Advanced Wastewater Facility has helped the new Sweetbay Grocery Store in the city earn certification as a green building under the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) rating system.

The 38,000-square-foot store, which opened in November 2009, uses about 500 gallons of reclaimed water a day, supplied by the Tarpon Springs plant, for toilet flushing. The store uses 2,000 to 3,000 gallons of potable water a day for other purposes and pays a lower rate for the reclaimed water. The result is a boost for the environment and significant savings for the store, according to Curtis McIntyre, manager of engineering services.

"It's worked out very well," he says. "We wanted to get as many points toward LEED certification as we could, and we knew that reclaimed water was available from the Tarpon Springs treatment facility." The site developer also uses reclaimed water for irrigation and landscaping in a system that uses timers and drip irrigation to conserve water.

Sweetbay, based in Tampa, is a major Florida grocer, with 104 stores in the state, specializing in locally grown organic and natural foods. Other features of the Tarpon Springs store that supported LEED certification include:

- Low-flow toilets and faucets.
- Reusable bags.
- Special parking for bikes, carpool vehicles, and low-emission automobiles.
- Earth-friendly cleaners and low-VOC paints.
- Compact fluorescent lighting.
- High-efficiency air conditioning.

the Year Award in 2010. "About 65 to 70 percent of our effluent water is reused," says Page. "We have about 1,000 customers, including the city cemetery and the municipal golf course, which maintains an 850,000-gallon storage pond monitored and flow-controlled by remote telemetry."

Customers include homes, commercial ventures and developers. "They pay 95 cents per thousand gallons," says Page. "The water is pressurized and pumped to them through a separate distribution system. Their participation is voluntary." The treatment facility itself uses some of the reclaimed water for processes such as makeup of the chlorine solution.

The system was developed through a cooperative funding program with the Southwest Florida Water Management District through a 50/50 money match. The way Tarpon Springs collects, stores and monitors the water to be reused is unique, and it's a homegrown solution.

"In the old days, we had a single reuse tank for our recycled water," says Marcincuk. "If effluent was out of spec, we had no other alternative but to release it to the river. We were letting a valuable commodity go to waste."

Today, the plant operates two recycle tanks with a combined 4-million-gallon capacity. If effluent is out of spec, it is captured in a dedicated tank and then directed back through the plant for retreatment. The second tank holds water available for reuse. The SCADA system [Citect software (Schneider Electric) paired with Allen-Bradley (Rockwell Automation) PLCs and developed with integrator McKim & Creed of Tampa] is tied into the tanks so the staff can monitor water quality and the level in each tank.

"Rob and Ray developed the two-tank system and the SCADA feature," says Smith. "We were the first system in the state to be permitted to operate our reuse system this way. The progressive outlook of the Florida DEP and the Southwest Florida Water Management District are what made it possible."

(continued)

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The Tarpon Springs staff includes, from left, Robert Marcincuk, chief operator; Lloyd Koeing, maintenance mechanic; Mike Swits, operator trainee; Jefe' Jones, operator; Marcella Quinn, operator; Howard Arter, technician II; Cassandra Arter, environmental specialist; Bill Carmer, operator; Linda Hougland, administrative secretary; Kelly Frazier, day shift lead operator; Gregory Murphy, operator; Bob Gangloff, operator; Bill Gatlin, technician II; Ray Page, utilities superintendent; and Phil Green, senior technician.



Kelly Frazier, day shift lead operator, changes the oil on one of the plant's tandem aboveground pumps from ITT Water & Wastewater.

OVER THE TOP

As critical as these process improvements have been to the facility's performance, the staff had to work even harder to push Tarpon Springs over the top. Staff-driven innovations are saving electricity and operating costs.

Before, all of the facility's big pumps were either on or off, draining power unnecessarily and creating surges in plant flow. "We've installed variable-frequency drives (VFDs) on all intermediate pump stations," Page says. "That smooths out the flow and prevents the big swings we used to experience in chlorine usage, for example."

The Tarpon Springs staff has also installed VFDs on the aerators, where speed is based on achieving dissolved oxygen set points; on the chlorine feed to avoid peaks and valleys; and in the wet wells to control pump station flow rates.

Through the use of pump integrators, the staff can obtain maximum pump capacity more efficiently. Before, pumps would run at 100 percent capacity all the time. Now they're coupled with a lag pump to produce the same capacity with less energy. "By pairing the pumps at their most efficient point, we get maximum pumping capacity and efficiency," Page says. About 20 pumps around the facility are set up this way.

In addition, the facility has switched to premium-efficiency motors, which are "the most efficient you can get," Page says.

STAFFED TO SUCCEED

With energy efficiency and process perfection as daily objectives, the Tarpon Springs team has made sure to maintain the required in-house expertise. An electrician is on site, and the facility maintains its own electrical and mechanical shop — a 20- by 30-foot building alongside the solids handling facility.

"We have experienced welders on staff," says Smith. "When we hire, we're looking for mechanical and electrical skills. We try to do as much as we can ourselves and reduce our costs for

"In 1999, we were under a consent decree. But most of what we've done to improve treatment here, we've done on our own."

RAY PAGE

Utilities superintendent
Ray Page



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outside contractors. All staff members are responsible for our success on a daily basis."

The facility maintains a stock of spare parts for every piece of equipment. And staffing is handled with an eye to economy, as well. "We used to operate with two people, around the clock," says Smith. "Now, with our SCADA system, we can operate with one person on the afternoon and midnight shifts. We haven't fired anyone because of this, but we've reduced staff where possible as people retire or leave for other jobs."

SEEING THE LIGHT

The Tarpon Springs plant has done such a good job of improving efficiency and saving money that other organizations have noticed and are taking advantage of the facility's money-saving programs.

The facility's SCADA system controls the lighting at local athletic fields operated by the city. The program keeps tabs on who is using the lights and how long they're on. Charges are then based on actual use, promoting conservation. "It's more accountable," says Smith. "It provides a paper trail showing how the lights are used. It's a lot better than simply turning the breaker on and off."

The facility even applies energy efficiency to transportation. Known to staffers as the Green Bean, one of the plant vehicles operates on batteries powered by solar panels that cover its entire roof. The Bean is similar to a four-seat golf cart and is certified to DOT standards. It is equipped with lights, turn signals, safety belts and other required items and is registered as a car. Staffers drive the Bean around the facility and along the half-mile road to the river outfall.

Top speed is 21 miles per hour — perhaps about the same as that little engine as it crested the hill and headed down. **tpo**

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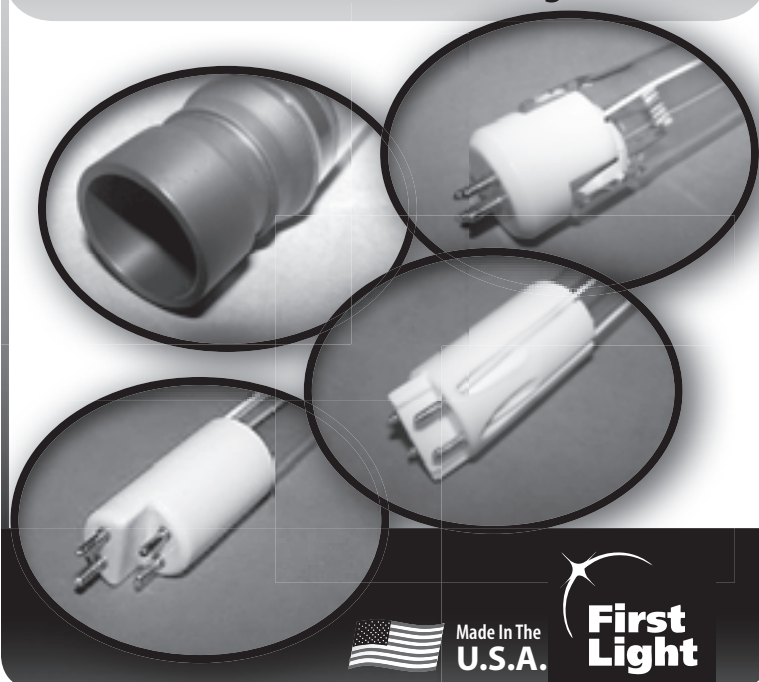
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Ever Greener

A SERIES OF INNOVATIONS BRING SUBSTANTIAL GAINS IN SELF-SUFFICIENCY AND ENERGY EFFICIENCY FOR THE WASTEWATER TREATMENT PLANT IN WACO, TEXAS

By Doug Day

Energy efficiency is always on the mind of the staff at the Waco (Texas) Metropolitan Area Regional Sewerage System. While improving compliance, increasing capacity, and reducing BOD load, management and staff at the wastewater treatment plant are continually looking to save energy.

"The decisions to pursue the green initiatives have been easy," says Kristy Wolter, operations program manager for the City of Waco Water Utilities, which operates the plant for the regional group that also includes the communities of Woodway, Lacy-Lakeview, Lorena, Bellmead, Robinson and Hewitt. "It hasn't just made environmental sense. It makes financial sense." The initiatives have included:

- Digester upgrades.
- Major aeration basin improvements.
- Diversion of fats, oils and grease (FOG) directly to the digesters to expand methane production and reduce treatment process energy consumption.
- Use of lift station emergency generators in a utility load management program.



FOG and high-strength waste that used to be a problem for the Waco plant are now valuable resources. They stimulate production of more biogas for the biosolids dryer and three combined heat and power units.

DRIVING DOWN DEMAND

The wastewater treatment plant has steadily increased efficiency over the last eight years, cutting its energy use by 35 percent through innovative practices for an annual savings of about \$675,000. Its focus on renewable energy and efficiency earned an Environmental Excellence Award from the Texas Commission on Environmental Quality in 2010.

From 2002 to 2005, the plant reduced electricity demand from the grid an average of 12 percent per year by increasing methane production in its anaerobic digesters. It now produces one-third of its own power.

With a current average flow of 25 mgd, the 37.8 mgd (design) plant will soon be generating even more of its own power while increasing its total capacity to 45 mgd and its high-strength waste processing by 200,000 gpd.

That will be achieved when three retired digesters are brought back to life this year and updated with dome covers, new mixers, heat exchangers and waste gas burners to achieve full acetogenic and methanogenic anaerobic digestion.



PHOTOS COURTESY OF CITY OF WACO WATER UTILITIES

Aeration basin improvements that cut energy use by about 35 percent contribute to more sustainable operations at the Waco Metropolitan Area Regional Sewerage System.

"We're not at full two-phase digestion yet," explains Wolter. "We'll repurpose the tanks for the faster acetogenic digestion." The other four will be reserved for methanogenic digestion, making methane production more efficient.

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.

IMPROVED AERATION

Operational quality was at the heart of the plan to improve aeration basin performance in 2003, but energy efficiency was also a goal. The nitrification process was deficient because the diffusers were overworked, causing coarse rather than fine bubbles in the plant's five aeration basins.

The first step was to increase the oxygen supply by increasing the number of fine-bubble diffusers in each basin from 2,800 to 3,500. Dissolved oxygen probes were added to the three zones in each basin to feed the plant's PLC system and enable proper control of the blower inlet and throttling valves.

The \$400,000 project took just 2.4 years to achieve payback. In the first year alone, energy consumption dropped 17 percent. In the years since, energy use has been 22 to 44 percent below the baseline. Better treatment has also reduced chlorine use from a daily average peak of 6,000 pounds per day to a daily average peak of 800 to 1,200 pounds.

Energy savings from aeration basin improvements

YEAR	ANNUAL kWh USE	kWh REDUCTION	COST SAVINGS
2002	14,076,530	N/A	N/A

Aeration Basin Improvements

YEAR	ANNUAL kWh USE	kWh REDUCTION	COST SAVINGS
2003	11,624,105	2,452,425 (17%)	\$ 131,695
2004	11,006,112	3,070,418 (22%)	\$ 199,577
2005	9,201,249	4,875,281 (35%)	\$ 335,907
2006	7,969,924	6,106,606 (43%)	\$ 547,763
2007	7,851,481	6,225,049 (44%)	\$ 715,881
2008	8,949,861	5,126,669 (36%)	\$ 608,536

GREEN PARTNERS

High-strength organics and fats, oils and grease (FOG) used to challenge the Waco plant, which received 33 percent of its daily BOD from industrial customers.

“Wastewater plants aren’t designed to treat such greasy waste, and it can cause blockages in the collection system,” says Wolter. “We converted an unused 40,000 gallon tank into an industrial receiving station in 2006 so customers could truck that waste to us. It bypasses the traditional treatment train, where the most energy is used, and goes directly to the digesters, where it generates more methane than traditional solids.”

Solving the BOD problem held off a costly expansion and in the process increased biogas production. The nine Green Partners involved in the FOG program include local industries, a convenience store, a fast food restaurant, and a convention center. With about six to nine truckloads of FOG and high-strength waste being delivered to the plant daily, the amount of grease going through the treatment process has been cut by 90 percent and solids by 50 percent.

Every month, about 65,000 gallons of FOG and 775,000 gallons of high-strength waste is placed directly into the digesters, generating 50 percent of the gas needed to run the biosolids dryer, while reducing energy use for the digesting treatment process by 30 percent — a savings of about \$120,000 a year. It also reduces loading in the aeration basins, in turn requiring less oxygen and energy to keep the process healthy.

PRODUCING HEAT AND POWER

“When we started this work in 2002, we were using 14 million kWh a year,” says Wolter. “We’re down to 9 million kWh. We’re saving \$675,000 a year. As we continue to grow the program and take in more industrial waste, we hope we’ll be able to continue to use all of the methane we produce.”

Methane not used for the dryer supplements natural gas in three 500 kW Caterpillar combined heat and power units. The plant’s digesters, in turn, receive heat recovered from those units. A planned dryer replacement will include gas cleaning to displace even more, perhaps all, of the dryer’s natural gas demand.

And the environmental benefits don’t end there. “Instead of sending the solids to a landfill, we make Class A biosolids used as fertilizer by agricultural customers and the public,” Wolter says. But 5,000 metric tons per year hasn’t been enough: “We have back orders because it’s a pretty popular product.”

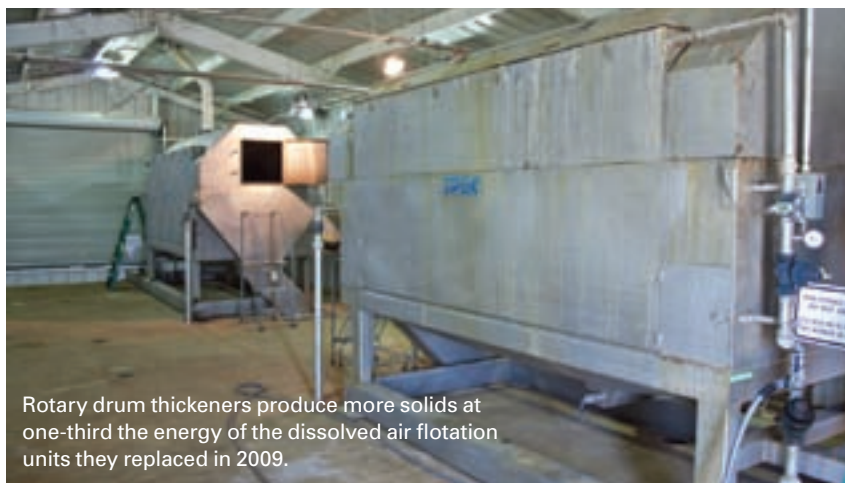
Waco’s unique industrial base includes a meatpacking plant, a candy manufacturer, and a poultry processing facility that all provide energy-rich material. “We’re going to study feather byproducts — whether ground up feathers will give us any useful methane,” says Wolter. Another possibility is adding algae from the drinking water plant’s dissolved air flotation unit to the digesters to further increase methane production.

OTHER UPGRADES

The agency replaced its dissolved air flotation unit in 2009 with rotary drum thickeners that use one-third the energy but produce more solids for the digesters — saving about 500,000 kWh per year.

Use of the lift station emergency generators during times of peak electricity demand has turned them from a source of backup power into a new revenue source. During times of high demand, the generators power the lift stations and reduce load on the area’s electrical grid. In exchange, the local utility pays the plant \$70,000 a year.

Recycling of yellow oil (FOG not contaminated by other wastes) has proven beneficial, as well; keeping it out of the collection system to prevent clogs, bypassing the treatment process to save energy, and creating ten times the methane of other wastewater solids. “We started the Green Turkey Initiative for Thanksgiving in 2009 by set-



Rotary drum thickeners produce more solids at one-third the energy of the dissolved air flotation units they replaced in 2009.

ting up collection sites for used fryer oil,” says Wolter.

Now called Clean Up the Grease, the program has five collection sites centrally located around Waco. “It keeps people from pouring it outside where it can affect stormwater, and keeps them from pouring it down the drain and clogging the collection system,” says Wolter. “We’ve since started picking up fryer oil from restaurants and places like convenience stores and little league parks.”

A dedication to high-quality performance and a keen understanding of the treatment process has allowed Waco to produce clean water while capturing renewable resources to further limit the plant’s impact on the environment.

Details of the Waco aeration basin improvements can be found in a case study in the U.S. EPA “Evaluation of Energy Conservation Measures for Wastewater Treatment Facilities.” Visit www.epa.gov and search for Document No. EPA 832-R-10-005. tpo

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DEEP DIVE

DAVE KALIN DEVOTES HIMSELF FULLY TO EXCEPTIONAL-QUALITY TREATMENT,
AND TO BUILDING AN EFFICIENT PLANT WITH A CROSS-TRAINED AND HIGHLY COMPETENT STAFF

By Jim Force

IT IS THE SUMMER OF 2008. FROM A SMALL BOAT, A SCUBA DIVER descends 20 feet to the bottom of Lake Ontario, more than a quarter-mile from shore. He approaches the outfall of the Town of Webster wastewater treatment plant and takes a grab sample of effluent in a glass jar.

The diver is Dave Kalin, chief operator of the Walter W. Bradley Treatment Plant in Webster, N.Y. He is taking the sample to prove to regulators that because of dilution in the lengthy outfall line, the chlorine residual in the plant's effluent is within permit limits. The finding will make potentially costly changes to the plant's disinfection facility unnecessary.

But there's more. The dive also reveals that the last section of the outfall line is broken — pieces are scattered about the lake bottom. And the diffuser at the end of the line is simply gone. Thus the dive, at Kalin's expense, helped the city avoid the cost of upgrading its disinfection unit, while revealing a problem that could have gone unnoticed for years, becoming progressively more expensive to repair.

This is typical of Kalin, 2010 winner of the State of New York Uhl T. Mann Award for operational excellence. "He always asks, 'What do I need to do to get this done,'" says colleague Jim Oates, plant operator. "In the six years he's been here, he has accomplished a lot." That he has. In the Mann award application, Kalin was credited with:

- Establishing the city's pretreatment program.
- Implementing extensive safety procedures.
- Writing the town's first sewer overflow and spill-response programs.
- Preparing the town's five-year plan as mandated by the state.
- Overseeing numerous process improvements.
- Developing training, public relations, and overall effective management and communications practices.



Chief operator Dave Kalin. (Photography by Jay Palmer)

HOMETOWN BOY

At 54, Kalin has come a long way from growing up in the Town of Webster, on the Lake Ontario shore, and graduating from high school there in 1974. "I remember how polluted the Irondequoit Bay was then," he recalls. "I had a boat and I liked to fish. The water quality was very poor. I could see the pollution, and it was a shame."

Like many veterans in the clean-water profession, Kalin went right to work as a laborer at the treatment plant at age 18, and moved up quickly. He took courses at the State University of New York-Morrisville and Syracuse University to obtain certification and earn his operator's license. He took correspondence courses from Michigan State University and California State University at Sacramento.

"When I started," he says, "I really wasn't thinking that much about cleaning the water, but the job opening was there, and once I got into it I enjoyed it and found it quite interesting. I took the initiative to get certified and make a career out of it."

After a stint as a pump and process specialist at the 120 mgd Van Lare Wastewater Treatment Plant, which serves greater Rochester, Kalin returned to his hometown plant in 1979 and became the second in command in 2004. Two years later, he was named chief operator.

HIGH-QUALITY PRODUCT

The Webster facility treats wastewater collected in a 300-mile network of sewers and 21 pumping stations. It is rated for 75 mgd and treats an average of about 6.0 mgd. The original plant was a trickling filter operation, dating back to 1968. It was upgraded in 1980–82, and today uses activated sludge to turn out an exceptional-quality effluent, achieving removals of 93 to 97 percent for TSS and BOD.

"We're reusing more and more of our own effluent. We've seen about a 30 percent reduction in our water consumption, saving more than \$300 per month."

DAVE KALIN

Dave Kalin shows samples of influent and effluent.

profile



Dave Kalin, Walter W. Bradley Wastewater Treatment Plant, Town of Webster, N.Y.

POSITION: Chief plant operator

EXPERIENCE: 36 years

EDUCATION: Coursework at SUNY-Morrisville, Syracuse University, Michigan State University, and California State at Sacramento

AWARDS: 2010 Uhl T. Mann Award for operational excellence, New York WEA

CERTIFICATION: New York State Class 4A Operator, wastewater treatment

GOALS: Finish 40 years in the business; get every part of the plant updated and leave it in the best operating condition before retirement

GPS COORDINATES: Latitude: 43°15'34.96"N; Longitude: 77°24'47.22"W



Kalin checks the treatment plant's Andritz centrifuge.



The Walter W. Bradley Wastewater Treatment Plant.

The Walter W. Bradley treatment plant staff includes, from left, Dwayne Hilfiker, laborer; Jim Willison, operator; Adam Bronson, maintenance mechanic; Ken Dickinson, maintenance mechanic; Jim Oates, operator; Bryan Bundshuh, maintenance mechanic; Andy Merkel, maintenance mechanic; Denise Jones, office manager; and Dave Kalin, chief operator.

Ferric chloride is added for phosphorus removal, and the plant has nitrogen limits that it meets consistently. Three anaerobic digesters stabilize the waste biosolids and generate biogas, used to heat the digesters and the solids-handling building. A centrifuge dewateres the biosolids, and the cake is landfilled.

Sodium hypochlorite disinfects the water before discharge. Some of the effluent is reused in the plant for



“When someone’s out sick, or on vacation, cross-training helps us fill the gap. Plus, nobody feels their job is more difficult or important than anyone else’s. There’s no finger-pointing here. We get along together.”

DAVE KALIN

washing and rinsing equipment. The plant also treats some wastewater from the nearby Village of Penfield.

STRAIGHT TO WORK

As the new person in charge at Webster, Kalin wasted little time making needed changes. He was instrumental in acquiring and installing the centrifuge (Andritz), saving the town about \$40,000 a year in biosolids hauling costs. He also initiated using Bioxide (Siemens) to control odors from biosolids operations and at the landfill, and led the adoption of a new SCADA system for plant controls.

By fine-tuning the digester process and using the biogas as fuel (Cannon mixers from Infilco Degremont, H.B. Smith boiler), Kalin’s team is saving even more in energy costs. “We estimate about \$20,000 a year in savings there,” Kalin says.

The water reuse plan is paying off, as well. “We’re reusing more and more of our own effluent,” Kalin says. “We’ve seen about a 30 percent reduction in our water consumption, saving more than \$300 per month.” Other improvements include revamping the bar screen and grit removal facilities for longer life and replacing old coarse-bubble diffusers with fine-bubble ceramic diffusers (ITT Water & Wastewater – Sanitaire), cutting the energy requirements for aeration from 300 hp to 75 hp.

EFFECTIVE LEADER

All that is good, but when his staff nominated Kalin for the prestigious Mann Award last year, they emphasized his management skills and leadership, especially in safety, training, and industrial pretreatment.

“The key to safe operations is training, training, training,” says Kalin, who has been a safety trainer most of his clean-water career. “This can be a dangerous profession. Confined spaces, lack of oxygen, vehicle operation. I can remember in the early days operators going into a multiple-hearth furnace with only a dust mask on. No gas detectors, no second person on site.”

In fact, he believes improvement in safety procedures is one of the biggest advances he’s seen in wastewater operations. “Today, we use safety videos, and we train our staff in everything from CPR to driver education, using OSHA-approved seminars,” he says. “I’m proud of our record here — no lost time accidents, no one hurt or killed.”

Oates adds, “Under Dave’s tenure, the town has all of its gas detectors and meters calibrated quarterly, and confined-space permits and lock-out/tag-out have become routine.”

Kalin is also a big believer in cross-training. His responsibilities extend beyond the treatment plant to the town’s collection system, and so his staff is trained in both. “Our six employees spend two weeks at the plant, followed by two weeks in our collections system,” he says. “When someone’s out sick,

WATER LOVER

Growing up along the shores of Lake Ontario, Dave Kalin always had an affinity for water. He owned a 26-foot Sea Ray cabin cruiser when his two boys were young and took trips all over Lake Ontario and the lakes around Rochester.

“We’d often go up into 1,000 Islands area, and once we took a three-week trip up the Rideau Canal all the way to Ottawa,” he recalls. He has a rowboat now and still loves to fish for bass, trout, and salmon, now plentiful in the Great Lakes.

His best catch? “An 18-and-a-half pound salmon. I hooked it right at the end of a local fishing contest, so it wasn’t recorded in the top ten. But it would have been had I caught it on the first or second day.”

He learned to SCUBA dive at age 32. One of his most memorable journeys was a 100-foot drop to the wreck of an 1830s schooner near Kingston, Ont. He continues to fish, boat and dive, but he is concerned about invasive species now.

“The lake is clear as can be, and some of that is due to the presence of zebra mussels. We’re beginning to see the Asian gobi (a fish common in aquariums, and also brought into the lakes through the ballast of foreign ships). It’s having an impact on the bass population because it eats the bass eggs.”

"He always asks, 'What do I need to do to get this done.' In the six years he's been here, he has accomplished a lot."

JIM OATES

or on vacation, cross-training helps us fill the gap. Plus, nobody feels their job is more difficult or important than anyone else's."

That helps boost morale, another important factor in successful management. "There's no finger-pointing here," says Kalin. "We get along together."

MEDICINE RECYCLING

The Webster crew waives its afternoon break so that the staff can have more time together in the mornings. "On Thursdays, two of our folks are in charge of making breakfast for the staff — breakfast sandwiches, eggs and bacon," he says. "We enjoy doing that."

With responsibilities for the town's industrial pretreatment program, Kalin and the Webster treatment plant take part in the local pharmaceuticals recycling program. "It's big here," Kalin says. "We're in our third year of hosting the waste pharmaceutical products right here at the plant." Kalin has worked with the state departments of environmental protection and health so that residents can drive in and drop off pharmaceuticals in a barrel, which is overseen and secured by local law enforcement.

"In 2009, we collected over 400 pounds of drugs and 16 pounds of needles from some 87 participants," says Kalin. "The material is taken to Niagara Falls, where it is incinerated to generate power. It helps keep these materials out of the sewers, and off the bathroom shelves where kids might get at them."

That's the kind of collaborative approach Kalin takes with all his activities. His staff members compliment him on his public education efforts and his ability to keep the town board and local citizens aware of the treatment plant's importance to the community. Despite his soft-spoken nature, he communicates effectively, especially in budget presentations to town officials.

"A good supervisor is cost-conscious," he says. "We work hard to keep our board happy and keep costs down." In fact, the sewer rate in Webster is \$162.50 per year per resident and has held steady for 10 years. It's about \$100 per unit lower than costs used to be, and that has been made possible by reducing staff and improving operations to the most efficient levels.

TACKLING CHLORINE

As for that chlorine issue for which Kalin made his dive, the town is under orders to reduce chlorine residual in its effluent from 2.0 to 0.25 mg/l. Kalin visited the outfall up close after his staff and the engineering consultant had performed dye tests, a dilution study, flow metering, and total chlorine decay studies — all to prove to regulators that chlorine residual was not an issue in the effluent.

The damage he found in the outfall line is being addressed. "We're getting the pipe fixed, and we're replacing the diffusers so the town can meet the schedule of compliance in the latest SPDES permit," Kalin says. "We're 99 percent sure we'll get some stimulus money for the project. We're getting it done." **tpo**

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Aerial view of the Western Racine County Sewerage District treatment plant.



Ahead of the Curve

SOFTWARE IMPROVES THE SPEED AND QUALITY OF POWER MEASUREMENT, HELPING A WISCONSIN SANITARY DISTRICT TO CONSERVE ENERGY AND REDUCE COSTS

By Scottie Dayton

When the Western Racine County (Wis.) Sewerage District upgraded the capacity of its activated sludge extended aeration treatment plant from 1.3 to 2.5 mgd in 2005, the expansion doubled the budget and the electric bill.

The upgrade included a new sewage receiving station, a mechanical bar screen to replace a comminutor, a second oxidation ditch and clarifier, and a UV disinfection system to replace the chlorine system.

Superintendent Jeff Bratz at first was too busy getting the plant running to think about energy. "As I found free time, I realized that we had to find creative ways to save money if we were to pay for the facility on a diminishing budget," he says.

The upgrade increased organic capacity from 2,300 to 3,578 pounds per day of biodegradable material, but the anticipated growth never happened. Bratz wondered why he was using twice as much power to process only a slight increase in organic loading.

To track energy consumption, Bratz applied for a grant from the state's Focus on Energy program to help purchase EnergyVIEW software from IntelliSys Information Systems. Linked to the plant's SCADA system, the application meters, measures, stores and analyzes energy data. In the first three months, the \$5,000 program gave Bratz the tools to save an estimated \$20,000 to \$25,000 per year on energy.

REAL-TIME ANALYSIS

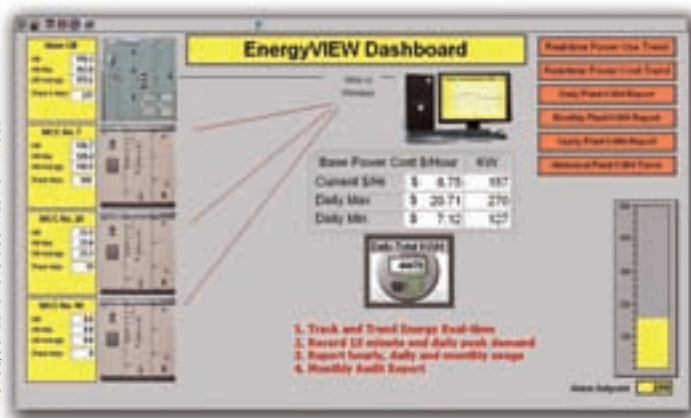
The only hardware Bratz had to install was a metering device on the main power line to the plant to record the draw for kilowatts and report in kilowatt-hours. A real-time display enabled him to trend transducer outputs in high resolution.

The trend pan-and-zoom features gave him second-by-second analysis of real-time data. The software also allowed him to generate yearly, monthly, weekly, and daily charts, configure 15-minute peak demand or hourly data by the minute, and set warnings and alarms if preset values were about to be exceeded.

"Real-time monitoring and reporting enabled me to see and record how much energy we were using at any time

of the day and approximately how much it cost," says Bratz. "I kind of knew which processes were using the most electricity, but it's easier

PHOTOS/SCREENSHOTS COURTESY OF WRCSO



The EnergyVIEW software main dashboard provides an at-a-glance summary of key energy usage information.

to convince the sewer commission to take action when they can see it on paper."

The bulk of consumption occurred in the two oxidation ditches and three sludge tank mixers. The ditches each have two 40 hp and two 20 hp motors. "I had 240 horsepower running constantly and no way to slow down the motors when there was excess dissolved oxygen at night," says Bratz.

Contractors installed variable-speed drives on the eight motors and attached them to oxygen probes in the tanks to maintain a constant DO level. "We're anticipating an energy savings of 20 percent on the ditches," says Bratz. "That's huge, provided the utility doesn't raise the rates to compensate for the income it is losing."

The work, completed by the end of 2010, qualified the plant for a \$27,000 grant from WE Energies, the local electric utility, to offset the cost of the equipment.

POWER BOOSTER

The software also showed that the sludge mixers each drew 60 amps. The facility normally operated at a peak demand of 200 kW or less, but mixing sludge increased demand by 180 kW.

"The utility charges \$11.35 per kilowatt for peak demand and \$1.76 per kilowatt for non-peak demand," says Bratz. "That's a differ-



District superintendent Jeff Bratz.

Share Your Idea

TPD 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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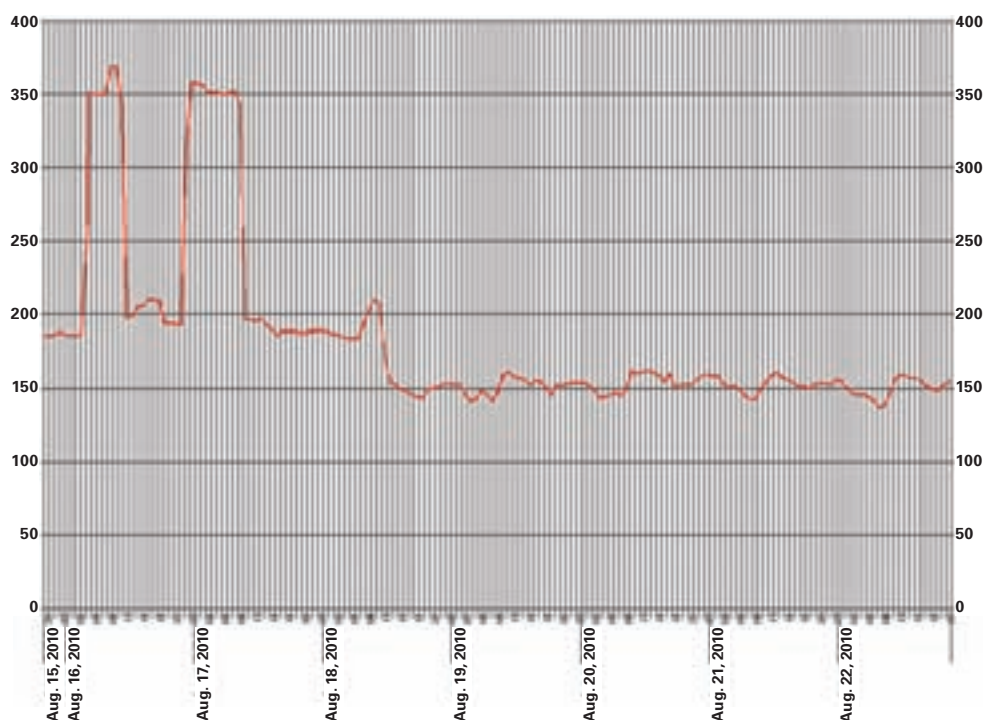
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"I kind of knew which processes were using the most electricity, but it's easier to convince the sewer commission to take action when they can see it on paper."

JEFF BRATZ

Total Facility Power Use KWH

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ence of \$9.59. It's almost 10 times cheaper to mix sludge at night. While this appears to be a no-brainer, I had never analyzed it. If I had to haul sludge tomorrow, I simply turned on the mixers.

"I think many operators do those things unconsciously. I did until the program put the evidence right in my face. It was a 'Holy cow! Why didn't I think of that before?' moment." The program displays demand in graph and number form.

This year, Bratz is analyzing the power usage of two screw pumps that bring influent into the plant. "I operate one at a time, but the 75 hp motor runs constantly," he says. "We're investigating the possibility of shutting down the big motor and running a smaller pump at night when flows are lower."

Bratz is also investigating other changes. "The return pumps run continuously in the lift stations," he says. "Maybe we can turn them on and off. Maybe I can run the dissolved air floatation unit for sludge thickening half a day instead of a whole day. EnergyVIEW makes it possible to look at so many things." **tpo**

An EnergyVIEW power trend graph shows effect of sludge mixing equipment on electric power usage.

Partners in Training

MINNESOTA REGULATORS AND OPERATORS WORK TOGETHER ON EDUCATIONAL PROGRAMS TO ADVANCE KNOWLEDGE IN TREATMENT PLANT AND COLLECTION SYSTEM PROCESSES

By Ted J. Rulseh

Since the 1970s, the Minnesota Pollution Control Agency has offered an extensive wastewater training and certification program. It began with an Annual Sewer School and grew to include training in a variety of topics, including activated sludge, stabilization ponds, laboratory, trickling filters, spray irrigation, aerated ponds, lift stations, supervisory management, land application of biosolids, wastewater treatment technology and collection systems.

The size of the training unit has declined with budget challenges, notably during the recent economic decline. Still, MPCA continues to sponsor two major conferences per year (wastewater treatment and collection systems), along with several two- and three-day seminars and many one-day classes.

Nutrient removal was added to the roster in 2009, with an accompanying manual. Members of the unit also provide hands-on assistance and troubleshooting to wastewater treatment plants throughout the state. Together, the unit's members have hundreds of years of experience in wastewater operation, training and certification.

A defining feature of the unit is its close relationship with the professional associations in the wastewater field, notably the Central States Water Environment Association and the Minnesota Wastewater Operators Association. Training units and association members support each other in handling committee work and putting together training programs and conferences.

These groups also work together to produce an annual training

"Our ultimate goal is to have well-run treatment plants — to help current and future wastewater operators run their plants, keep up with the times, and stay in compliance with our regulations."

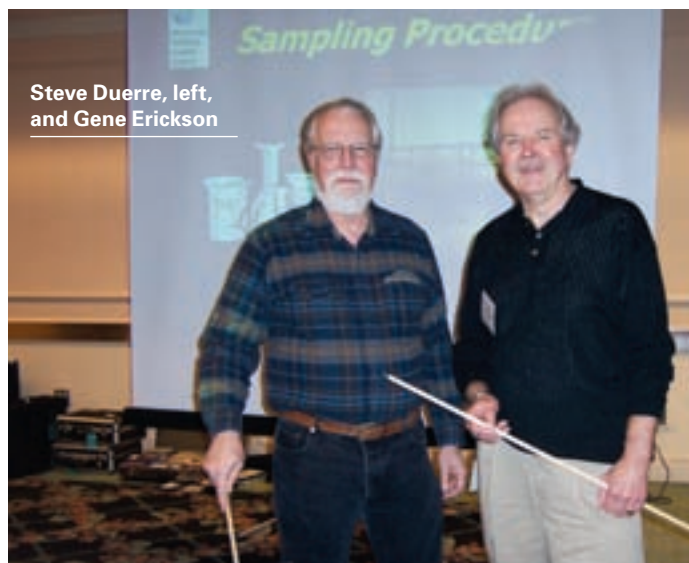
STEVE DUERRE

calendar that serves the needs of more than 2,000 wastewater and collection system professionals.

Gene Erickson, an MPCA engineer who supports the training program, and Steve Duerre, an MPCA pollution control specialist and trainer, talked about the program in an interview with *Treatment Plant Operator*.

tpo: Is the MPCA training program homegrown, or does it rely on outside resources such as the Sacramento program?

Erickson: We have actually developed our own training programs and manuals for wastewater treatment technology, stabilization ponds, land application of biosolids, nutrient removal, and math — both for wastewater and collection systems.



Steve Duerre, left, and Gene Erickson

We list the Sacramento books as reference for our certification program, for people who want to know what to study to prepare for their exams. Our course on collection system basics is modeled after the Sacramento State collection system books.

tpo: What would you say makes your training program unique?

Duerre: One thing that's unique about us is that in addition to wastewater operators, we run certification and training programs for collection system operators, land application of municipal biosolids and industrial byproducts, and industrial spray irrigation.

Erickson: Another unique element is the relationships we've built with the operators. We're becoming familiar with them, and they're becoming familiar with us. If they have an issue, like why is my activated sludge looking black today, or why is my pond not responding the way it's supposed to, they're really comfortable about calling us.

Even though we're the regulatory agency, they don't see us so much as the cops. They see us as people they can call and ask questions. That makes a lot of difference.

We're broken up into regions in Minnesota and we often call on members of our compliance staff to help with training. That way they understand where the operators are coming from, and the operators understand them a little bit.

So when the compliance people come out and do their inspections, the operators feel free to ask them questions and get advice. In

(continued)



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our classes we always make it a point to be sure the operators understand what the rules are. That way, when they do get inspected by the compliance staff, it's not foreign to them.

tpo: How important is continuing education for operators today versus a few years or a couple of decades ago?

Duerre: It's hugely more important than a few years ago because of the way things keep changing so fast. With all the new requirements, tighter permit limits and new technologies, it seems like every time they turn around they get hit with something new. Continuing education is essential now to enable the operators to keep up.

Our ultimate goal is to have well-run treatment plants — to help current and future wastewater operators run their plants, keep up with the times, and stay in compliance with our regulations.

tpo: Do your training programs combine classroom sessions with actual hands-on practice?

Erickson: The training programs are given in a classroom setting. The important thing is the interaction, where they learn from each other. We stress in each course that while there's an instructor up in front doing a presentation, there are many instructors sitting down in the room who have a great deal of knowledge and experience.

We stress the importance of sharing that with each other, and they do. We always provide a lunch, and when they sit down at a table, they talk about what they all have in common, and that's wastewater treatment. The same thing happens at night at the hotel when they get together for dinner.

tpo: How does your training unit interact with the industry associations?

Erickson: Back in the 1970s, we had a supervisor, Bill Sexauer, who we call the godfather of training. He actually started this unit, and he had a unique vision. He was a big advocate of getting us to be members of the operators associations — being a part of their groups and being involved in their committees and their training.

Duerre: We work primarily with the Minnesota Wastewater Operators Association. I'm on several of their committees, and Gene is, too. We help them plan their programs and help them put on their training.

Erickson: The operators are divided into six sections in the state. They have quarterly section meetings and an annual conference. We help plan their conference, and they help us plan our two conferences. We share resources and speakers back and forth.

tpo: How heavily does your program emphasize collection systems?

Erickson: Collection system certification is mandatory in Minnesota, and we have an excellent training program for collection system operators. We have an annual two-and-a-half-day conference with six concurrent sessions, where we cover sewer cleaning, I&I, pump maintenance — just about everything a collection system operator needs to know. We get in the neighborhood of 400 or 450 operators coming every year.

We also offer a basic collection system conference once a year as an exam refresher and a place to learn about the rules and regulations they have to comply with.

tpo: What is the single biggest training need in the profession today?

Duerre: The single greatest training need is learning how to

deal with the current economic conditions — how to do more with less. Budgets are getting cut, and employees aren't being replaced. Operators need to learn how to become more efficient and manage their assets more effectively.

Ironically, when budgets are cut, training seems to be one of the first items on the chopping block. We are seeing more operators getting their certification renewal hours by going to something that is close by and free or inexpensive, even if the topic is not entirely relevant to their situation.

Erickson: As a profession, we need to convince the cities to continue to allow their operators to come to training. Certification isn't

“We need to convince the cities to continue to allow their operators to come to training. It's through certification courses that they learn new ideas, learn efficient ways of doing things, and learn about the new rules they're being faced with.”

GENE ERICKSON

just something that you need in order to comply. It's through certification courses that they learn new ideas, learn efficient ways of doing things, and learn about the new rules they're being faced with.

tpo: What are some of the biggest challenges operators have to keep up with in today's world?

Duerre: Nutrient regulations are getting stricter and are becoming more and more challenging to meet. That's especially true in older plants that were not really designed for nutrient removal. Having to retrofit or adapt the plant to meet the new permit requirements can be a big challenge.

tpo: How does your training unit make sure the instruction includes the most up-to-date information and concepts possible?

Erickson: We rely on a lot of people. For our two annual conferences, we have a committee of operators, consultants and vendors who help us put together the programs. We sit down and discuss hot topics — what things we think people should know. We consider feedback from the evaluations we received at the previous conference. It's amazing what that committee does for us every year. We're the facilitators. They are the doers. They are up to date. They know what's going on in the profession.

MEMBERS OF THE TEAM

The Minnesota Pollution Control Agency Municipal Wastewater Operator training staff includes Charles Thompson, supervisor; Emily Armistead, training coordinator; Dianne Navratil, wastewater certification officer; Steve Duerre, pollution control specialist (collection systems, wastewater treatment and biosolids); Kay Curtin, pollution control specialist (collection systems and wastewater treatment); and Dave Bodovinitz, pollution control specialist (wastewater treatment, spray irrigation and industrial byproducts).

MPCA staff members who provide training and other support on a part-time basis are Gene Erickson, engineer (collection systems and wastewater treatment); Brad Gillingham, pollution control specialist (wastewater treatment); Craig Schafer, pollution control specialist (wastewater treatment); Pam Meyer, engineer (wastewater treatment); and Jorja DuFresne and Steve Stark, pollution control specialists (biosolids).

(continued)



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Duerre: We are also developing very comprehensive Need-to-Know criteria for each certification level. Our staff member Kay Curtin is leading that effort. We will use those criteria for writing our exams and will incorporate them in our training. We have steering teams and sounding boards consisting of operators who assist us in that effort.

tpo: How do wastewater training programs need to adapt in the face of changing times?

Duerre: I think we need to adapt to the computer age. I'm still sold on the old model of face-to-face training, but I can see that we're becoming more Internet-based, and we'll need to start looking at vehicles like webinars to keep costs down and reach more people. I still think there's a big difference between actually being there and sitting in front of a computer. But online is where we seem to be heading.

"I think we need to adapt to the computer age. I'm still sold on the old model of face-to-face training, but I can see that we're becoming more Internet-based, and we'll need to start looking at vehicles like Webinars to keep costs down and reach more people."

STEVE DUERRE

Erickson: As the baby boomers retire, the younger people coming up are more used to the online world. They may have taken a lot of their college courses online. That's how they learned. There will be a switch. It's going to evolve over time.

tpo: What is the role of training in elevating the stature of the profession?

Erickson: Anytime you have people who are certified, that does add credibility to the profession. It took those people a lot of work to become certified — not only passing the exams but the continuing education that goes with it. It elevates the whole profession.

Duerre: Wastewater operators are the ultimate environmentalists. I think certification is a badge of pride for the operators and lends an air of professionalism to the public perception.

tpo: From a trainer's perspective, what advice would you give to young people interested in clean-water careers?

Duerre: Study everything. Wastewater operators have to wear many hats. They have to be scientists, mathematicians, mechanics, plumbers, electricians. People really get surprised at what you have to know.

If you want to get into this business, be willing to move around at the beginning. Start at a small plant, get some experience, and if you're willing to stick with it, with all the baby boomers retiring, you can almost write your own ticket as you move up through the ranks. There's a really good future for young people coming into the profession. **tpo**

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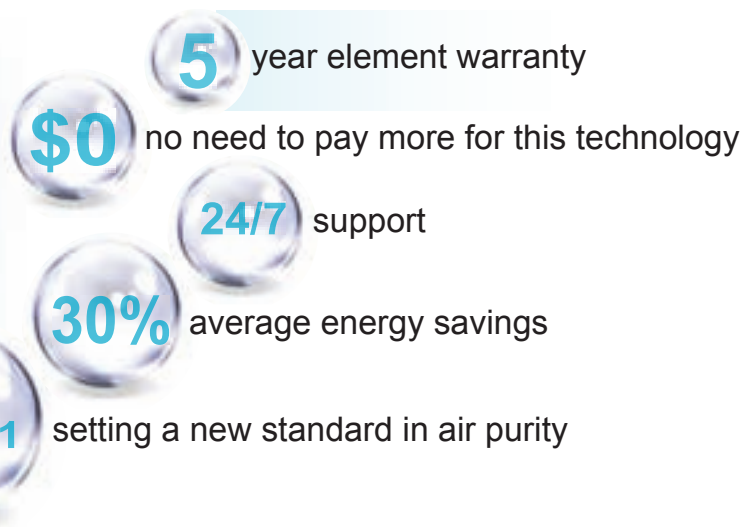
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A COMBINATION OF TECHNOLOGIES HELPS A MINNESOTA CITY COMPLY WITH TIGHT PHOSPHORUS LIMITS AND PRODUCE REUSE-QUALITY WATER

By Ted J. Rulseh

Wastewater treatment in the City of Mankato, Minn., means more than sending clean effluent back into the local watercourse. It means treating that effluent to reuse standards, mainly so that a nearby electric power plant can use it to cool the turbines.

At the same time, the wastewater treatment plant must meet new water-quality requirements that limit cities along the Minnesota River to 1 mg/l of total phosphorus in effluent by 2015 to help prevent algae blooms and related pollution problems.

Two technologies from Kruger Inc. (a part of Veolia Water Solutions & Technologies) helped the city achieve those aims. A compact clarification system provides phosphorus removal for the plant's current and future needs, while a disc filter system provides solids removal to meet reuse requirements.

Wastewater facility effluent typically contains less than 0.4 mg/l of total phosphorus, and water from the city's Water Reclamation Facility meets California Title 22 Standards for Water Reuse.

The project has received a 2006 Governor's MnGREAT! Award (Minnesota Government Reaching Environmental Achievements Together), and a 2007 Project of the Year Award from the Minnesota chapter of the American Public Works Association, in the category for projects costing more than \$10 million.

SIGNIFICANT SAVINGS

The original Mankato treatment plant was built in the mid 1950s. A major expansion in 1974 added secondary treatment. Three equalization basins were added in 1985, and an upgrade in 2000 added capacity along with phosphorus and ammonia reduction. The Water Reclamation Facility was built in 2006.

The wastewater facility (11.25 mgd design, 22.0 mgd monthly maximum) is owned and operated by Mankato and also serves North Mankato, Eagle Lake, South Bend Township, Skyline Village, Lake Washington District, and the City of Madison Lake. Its effluent flows to the Water Reclamation Facility, whose effluent is pumped underground to serve as cooling tower water for the Mankato Energy Center, a privately owned electric power plant 1.5 miles away.

Wastewater treatment plant superintendent James Bruender reports that the energy center receives water as needed in line with demand for electricity. Monthly average flows range from lows of about 1 mgd to nearly 3 mgd during the peak winter heating and summer air conditioning seasons.

The Mankato reuse project has received a 2006 Governor's MnGREAT! Award (Minnesota Government Reaching Environmental Achievements Together).



PHOTOS COURTESY OF KRUGER INC.

After wastewater effluent flows through the ACTIFLO process, it enters the Hydrotech Discfilter (Kruger), which provides additional filtration to meet reuse requirements focused on solids and turbidity reduction.

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The cooling process evaporates 75 percent of the treated water, and the remainder returns to the wastewater treatment plant, where it is mixed with effluent and discharged to the Minnesota River.

Without the reclamation system, the city would have had to supply water from surface and groundwater sources to accommodate cooling for the energy center. The process saves the city an estimated 680 million gallons of water and \$15 million in potable water costs per year. Besides preserving its natural water supply and saving money, the system turned a waste into a resource. The water reuse project was the first of its kind in Minnesota.

TECHNOLOGIES AT WORK

The city, in partnership with Calpine Corporation, retained the Black & Veatch consulting firm to design the treatment solution. The two-stage treatment process combines the ACTIFLO and Hydrotech Discfilter processes from Kruger.

Wastewater plant effluent first enters the ACTIFLO process for phosphorus removal. This compact clarification system combines coagulation, flocculation, and sedimentation, using microsand as seed for floc formation. The microsand provides surface area that enhances flocculation and acts as a ballast to speed settling.



The water then flows to the Hydrotech Discfilter, which provides additional filtration to meet reuse requirements focused on solids and turbidity reduction. Designed for fine solids removal, the system contains woven cloth filter elements installed on multiple discs and using an inside-out flow pattern.

Water flows by gravity into the filter segments from a center drum. The media mounted on both sides of the partially submerged discs separates the solids out. The filtered water flows through the disc media into the collection tank. Once solids have accumulated on the inside of the media, the discs are cleaned by an automatic counter-current backwash system.

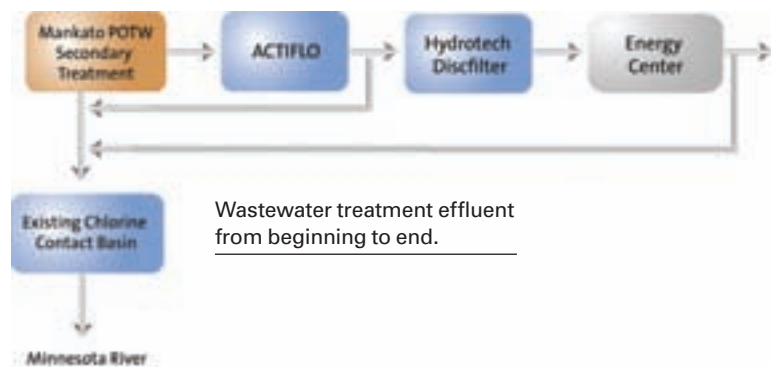
“Our turbidity, averages about 0.8 NTU after the filters. Our permit requires 2.0 NTU, and we typically don’t go over 1.0 NTU.”

JAMES BRUENDER

“Our turbidity, averages about 0.8 NTU after the filters,” says Bruender. “Our permit requires 2.0 NTU, and we typically don’t go over 1.0 NTU.”

EASY OPERATION

Both technologies are highly automated and operate through the facilities’ SCADA system. “Maintenance of the ACTIFLO process consists of cleaning the lamellar tubes once a week,” notes plant



operator Jason Westphal. “It takes about 15 minutes to drain the system down and hose off the tubes inside and out.”

About once a month, the tertiary filter is cleaned with Super Iron Out rust remover to eliminate iron residue that results from addition of ferric chloride upstream for phosphorus removal.

“The Kruger support and operations people have been very helpful during startup and with troubleshooting,” notes Bruender. “Both systems have worked well since they were installed in 2006.” **tpo**



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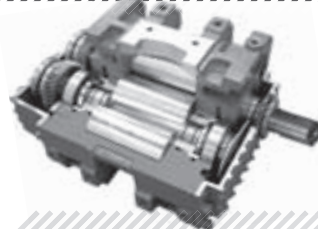
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Denitrification: A Unique Approach

THE LITTLETON/ENGLEWOOD WASTEWATER TREATMENT PLANT APPLIES AN INNOVATIVE TWO-PART STRATEGY FOR HIGHLY COST-EFFECTIVE NITRATE REMOVAL

By Jim Tallent and Greg Farmer

In 2001, the Littleton/Englewood Wastewater Treatment Plant began design of its Phase 2 expansion from 36 mgd to 50 mgd. At the same time, the Colorado Department of Public Health and Environment was conducting a total maximum daily load (TMDL) study of Segment 14 of the South Platte River in Denver, potentially affecting future discharge permit limits.

To meet the compliance schedule for nitrate removal set in the plant's existing discharge permit, it was necessary and most cost effective to include denitrification in the design of the expansion to meet anticipated (and not yet specified) total inorganic nitrogen (TIN) requirements.

The denitrification design incorporates innovative features to increase operational control, reduce capital construction expense, and reduce operation and maintenance costs for nitrate removal.

WATER QUALITY CHALLENGES

Used for recreation and drinking water, Segment 14 of the South Platte River is identified as an impaired segment for several parameters, the most important being nitrogen.

The denitrification design incorporates innovative features to increase operational control, reduce capital construction expense, and reduce operation and maintenance costs for nitrate removal.

Facing imminent nitrogen discharge limits, the plant took an innovative approach. Facility staff and engineering consultants Brown and Caldwell recommended, developed and designed two system enhancements:

- An innovative denitrification filter design.
- A newly designed in-plant nitrate recycling system.

FILTER INNOVATIONS

After an alternatives analysis and pilot testing of denitrification processes, the plant team selected the Severn Trent Services TETRA Denite filter design with eight individual downflow filters. This design provides a substrate for biological removal of nitrate along with solids filtration and best addresses anticipated phosphorus removal requirements in the future.

Using methanol as a carbon source for denitrifying microorganisms, the typical Severn Trent system approach is to apply methanol to the entire process flow. After looking at many operating Severn Trent denitrification systems, the Littleton/Englewood team recommended several design modifications.

In the Littleton/Englewood system, each filter was designed with an individual chemical feed system for denitrification. Filter influent flow distribution, using cutthroat flumes, also provides maximum flexibility in optional operating modes.

Since only partial denitrification is needed at certain times of the year, denitrification filters can be operated independently (in denitrification or filtration-only mode) to meet variable discharge limitations, while optimizing use of methanol. To attain this level of flexibility, an advanced process control strategy and instrumentation were included for each filter.



Maintenance is performed on the facility's ChemScan denitrification analyzer.

OPPOSITE PAGE: The Severn Trent Services TETRA Denite filter design with eight individual downflow filters provides a substrate for biological removal of nitrate along with solids filtration and best addresses anticipated phosphorus removal requirements in the future.

During pre-design meetings, parties debated the wisdom of a complex process control strategy using individually controlled filters. However, further evaluation and design discussion focused on the benefits of individual-filter denitrification control, and Severn Trent ultimately patented those innovations.

NITRATE RECYCLING

The recycling of a nitrate-rich process stream into the plant influent is truly innovative. It is theorized¹ that denitrification may occur in carbonaceous trickling filters. The Littleton/ Englewood plant, which operates trickling filters as part of secondary treatment, implemented a variation of the recycle stream concept as a way to test the theory and temporarily reduce TIN.

In operation since August 2001, the system used existing infrastructure to provide “nearly free” nitrate removal while yielding other environmental benefits. As one side benefit to this nitrified effluent return (NER), plant staff noticed that odors normally gener-

ated in the primary clarifiers were not as noticeable. Testing confirmed that hydrogen sulfide production was virtually eliminated while nitrate was recycled via NER.

In addition, Severn Trent filtration, whether in the nitrate removal or filtration-only mode, has shown a benefit in the facility's chlorine-based disinfection system. *E. coli* levels dropped from an average of approximately 60 colonies/100 ml to typically 4 colonies/100 ml at present, with no changes in disinfection system design.

As a result of testing, the plant team designed a full-scale NER system to take advantage of existing nitrate-reducing capabilities within the treatment process. The NER system also provides a relatively constant hydraulic flow within the facility, allowing for more stable operation.



Since only partial denitrification is needed at certain times of the year, denitrification filters can be operated independently (in denitrification or filtration-only mode) to meet variable discharge limitations, while optimizing use of methanol.

By using a combination of denitrification filters and nitrate-rich process flow recycling, daily TIN and ammonia discharge limitations are met while providing capital construction savings, operational cost optimization, and other environmental benefits.

BENEFITS QUANTIFIED

The Littleton/Englewood plant's denitrification system design has led to several accomplishments:

- By reducing the need for redundant treatment capacity in the denitrification filter process, the inclusion of the NER system in the Phase 2 design has reduced denitrification filter capital construction costs by about \$3 million. As a result of this design, the NER system is capable of recycling up to 50 percent of plant design flow.

- In addition to construction savings, NER reduces the nitrate load to the denitrification system. Based on 1,500 pounds of nitrate removed per day, recent cost analysis (including related electrical/methanol expenses) indicates it costs \$0.69 per pound of nitrate removed in the denitrification process, versus \$0.24 per pound of nitrate removed via NER. Overall, NER operation reduces denitrification operation and maintenance costs by about \$246,000 per year.
- Process optimization efforts have also enabled the plant to discontinue methanol application for four months of the year (May through August) and rely on NER alone to meet discharge requirements. That constitutes a savings of about 750 gallons of methanol per day — or \$134,000 for the four-month period, assuming a methanol price of \$1.49 per gallon.

Innovative approaches to nutrient removal have effectively positioned the Littleton/Englewood Wastewater Treatment Plant to meet current and future permit requirements while supporting continued cost-effective operations.

ABOUT THE AUTHORS

Jim Tallent is Operations Division manager and a Class A wastewater treatment plant operator at the Littleton/Englewood (Colo.) Wastewater Treatment Plant and can be reached at jtallent@englewoodgov.org. Greg Farmer is process control administrator for the plant and a Class A operator. He can be reached at: gfarmer@englewoodgov.org. The authors acknowledge Brown and Caldwell and Severn Trent Services for their contributions to this article. tpo

¹ Sidney Biesterfeld, Greg Farmer, Linda Figueroa, Denny Parker, and Phil Russell “Quantification of Denitrification Potential in Carbonaceous Trickling Filters” *Wat. Res.* 37 (2003): 4011-4017.

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Thirsty Ground

RAIN GARDENS AT THE GRAND RAPIDS TREATMENT PLANT HELP CAPTURE AND FILTER MORE THAN 12 MILLION GALLONS A YEAR, HELPING TO CURTAIL RUNOFF POLLUTION

By Jeff Smith

The mention of rain gardens may conjure up an image of little areas of shrubs and flowers that mitigate small amounts of rainwater runoff. But not at the wastewater treatment plant in the City of Grand Rapids, Mich.

This 90 mgd (design) activated sludge plant with average daily flow of 49 mgd is home to five large “industrial-strength” rain gardens that process more than 12 million gallons of rainwater each year that otherwise would flow to the nearby Grand River.

“To my knowledge, our River of Dreams rain garden is the largest landscaped garden in this area of the state,” says plant Environmental Services Department (ESD) chemist Sandy Buchner. “It’s our second rain garden and measures 75 by 75 feet. It contains 29 different plant species native to Mich-

“The plant considered installing a system of pipes and pumps to collect the runoff from the old tank site, but a rain garden proved to be more cost effective and almost maintenance free.”

SANDRA BUCHNER

igan.” It serves as a demonstration garden to help educate the community about stormwater management.

OUT OF FRUSTRATION

The idea to plant a rain garden grew from the frustration of plant workers who couldn’t properly mow and maintain an area near the maintenance building. “It was always wet and mushy, not to mention the mosquitoes,” Buchner says.

So the plant partnered with the Western Michigan Environmental Action Council (WMEAC), which provided expertise and experience on a 25- by 35-foot rain garden. “That was in 2002 and our first rain garden,” says Buchner. “We call it River of Stars.”

A project in 2008 to remove some large primary settling tanks inspired the creation of the River of Dreams garden. “The plant considered installing a system of pipes and pumps to collect the runoff from the old tank site, but a rain garden proved to be more cost effective and almost maintenance free,” Buchner says. It was also more in tune with the mission of the ESD to take a lead within the community in protecting the environment.

A combination of native perennials like black-eyed Susans and prairie grasses were selected to ensure that something is in bloom spring through fall. The most unusual plant is the prickly pear cactus — “Yep! We even have cactus here in western Michigan,” Buchner says. To hold down costs, year-old plugs were planted, using volunteers from the plant, college students, and interested citizens. “Lots of volunteers contributed to planting the gardens,” she says.

A GREEN LEADER

The newest garden, called River of Two Cities, handles about two acres of runoff from a LEED-certified biosolids facility built in 2009 in partner-

A project in 2008 to remove some large primary settling tanks inspired the creation of the River of Dreams garden at the Grand Rapids treatment plant. A combination of native perennials like black-eyed Susans and prairie grasses ensure that something is in bloom spring through fall.

Share Your Ideas

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structure," she says. "We have more LEED-certified buildings per capita than anywhere else in the nation."

She is particularly proud that the plant provides an area for WMEAC to locate a nursery to grow native plants that end up at local schools and other rain gardens throughout the city. "Many schools would not have been able to have a rain garden project if WMEAC would not have provided the plants grown at this nursery," says Buchner.

"The gardens help with the rainwater runoff problems. But they also create a natural habitat for wildlife," she says. "The rain gardens also serve as a resting spot for employees to take in the peace and quiet during breaks." **cpo**

ship with the neighboring City of Wyoming. Buchner says the River of Two Cities garden was too big for conventional planting and landscaping, so parts have been hydro-seeded with a native plant-mix and excavated with swales to serve as short-term retention basins.

"It has more of a prairie grass appearance, but it won't need to be mowed," she says. "And mosquitoes are never a problem in a properly designed garden because the drainage time through the garden is 24 hours or less, and it takes several days in standing water for mosquitoes to hatch."

Buchner's enthusiasm and pride show when she talks about the rain gardens and the environment. "Most people don't know it, but Grand Rapids is a leader in green infrastructure," she says.

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Pages 48 through 82 contain a convenient alphabetical directory and product category listing of manufacturers or suppliers in the municipal wastewater treatment plant industry. Companies that are advertising in this magazine will be listed in **bold**. Please tell any of the companies you contact that you saw their listing in the TPO Annual Directory. If you have any questions, please contact COLE Publishing at 800-257-7222 or 715-546-3346. You can also find us at www.tpomag.com.

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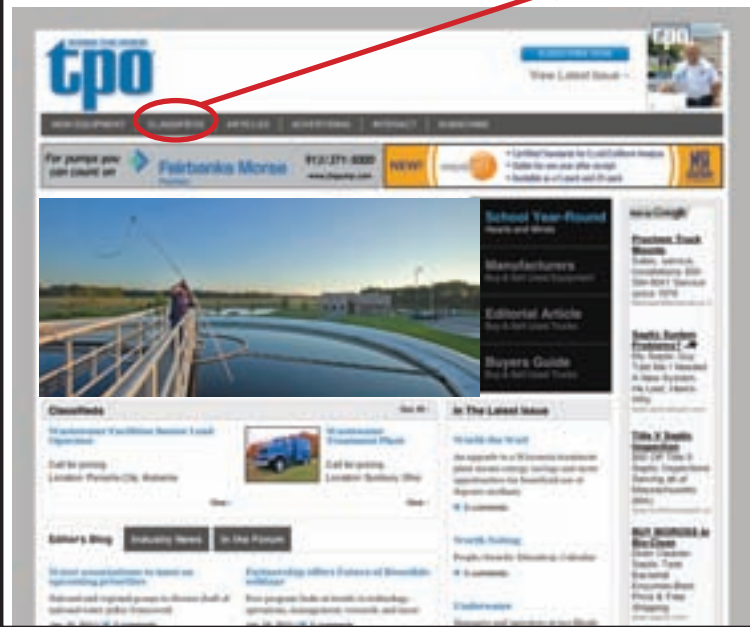
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harrybroussard@eaton.com
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www.rigalite.com

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www.headworksusa.com

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Canada
905-522-0012 • Fax: 905-522-0031
info@hydromantis-software.com
www.hydromantis.com

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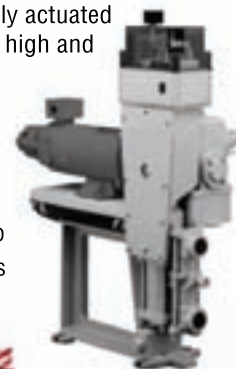
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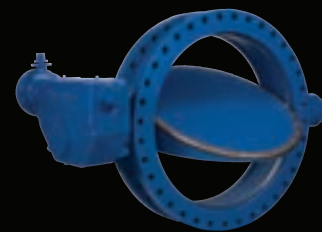
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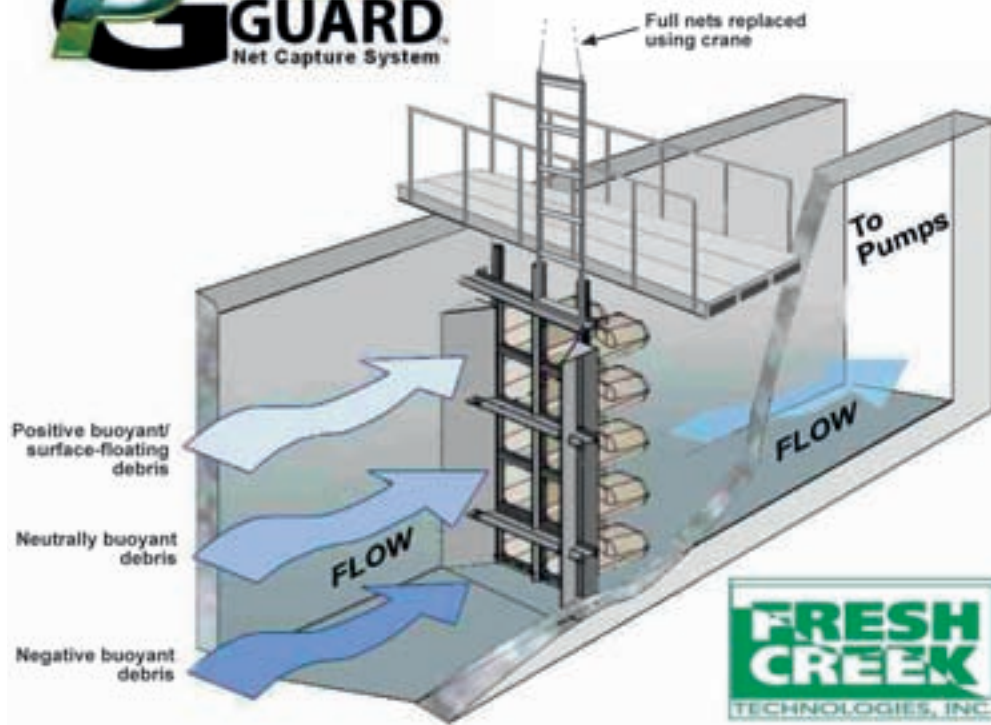


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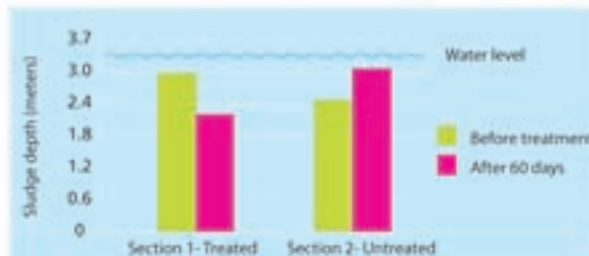


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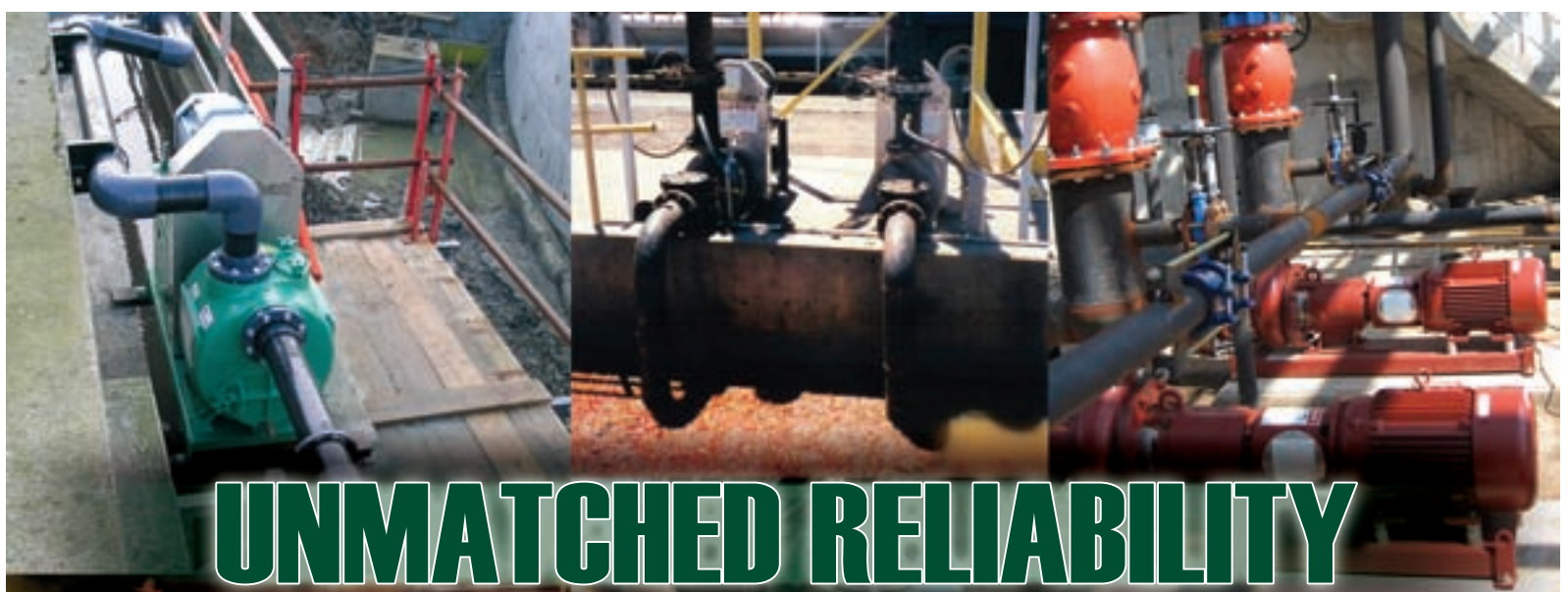
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Eye on Alkalinity

SIMPLE TESTS CAN HELP YOU DETERMINE WHETHER TOO LITTLE INFLUENT ALKALINITY MAY BE KEEPING YOU FROM MEETING A MINIMUM CHLORINE RESIDUAL

By Ron Trygar, CET

Troubleshooting treatment plant problems can be a daunting task — it seems there are so many variables to look at when making a diagnosis.

One such problem is the inability to meet a minimum chlorine residual standard. There are several reasons why a treatment plant might not be able to maintain chlorine residual: excessive chlorine demand, improper effluent pH, disinfectant feed equipment malfunction, and interferences with the residual chlorine testing reagents.

But another possible cause is a lack of alkalinity, and alkalinity is one of the most overlooked process control tests. Alkalinity — the ability of water to buffer against a pH change or to neutralize acids — is measured in mg/l as calcium carbonate (CaCO_3). Through a complex chain of events, alkalinity can affect the chlorine residual in plant effluent.

Alkalinity testing is easily done in a lab or in the field without expensive lab equipment, and the results are very useful. Lab supply companies make easy-to-use test kits, and some can even be purchased at swimming pool supply stores.

WHERE ALKALINITY COMES FROM

Raw wastewater contains some alkalinity. How much depends on a few factors, including the source of the water. Water from a deep aquifer, reservoir, river, lake or seawater contains different amounts of alkalinity. To see how much is in your local source water, you can contact your drinking water supplier, read the consumer confidence report they send out, or run an alkalinity test yourself.

How can alkalinity contribute to wastewater treatment plant problems? Normally having too much alkalinity is not the issue — it's having too little to complete biological and chemical treatment.

How can alkalinity contribute to wastewater treatment plant problems? Normally having too much alkalinity is not the issue — it's having too little to complete biological and chemical treatment. Wastewater treatment processes that consume alkalinity include:

- Biological nitrification in aeration tanks, trickling filters and RBCs.
- Gas chlorination for effluent disinfection.
- The acid formation stage of anaerobic digestion.
- Biological nitrification in aerobic digesters.
- Chemical addition of aluminum or iron salts.



Tests for alkalinity can be performed in the laboratory (above) or in the field using simple and inexpensive test kits (right).

If your influent is already alkalinity-limited, these processes will use up what is available and then may decrease or stop altogether.

HOW IT ALL WORKS

Inside a wastewater treatment plant, autotrophic bacteria (nitrifiers) consume alkalinity and oxidize ammonia to gain energy for reproduction. With enough dissolved oxygen (DO), adequate temperatures, the right detention time and several other items, nitrifiers convert ammonia and ammonium to nitrite (NO_2^-), and then nitrate (NO_3^-).

Under optimum conditions, almost all the ammonia and ammonium may be converted to nitrate. But what if things are not optimum? If there is not enough influent alkalinity to support nitrification, you may find an increase in nitrite exiting the biological treatment process. This might be at certain times of the day, or on certain days of the week, depending on your flows and influent characteristics.

To fully convert one pound of ammonia/ammonium to nitrate, it takes about 7.1 pounds of alkalinity to support the nitrifiers. If your influent ammonia is around 30 mg/l, you need 213 mg/l of influent alkalinity to complete nitrification. Remember that this is a minimum — you still need some for acid buffering in downstream processes, like disinfection.



PHOTO COURTESY OF RON TRYGAR

What's Your Lab Story?

The Lab Detective feature in *TPO* will help operators learn analytical techniques that help diagnose and solve treatment problems. Are you struggling with a process issue?

Send a note to editor@tpomag.com. Your question may become the topic of a future column.

MAKING A DIAGNOSIS

It's not uncommon to see influent ammonia/ammonium higher than 30 mg/l, and some facilities see 50 to 75 mg/l at certain times of the day. If you think your plant might be facing an influent alkalinity deficiency, you should test the clarifier effluent for alkalinity, ammonia, nitrite and nitrate. Collect samples at the same time, or a little before the time, you see the effluent total chlorine residual drop.

Suppose you suspect that too little alkalinity may be keeping your plant from meeting the minimum chlorine residual. That suspicion will be confirmed if you see that the alkalinity is very low (<40 mg/l as CaCO_3), the ammonia/ammonium levels have increased, nitrite is present, and nitrate nitrogen has decreased. Just 1 to 2 mg/l of nitrite is all it takes to lose 5 to 10 mg/l of chlorine residual.



It takes about 7.1 pounds of alkalinity to support conversion of one pound of ammonia/ammonium to nitrate. If influent ammonia is about 30 mg/l, you need 213 mg/l of influent alkalinity to complete nitrification.

Under normal operating conditions, when influent alkalinity is sufficient, you would see clarifier effluent alkalinity greater than 50 mg/l, the ammonia and nitrite numbers at or near zero, and nitrate nitrogen elevated — say, above 15 mg/l as N.

Nitrite has a large demand on effluent chlorine residual. One mg/l of nitrite can consume about 5 mg/l of total chlorine residual, reducing the chlorine to chloride and rendering it useless as a disinfectant. Another byproduct of this reaction is the

oxidation of the nitrite to nitrate. If you measured just nitrate in the chlorine contact chamber, you would see a spike in nitrate. This happens because the nitrite was oxidized by the chlorine to nitrate and used up in the reaction.

You need to measure nitrite and nitrate just before the chlorine injection point. If you add chlorine to the clarifier for algae control, collect your sample upstream of this chlorine feed. Even running the tests on settleometer supernatant would be acceptable.

WHAT TO DO

If the analysis confirms your thoughts of an influent alkalinity deficiency, there are a few things you could do to correct the situation. One is to turn up the chlorine feed to maximum and even manually feed dry granular chlorine in the form of high-test hypochlorite (HTH) to the tank to boost the chlorine residual. That works to some extent, but it could be costly and unreliable.

You could boost influent alkalinity by adding lime (slaked into solution), sodium hydroxide (NaOH) or soda ash (sodium carbonate, Na_2CO_3), especially during times when normal influent alkalinity is not enough to cover the 7.1 to 1 ratio of alkalinity to influent ammonia/ammonium.

If your facility is not required to nitrify, you could inhibit nitrification by limiting dissolved oxygen, reducing aerobic retention times, or reducing sludge age. If your facility is required to nitrify, you need to ensure complete nitrification.

Another possibility is allowing denitrification to take place somewhere in the plant. Denitrification is the reduction of nitrate to nitrogen gas in the presence of facultative heterotrophic bacteria in an anoxic (dissolved-oxygen-free) environment.

During the biological reduction of nitrate, a small amount (about 3.5 mg/l) of bicarbonate alkalinity is re-established, helping to

increase effluent alkalinity, and the interference of nitrite is reduced as well.

So there you have it. You have several solutions to look at, and some in-plant research to do to find out which would be the most effective, both for cost and ease of application. Always follow safety rules when handling chemicals, read the MSDS before using chemicals, and wear appropriate personal protective equipment. Be safe out there!

ABOUT THE AUTHOR

Ron Trygar is senior training specialist in water and wastewater at the University of Florida TREEO Center and a certified environmental trainer (CET). He can be reached at rtrygar@treeo.ufl.edu. tpo

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Steve Aiken

WesTech Engineering Acquires WWETCO

WesTech Engineering Inc. of Salt Lake City, Utah, has acquired WWETCO LLC of Atlanta, Ga. WWETCO, wholly owned by WesTech, will continue to function as an independently operated company. WesTech is a manufacturer of process equipment for municipal water, wastewater and mining.

Pump Solutions Group Acquires EnviroGear Product Line

Pump Solutions Group, a business unit operating within the Dover Fluid Management Segment of Dover Corp., has acquired the EnviroGear product line from PeopleFlo Manufacturing Inc. EnviroGear will become a new brand of PSG with manufacturing relocated to PSG's facility in Grand Terrace, Calif.

Corix Utilities Provides University with \$2 Mil Endowment

Corix Utilities of Vancouver, British Columbia, provided the University of Oklahoma with a \$2 million endowment for the Corix Institute for Water Resources and Sustainability. The institute will provide research on clean water and sanitation as well as sustainable solutions for emerging regions of the world.

Ruhrpumpen Launches Website

Pump technology company Ruhrpumpen has redesigned its product website. The new site, www.ruhrpumpen.com, features an overview of the company and its product line.

Sensorex Launches Website

Sensorex has launched a new product website, www.sensorex.com, featuring sensors for the industrial and water/wastewater treatment industries. The site includes specification data, tutorial information, online tools and selection guides.



Big Fish Completes NSF Verification Test

Big Fish Environmental LLC, designer and builder of septage and high-strength wastewater receiving and treatment facilities, completed a 13-month verification test performed by NSF International under the U.S. Environmental Protection Agency ETV Program's Water Quality Protection Center. Results showed Big Fish achieved 95 percent reduction of influence BOD, TSS, phosphorus and FOG. The assessment was performed at Big Fish's facility in Charlevoix, Mich. During verification, the Big Fish system processed waste from residential and commercial septic tanks and portable restrooms as well as wastewater treatment plant secondary sludge and commercial waste containing fats, oils and grease.

Wilden Launches Product Website

Wilden has launched a new product website, www.wildenpump.com. The site enables users to search for products by brand, size, air distribution system and type, as well as by industries served.



Industrial Video and Control Acquires Longwatch

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6. NOV INTRODUCES EZSTRIP PUMP

EZstrip technology from NOV Monoflo enables pumps to be disas-

sembled, de-ragged, and maintained in place, reducing downtime and maintenance costs. The technology can be installed on new pumps or retrofitted into existing select Compact C and B-Range installations. No electrical disconnection is required. Suction and discharge pipe are untouched. The unit offers dry-run protection. The model range has a capacity of up to 726 gpm and 174 psi. It is available in either cast iron or stainless steel. **281/200-1200; www.ezstrip.com.**

7. SCHNEIDER ELECTRIC OFFERS PRODUCTION ENERGY OPTIMIZATION

The Production Energy Optimization solution from Schneider Electric is an energy management and analysis tool. The PEO reduces energy consumption per unit of production, making it more predictable for forecasting purposes. **888/778-2733; www.schneider-electric.us.**

8. BEL-ART OFFERS SCIENCEWARE VACUUM ASPIRATOR

The Scienceware vacuum aspirator collection system from Bel-Art Products includes a 1-gallon collection bottle, clear flexible PVC tubing and vacuum pump contained and protected within a polypropylene housing that doubles as a holder for the chemical- and corrosion-resistant polypropylene collection bottle. The bottle features heavy-wall construction and a self-regulating, vacuum release safety vent built into the cap to prevent implosion of the collection bottle. **800/423-5278; www.belart.com.**

9. ASAHI OFFERS FRANK SERIES PRESSURE REGULATORS

PolyPure PPn Frank Series pressure and backpressure regulators from Asahi/America range in size from 1/2 to 2 inches. The regulators are

adjustable under working conditions, providing stable control over pressure, regardless of fluctuations or change in system demand. **877/242-7244; www.asahi-america.com.**

10. SODIMATE INTRODUCES SODIMIX DUST EMISSION REDUCER

Sodimix dust emission reducer for slurry systems from Sodimate Inc. eliminates the dust created from screw conveyors to slurry tanks. The wetting system consists of a plunging pipe connected to the dry feeder outlet that stems into the slurry tank. Powder fed into the tank is distributed by shaft-driven impellers for premixing. The screw feeder outlet is connected to an air/water filter. Suction created by the venturi system vacuums out the dust from the screw feeder outlet passing through the filter. At the end of each batching cycle, the water supply is directed to the water filter to clean and discharge all residual particles into the slurry tank. **773/665-8800; www.sodimate-inc.com.**

DATASTICK OFFERS ACOUSTIC MONITORING PACKAGE

The Vibration Acoustic Monitoring package, made to be used with handheld Vibration Spectrum Analyzers from Datastick Systems Inc., includes noise-canceling headphones with safety earmuffs, both passive and active cancellation, an inline amplifier for sound level adjustment, cable and connector. Used in the service of pumps and compressors, VSAs can be used to detect structural problems caused by vibration that could harm sensitive equipment in data centers. **408/987-3400; www.datastick.com.**

(continued)

product spotlight

Online Vibration Monitoring System Warns of Defects

By Ed Wodalski

The VIBNODE online condition monitoring system from Ludeca warns of potential defects in blowers, pumps, motors and other equipment. By providing ongoing equipment status information, it ensures against unexpected downtime and helps prioritize maintenance schedules to maximize equipment life.

"This is a true online remote monitoring system," says Alex Nino, applications engineer. "What I mean by true is that it collects data, processes, manipulates and gives you results. It is not a data logger that requires software for processing and manipulation."

The system's 16-bit A/D functionality provides 6- or 12-channel scanning. Shaft bearings can be monitored for looseness, misalignment, bearing defects and imbalance. Machinery faults or bearing fault problems on pumps, motors and gearboxes are collected 24 hours a day, enabling defects to be promptly diagnosed. When a vibration alarm is triggered, users are independently alerted by e-mail, text message, traffic light indicator or other means.

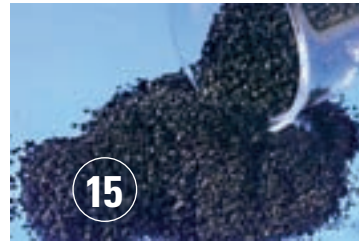
"You definitely don't want any downtime on any critical asset, if a bearing is going down or there's wear and tear on the machine," Nino says. "Most plants run on a 24/7 cycle. By being alerted to what is happening you can have the right maintenance personnel on hand to take care of the problem before it becomes a failure of some sort."

The entry-level system has preset measurement and alarm settings that can be adjusted in-house with the click of a mouse. Because the system works remotely, it can safely monitor equipment in hazardous areas or locations that might otherwise be inaccessible. The unit is available with NEMA 4X or stainless steel enclosure, can be mounted indoors or outdoors, and requires no maintenance. It has an ambient operating temperature range of -13 to 140 degrees F.

OMNITREND PC software programs the online system, sets alarm parameters, and provides analysis and reporting through an internal network or wirelessly. Data from multiple sites can be accessed remotely at any time. **305/591-8935; www.ludeca.com.**



VIBNODE online condition monitoring system from Ludeca



11. HACH INTRODUCES HQd BENCHTOP METER AND ION SELECTIVE ELECTRODE PROBES

The HQd benchtop meter and IntelliCAL ion selective electrode probes from Hach Co. are designed to test water quality and automatically recognize the testing parameter, calibration history and method settings to minimize errors and setup time. The benchtop meter can provide data transfer through USB ports and two-way communication to both PC and lab automation equipment. The probes, which test ammonia, ammonium, fluoride, chloride, and nitrate join the existing pH, dissolved oxygen, conductivity, BOD, ORP and sodium probes. **800/227-4224; www.hach.com.**

12. BINMASTER INTRODUCES SMARTBOB-TS1 SENSOR

The SmartBob-TS1 sensor from BinMaster Level Controls is made for bins up to 60 feet tall. The continuous level measurement sensor weighs less than 10 pounds and measures powders, granules, pellets, plastic resins and dry bulk solids. Data generated can be viewed from a control console mounted at the base of the bins, on a PC with eBob software or sent as automated alerts and e-mails to a smart phone via BinView Web-based software. **800/278-4241; www.binmaster.com.**

13. AEGIS OFFERS SGR BEARING PROTECTION RING KIT

The shaft ground ring universal mounting kit from AEGIS includes grounding ring and mounting hardware for most motor designs. The ring prevents electrical fluting damage in the bearing, bearing noise, repairs and downtime by channeling VFD-induced bearing currents to the ground. **207/998-5140; www.est-aegis.com.**

14. STAHLIN INTRODUCES POLYSTAR POLYCARBONATE ENCLOSURES

PolyStar polycarbonate enclosures from Stahlin Non-Metallic Enclosures are made to withstand rain, sleet, snow, splashing water and hose-directed water. Available in five sizes, the enclosures feature an easy to remove lid, integrated lock hasp, flush-fit side-mount swing panel and DIN rail system. **616/794-0700; www.stahlin.com.**

15. SIEMENS INTRODUCES AQUACARB 1240CAT CATALYTIC CARBON

AquaCarb 1240CAT catalytic carbon water treatment from Siemens Water Technologies uses coconut shell-based carbon for chloramines, hydrogen sulfide and hydrogen peroxide removal. Applications include the removal of H2O2 in semiconductor wastewater or groundwater remediation systems using UV oxidation. **866/926-8420; www.water.siemens.com.**

16. JWC INTRODUCES SLUDGE MONSTER GRINDER

The Sludge Monster grinder from JWC Environmental is designed to protect sludge pumps, heat exchangers, centrifuges and other dewatering equipment from clogging with rags and debris. The grinder processes 274 gpm and can be used in scum line applications. **800/331-2277; www.muffinmonster.com. tpo**

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The Q45S provides the solution for monitoring H₂S in wet environments typically found in scrubbers. A specifically designed wet gas sensor measures in moisture saturated atmospheres where other standard gas sensors typically fail.



- Special Sensor for Wet Gases
- Optional Air Purge for Long Term Sensor Operation
- Multiple Power Configurations

Auto-Clean pH/ORP

Sensor Cleaning Problems?

Q45P/R

Q45P/R Monitors enhance the reliability of long term pH or ORP measurement by providing automatic sensor cleaning. Effective on biological slimes, oily coatings and other non-crystalline buildups, sensor maintenance is greatly reduced.



- Air Blast Sensor Cleaning System
- Programmable Auto-Clean Interval
- Self-Contained Air Supply
- Differential pH and ORP Sensors

Dissolved Oxygen Monitor

Process Control Starts With Reliable Measurement

Self-Cleaning DO system greatly reduces maintenance headaches.



- Dissolved Oxygen Monitoring Without the Maintenance
- "Air-Blast" Sensor Cleaning Insures Accuracy and Reliability
- Save Power and Improve Aeration System Performance
- Guaranteed Performance in Any Aeration Environment

Dissolved Ammonia Monitor

Unique Measurement Approach

Q45N

The Q45N uses reaction chemistry that converts ammonia in solution to a stable monochloramine compound equivalent in concentration to the original ammonia level. The measurement is then made with a unique amperometric sensor.



- New Approach to On-Line Ammonia Measuring
- Total Ammonia Measurement
- Optional Free Ammonia and Monochloramine Measurement
- 4-20 mA Outputs and Alarm Relays

Total Residual Chlorine Monitor

Amperometric Measurement

Q45H/79

The Q45H/79 provides highly accurate measurement of total residual chlorine down into the parts per billion range. Total chlorine is measured using EPA recommended method for reaction of the sample with butler and KI.



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- High Accuracy and Sensitivity Down to PPB
- 2-Assignable 4-20 mA Outputs Configured for Chlorine, Temperature or PID Control

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people/awards

American Water, a U.S. water and wastewater utility company, received a Project Merit Award in the 2010 Environmental Business Journal Business Achievement Awards. American Water was recognized for designing, building and operating the Fillmore Water Recycling Plant in California.

The **Atlantic Canada Water & Wastewater Association** announced its 2010 award recipients:

- Roland Richard, New Brunswick, Bedell Award
- Carl Yates, Nova Scotia, Fuller Award
- Deborah Smith, New Brunswick, Laboratory Analyst Award
- Mark Butler, New Brunswick, Ira P. MacNab Award
- CBCL-Lunenburg Water Supply, Project of the Year Award (Less than 5,000 Customers)
- R.V. Anderson-Bathurst WTP Upgrade, Project of the Year Award (5,000 to 25,000 Customers)
- Fredericton-E. John Bliss Water Treatment Plant, Project of the Year Award (25,000+ Customers)
- Ben Pitman, Nova Scotia, Volunteer Recognition Award

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

Alaska

The Alaska Water Wastewater Management Association has these courses:

- May 10–11 – Introduction to Membrane Treatment, Anchorage

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- May 10–12 – Pumps and Controls Training, Bethel
- Visit www.awwma.org.

California

The California Water Environment Association has these courses:

- May 3 – SSO Spill Volume Estimating & How to Use CIWQS (online seminar)
- May 5 – Introduction to Water/Wastewater Math, Watsonville
- May 12 – Introduction to Water/Wastewater Math, Watsonville
- May 19 – Introduction to Water/Wastewater Math, Watsonville
- May 26 – Introduction to Water/Wastewater Math, Watsonville

Visit www.cwea.org.

Canada

The Atlantic Canada Water & Wastewater Association has a Wastewater Treatment Course from May 10–13 in Halifax, N.S. Visit www.acwwa.ca.

Michigan

The Michigan Water Environment Association has a Wastewater Operators Seminar on May 12 in Gaylord. Visit www.mi-wea.org.

New Jersey

The New Jersey Water Environment Association will have an Industrial Wastewater Seminar May 9–10 at Bally's Hotel in Atlantic City. Visit www.wef.org.

New York

The New York Water Environment Association has these courses:

- May 3 – Anaerobic Digestion, Amherst
- May 4 – Asset Management, Rochester

Visit www.nywea.org.

North Carolina

The North Carolina AWWA has these courses:

- May 2–6 – Eastern Biological Wastewater Operators School, Raleigh
- May 3–6 – Physical/Chemical Wastewater Operators School, Raleigh
- May 10 – Lab Tech Day, Raleigh

Visit www.ncsafewater.org.

Ohio

The Ohio Water Environment Association has these courses:

- May 5 – Collection Systems Workshop, Lewis Center
- May 24 – Ohio Operations Challenge and Hands-On Operator Training Day, Columbus

Visit www.ohiowea.org.

Texas

The Texas Water Utilities Association has these courses:

- May 17 – Utility Safety, Gatesville
- June 21 – Basic Wastewater, Victoria

Visit www.twua.org.

Wisconsin

The Wisconsin Department of Natural Resources has these courses:

- May 2–3 – Iron, Zeolite and VOC, Fond du Lac
- May 5 – Working In The Streets: Traffic Control and Clothing, Janesville
- May 10–11 – Utility Management 2, Madison
- May 17 – Surface Water Processes, Green Bay
- May 18 – Water Supply Safety, Madison
- June 15 – Personal Protective Equipment, Plover

Visit www.dnr.state.wi.us/org/es/science/opcert/training.htm.

The University of Wisconsin Department of Engineering-Professional Development has a course on Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment April 26–28 in Madison. Visit www.epdweb.engr.wisc.edu. **tpo**

CALENDAR OF EVENTS

April 30–May 4

Florida Water Resources Conference, Gaylord Palms Resort, Kissimmee. Visit www.fwrc.org.

May 1–4

Arkansas Water Works & Water Environment Association Annual Conference, Embassy Suites Hotel, Hot Springs. Visit www.awwea.org.

May 9–13

New Jersey Water Environment Association Annual Conference, Bally's Atlantic City. Visit www.njwea.org.

May 10–12

Montana Section-American Water Works Association Conference, Holiday Inn and Best Western GranTree Hotels, Bozeman. Visit www.montana-awwa.org.

May 17–18

Nevada Water Environment Association Annual Conference, Sam's Town Hotel and Casino, Las Vegas. Visit www.nvwea.org.

May 22–25

Water Environment Federation, Residuals and Biosolids 2011: Adapting Residuals Management to a Changing Climate, Sacramento (Calif.) Convention Center. Visit www.wef.org.

May 22–25

West Virginia Water Environment Association/AWWA Annual Conference, Oglebay State Park, Wheeling. Visit www.wv-wea.org.

May 23–24

Louisiana Water Environment Association Spring Conference, Lod Cook Alumni Center, Baton Rouge. Visit www.lweaonline.org.

June 5–8

Pennsylvania Water Environment Association Annual Technical Conference and Exhibition, Lancaster Marriott. Call 570/549-2204 or visit www.pwea.org.

June 6–8

New York Water Environment Association/New Jersey Water Environment Association, The Sagamore Hotel, Lake George. Visit www.nywea.org.

June 8–10

Iowa Water Environment Association Annual Conference, Coralville. Visit www.iawpca.org.

June 12–15

Water Environment Federation, Collection Systems 2011, Raleigh, N.C. Visit www.wef.org.

June 12–16

ACE: American Water Works Association Annual Conference & Exhibition, Washington, D.C. Visit www.awwa.org.

June 26–29

Michigan Water Environment Association Annual Conference, Shanty Creek Resort, Bellaire. Visit www.mi-wea.org.

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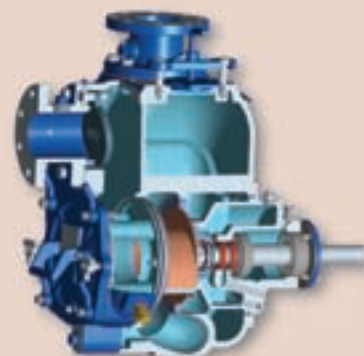
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