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on the cover

Plant supervisor Mitch Stone (right), plant operator Patrick Witcher and their team at the Appomattox (Va.) Water Reclamation Facility used lime and soda ash to reduce zinc from as much as 220 µg/l in the influent to about 30 µg/l in the effluent. The treatment approach was simpler and considerably less expensive than some alternatives. (Photography by Parker Michels-Boyce)

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Getting the Hands Dirty

IT DOESN'T TAKE GRANDIOSE PLANS OR OUTSIZED BUDGETS TO SPRUCE UP TREATMENT PLANT GROUNDS — AS SOME AMBITIOUS OPERATORS HAVE PROVEN

By Ted J. Rulseh, Editor

We often read about big new clean-water plants surrounded by acres and acres of ponds, pathways and wildlife habitat. Such projects are often the product of high-dollar engineering and landscape architecture firms, put to work as part of capital improvement programs with vast budgets.

But here and there, around the country, treatment plant teams are proving it doesn't take all that to make their grounds more beautiful, more sustainable, and more friendly to birds, fish and wildlife.

All it really takes is some energy, some dedication, some ingenuity, and a little creative scrounging. Two small-town treatment plants highlighted recently in our "PlantScapes" column prove the point.

ARTISTIC TENDENCIES

Last month we featured the 3 mgd treatment plant in Perry, Ga., where assistant plant manager Chad McMurrian got the ball rolling by painting a canvas showing the main operations building. It was the creative spark that led to creation of a nature walk for plant team members and the public.

The project came together little by little as team members found the time and as materials became available. Today a 200-yard-long trail 15 feet to 25 feet wide wraps its way through magnolias, oaks, birches and maples to the plant's receiving stream, Big Indian Creek.

There's a deer feeder with a motion-activated wildlife camera, a tire swing for kids, some duck houses and, perhaps best of all, a pond with goldfish and koi, fed by final effluent on its way to the creek.

The team spent no money on materials or labor. Everything came from scavenged items or donations, and volunteers did all the work. Now the staff leads tours of the area for the public and students as part of its clean-water education initiatives.

BETTER WITH AGE?

Meanwhile in Clifton, Colo. (see the story in this issue), the team at the 2.5 mgd clean-water plant transformed a for-

mer biosolids lagoon site into a wildlife habitat and a sustainable agricultural area that includes a vineyard. Nearly four acres are producing grapes, and another 10 acres may be added. The grapes are harvested and processed into wine by a local vintner. Money from sale of the grapes helps offset maintenance costs.

Other land is planted with upland tall grasses, trees and shrubs to establish a sustainable habitat with a variety of species, including ducks and pheasants. This project was more complicated — it relied on grants from various sources, along with labor from inmates at a minimum-security correctional institute.

What is it worth to make that treatment plant look like something more than a few rectangular and circular structures at the end of a road on the fringe of town?

But extensive volunteer labor was involved, and that included landscaping work on the part of the treatment plant team. In the words of plant manager Brian Woods, "If you want something bad enough, you'll see that it gets done."

CAN YOU DO IT?

Now, these two efforts are in many ways exceptional. The projects took a lot of work and a lot of time, and it's easy to see why operators at many plants would shy away from such endeavors. They put their all into their regular duties, and they want to spend their spare time with their families and personal recreation choices.

On the other hand, the clean-water profession tends to attract people who care about the environment, and that includes their plant surroundings. So, what is it worth to make that treatment plant look like something more than a few rectangular and circular structures at the end of a road on the fringe of town?

Maybe it's a sign with ornamental plantings around it. Perhaps a "birdscaped" property with strategically placed feeders and suet bags and perennial plants that in winter provide seeds favored by birds.

Even if you lack the energy or people power to emulate teams like those in Perry and Clifton, surely there is something you can do. Every little bit does in fact help. Feel free to share stories about PlantScaping work you have done — big projects or small. We'll be glad to share your accomplishments with *TPO* readers. Send me a note to editor@tpomag.com, and I promise to respond. **tpo**

letters

Bugs or Microorganisms?

To the Editor:

Our wastewater treatment plant staff enjoys your articles on the various plants in the USA. The write-up on the Florida Keys Aqueduct Authority's Big Coppitt Regional Water Reclamation Facility, headlined "Bug-Driven Performance" (*TPO,* January 2012) was excellent, but it grated us a little bit, like scratching your fingernails across a chalkboard.

Why? Bugs! The majority of treatment at a plant like Big Coppitt is done by microorganisms that are not bugs, but rather bacteria. As mentioned in the article, indicator organisms are looked at, such as those that appear on the Tetra Tech chart shown in the article, but that's just what they are — indicator microorganisms.

Our lab technician also makes adjustments based on what is seen in the microscope — just one of the parameters in a properly managed treatment plant. Tom Pfiester should change his informal title from "bug farmer" to "microorganism generator." Or is that too long of a title? Just a thought!

Joe Borowitz
Operator Trainer
Watchtower Wastewater Treatment Plant
Wallkill, N.Y.

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Brain Games

JOHNSON COUNTY WASTEWATER USES GAMES FOR KIDS AS A KEY ELEMENT OF AN EXPANDED WEBSITE THAT OFFERS INTERACTIVE LEARNING

By Briana Jones

Lori Sand (left), director of communications, and Karen Sorensen, Internet projects coordinator, for Johnson County Wastewater.

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.

Twelve years ago, the Johnson County (Kan.) Wastewater (JCW) website fell short of its potential. Serving about 440,000 customers with seven treatment plants, JCW needed a way to get the word out about the importance of wastewater treatment.

"They just had a really simple, static website," says Karen Sorensen, Internet projects coordinator. With a background in multimedia design and corporate training, Sorensen was brought on to amp up the website (www.jcw.org).

"They were very excited when I came on board to make the website as interactive as possible," Sorensen says. She quickly revamped the site to include more educational information and new interactive games for kids of all ages have been highly popular.

The MicroMatch game "puts the player in the shoes of a wastewater worker with the challenge of identifying various microbes as quickly as possible," says Sorensen. It's modeled after the old TV game show, Concentration.

The game board is made up of rows of squares. When a square is clicked, it uncovers an image of a microbe. The player then clicks on another square, revealing another microbe. The point is to uncover two microbes that match. Once that happens, those squares disappear, revealing part of an image behind the board. As all the squares are matched, the full image is revealed. Sorensen worked with local freelance programmer Joe Minenna to create the template and design.

WELL-ROUNDED EDUCATION

Getting more citizens to visit the website has been a bonus, and the games have helped. "Our monthly Web traffic statistics indicate that our education section consistently ranks high among visitors, particularly with MicroMatch," Sorensen says.

With easy-to-understand information available on the site, the public can learn the ins and outs of the wastewater treatment plants and their processes. Tim O'Donnell, assistant plant superintendent, observes: "MicroMatch teaches kids what kind of biology is going on in the wastewater process."

Besides the information on the website, JCW uses plant tours as a teaching method. "Our tours are supported by our website, including its games," explains Sorensen. "It's easy to go on a tour of a wastewater plant, but how much of that information is retained?

"The learning process can actually begin before the tour. A game such as our MicroMatch can introduce basic concepts. After the tour, playing the game reinforces vital information, in this case, the distinct visual characteristics of live microbes."

PHOTO AND GRAPHICS COURTESY OF JOHNSON COUNTY WATER

In the MicroMatch game, players try to match up pairs of pictures of microbes to reveal an underlying image.

OPERATOR INPUT

Another game now in the works simulates operating on an aeration tank. "The player is once again in the shoes of a wastewater operator and tries to control the amount of oxygen in the tank's 'microbiological soup,' successfully speeding the growth of microorganisms, which results in sedimentation," says Sorensen.

She notes that managing this challenging process is one reason why JCW has earned numerous Gold Peak Performance Awards from the National Association of Clean Water Agencies.

The wastewater treatment plant staff played an integral part in developing the games. Sorensen says: "The operators are a wealth of information — no two ways about it. They were really open and flexible and very pleasant to be with as I asked them questions. They taught me the whole process in a way that I didn't find in any book."

Operators provided additional information for the website, including a glossary of wastewater terms and a microbes information sheet complete with images of each microbe. And not to be overlooked, a Tic-Tac-Toilet game is a fun twist on traditional tic-tac-toe.

PUBLIC KNOWLEDGE

Building the community's knowledge of wastewater goes beyond interactive games. Lori Sand, director of communications for JCW,

"The operators are a wealth of information — no two ways about it. They were really open and flexible and very pleasant to be with as I asked them questions. They taught me the whole process in a way that I didn't find in any book."

KAREN SORENSEN

observes: "Continuing education helps build an ongoing relationship with our customers which is of a value to us because we want people to understand what it is that we do, why it's important to them and just to have that relationship with us as we go down that path."

Another game on the Johnson County Wastewater website is Tic-Tac-Toilet, a fun twist on traditional tic-tac-toe.

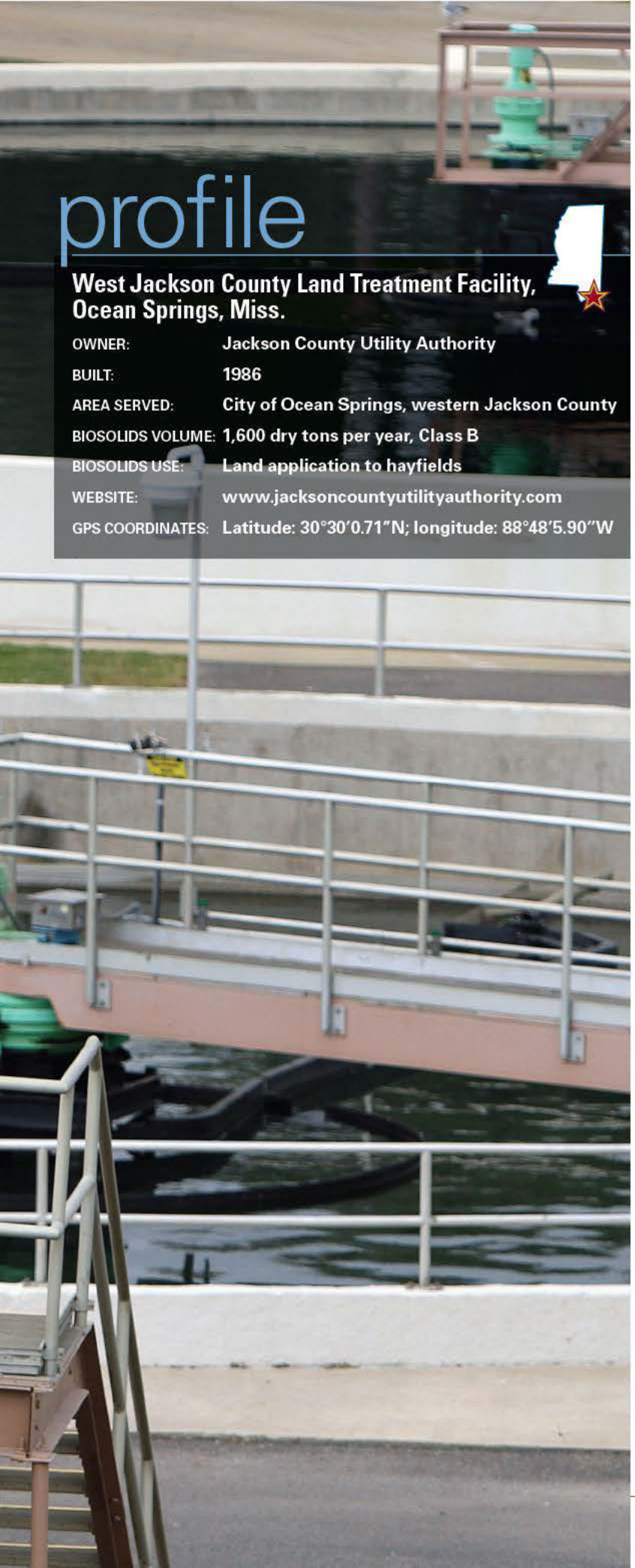
Sand believes, when the decision-makers are forced to make budget cuts, it is important that the public is informed so they understand the need to keep funds available for the treatment plant and its endeavors.

O'Donnell notes, "It comes down to money — bottom line. The more they know, the more we can do."

The interactive games on the JCW website make learning more fun for kids and adults. "It's amazing how much folks don't know what happens once they flush the toilet," says Sorensen. "Keeping them up to date about our multi-faceted industry makes them realize just how much of a value we are to them." **tpo**

Making *Hay*

Operator Richard Weathers walks the stairs to the aeration basin at the Jackson County Utility Authority's Pascagoula/Moss Point Regional Wastewater Treatment Plant. Behind him are two of the plant's clarifiers. (Photography by John Fitzhugh)



profile

West Jackson County Land Treatment Facility, Ocean Springs, Miss.

OWNER:	Jackson County Utility Authority
BUILT:	1986
AREA SERVED:	City of Ocean Springs, western Jackson County
BIOSOLIDS VOLUME:	1,600 dry tons per year, Class B
BIOSOLIDS USE:	Land application to hayfields
WEBSITE:	www.jacksoncountyutilityauthority.com
GPS COORDINATES:	Latitude: 30°30′0.71″N; longitude: 88°48′5.90″W

WEST JACKSON COUNTY TAKES BIOSOLIDS REUSE TO THE LIMIT BY FERTILIZING ITS OWN LAND AND CUTTING, BALING AND SELLING ITS OWN CROP

By Jim Force

THERE'S AN OLD SAYING: MAKE HAY WHILE THE sun shines. But the West Jackson County Land Treatment Facility, in Ocean Springs, Miss., makes hay all year-round and uses biosolids and treated wastewater to do it.

The Jackson County Utility Authority collects dewatered Class B biosolids from three of its wastewater treatment plants, stores it on concrete pads, and then discs the material into 160 acres of utility-owned land to support the production of clover, rye grass, and crab grass. The authority then cuts and bales the hay and either sells or donates it to several users in the area. Treated wastewater irrigates the hayfields.

Biosolids samples from the Andritz belt filter press.

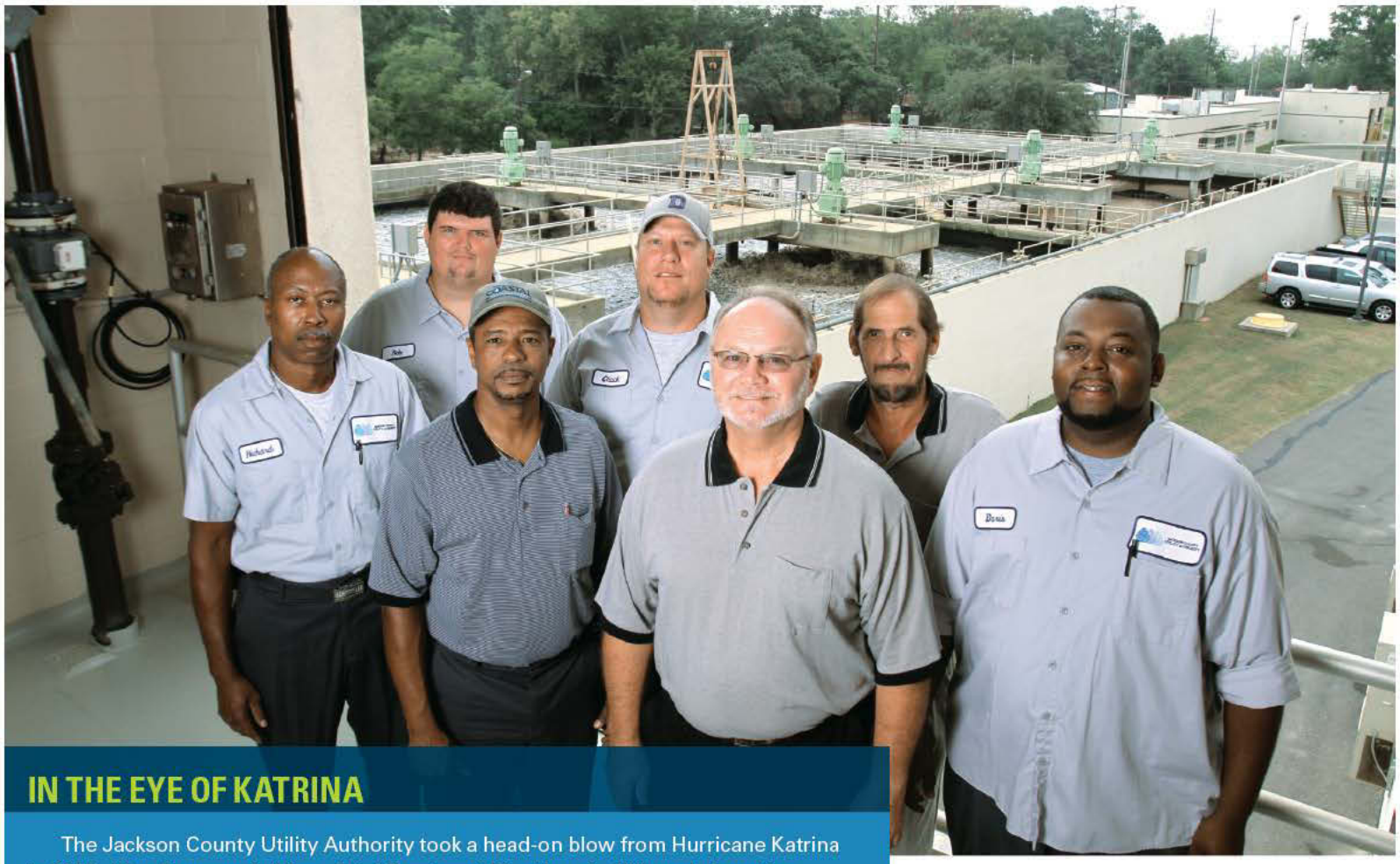
It's a beneficial reuse process that has won awards, generates revenue, and effectively eliminates the need for other more costly biosolids handling methods. "We have a 10 mgd plant in Pascagoula, a 3 mgd plant in Escatawpa, and a 4 mgd plant in Gautier," says Wayne Dennis, section manager. "Their flow schemes are similar, and the dewatered biosolids from all three plants are trucked to the West Jackson Facility in North Ocean Springs."

CENTRAL SITE

The West Jackson Facility is actually the fourth treatment plant serving this area of Jackson County, which borders on the Gulf of Mexico. Constructed in 1986, it is an aerated lagoon system with a design capacity of 5 mgd and is being upgraded to 7 mgd. Current average daily flow is 3.5 mgd.

Wastewater is transported to the plant through a force main, then moves through two aerated lagoons in series. The first lagoon uses a Triplepoint Water Technologies submersible aeration system that can provide diffused-air, fine-bubble, and coarse-bubble aeration. The second lagoon has four 15 hp AEROMIX floating directional aerators. A third 5-acre polishing lagoon follows, providing a total residence time of about 45 days.

The authority pumps most of its treated wastewater to a 110-acre series of constructed wetlands planted with cattails. The wetlands went into operation in 1991 for secondary treatment and to reduce the nitrogen-ammonia levels in the discharge. Water depths range from 8 to 12 inches, and retention time is about 25 days.



The Jackson County staff includes, from left, operators Richard Weathers and Rob Turnstall, plant supervisor Tim Thomas, lead operator Chuck Redmond, section manager Wayne Dennis, compliance officer Randy Coleman, and operator Brian Davis.

IN THE EYE OF KATRINA

The Jackson County Utility Authority took a head-on blow from Hurricane Katrina in 2005. "Our Pascagoula/Moss Point Treatment Plant is only 200 yards from the Pascagoula River and less than two miles from the Gulf of Mexico," says Wayne Dennis, section manager at the West Jackson County Land Treatment Facility. "We were inundated by the hurricane. The storm surge severely affected nine of the authority's 25 pump stations; two were entirely under water.

"The Pascagoula plant and Escatawpa plant were also severely damaged, and the Pascagoula plant took the brunt of the storm. We had seven feet of water in our storage building where we kept our portable emergency equipment — generators, pumps, tools and other equipment. We lost all vehicles except those that were not in the immediate area.

"We had three feet of water in our administrative building, located at the Pascagoula plant, and in most other places throughout the county." His staff members used personal vehicles to pull trailers with fuel totes to keep any undamaged emergency equipment going.

"It was a very, very trying time. Our people lost everything but still put in 12-, 14-, and 18-hour days for weeks on end. The heat was almost unbearable at times," says Dennis.

Operator Tim Thomas' experience was typical. "I was in town with my family," he recalls, "and didn't know how bad it was. I came down to the plant with a flashlight. It looked like a bomb had gone off. I didn't know if I'd have a job the next day or not."

Yet, 11 days after the hurricane, the maintenance department had all pumping stations in operation, and all treatment plants meeting permit limits. For months, the authority used bypass pumping and emergency power to maintain its wastewater infrastructure and keep it online.

Dennis credits his maintenance and operations staffs. "They were the ones in the trenches and the ones that took the bull by the horns and made it happen," he says.

"We found that by using clover as a cover crop, we could increase the nitrogen loading to 450 pounds per acre. That's a 50 percent increase in capacity."

WAYNE DENNIS

Following the wetlands, the water goes to a common effluent ditch, which flows by gravity to the effluent pump station. There, two 60 hp Flygt (Xylem) pumps lift it to a contact chamber, where it is treated with chlorine, then dechlorinated and discharged under an NPDES permit to Bayou Costapia, which flows into the Tchoutacabouffa River and ultimately to Biloxi Bay.

About 900,000 gallons a year from the aerated lagoons is regulated by a no-discharge permit and irrigates the hayfields. A trio of Peerless vertical turbine pumps driven by GE motors moves the water to a spray irrigation system.

PHOTO COURTESY OF SHARON MILLIGAN

Operator Jesse Spear incorporates biosolids using a 15-foot John Deere disc harrow.

Plant supervisor Tim Thomas tests mixed liquor suspended solids.

BENEFICIAL REUSE

While biosolids from the West Jackson Facility are removed from the lagoon bottoms only once every several years, it is the biosolids processing operation here that has drawn national attention and has won several distinguished awards.

Besides Dennis, the staff includes Raymond Ward, supervisor; James Roberts, lead operator; Damien Hosili, Dan Westerdahl and Jesse Spear, operators; Tommy Weaver, driver; Randy Coleman, compliance officer; and Shannon Clayton, maintenance supervisor.

"Our other three treatment plants aerobically digest their biosolids, with a residence time of 45 days," says Dennis. "Then they thicken and dewater the material to about 15 percent solids on 2-meter Andritz belt presses. The cake is placed in 30-cubic-yard aluminum Travis dump trailers, which are pulled by one of two 410 hp Mack trucks to the West Jackson Facility, where it is stored on five concrete pads."

The Pascagoula plant generates about 1,125 dry tons of biosolids per year, the Gautier plant about 490 dry tons, and the Escatawpa plant about 40 dry tons. Weaver picks up the biosolids cake and hauls it about 20 miles to West Jackson. The authority owns four Travis 30-cubic-yard dump trailers. The storage pads have a total capacity of 900 cubic yards, and the authority plans to build two more covered pads to increase storage capacity.

After each load, Weaver reports the cubic yards of biosolids hauled, the plant it came from, and the storage pad it was placed on. He then washes down the rig on a truck-wash pad so that none of the material is left to drop on the road.

"After they're placed on the storage pads, the biosolids are tested," Dennis says. "We check the fecal coliform, pH, TKN ammonia, and metals every two months. Our biosolids have to meet Class B standards, which means the fecal coliform must be less than two million colony-forming units per gram of total solids before it can be spread. Each field we spread on is limited in how much nitrogen it can take in a year, so we have to be careful not to overload the field."

FEEDING THE CROPS

The authority's acreage includes 16 plots totaling 160 acres. "If the sample results are OK, we apply the biosolids to the fields using a 170 hp John

Lab supervisor Carrie Dennis weighs a biosolids sample.

A truck picks up a load of biosolids at the Pascagoula/Moss Point treatment plant. The material will be shipped to the West Jackson County Land Treatment Facility.

Deere tractor and a New Holland 12-yard manure spreader," Dennis says. "Based on our permit, we incorporate the solids into the soil with a John Deere 15-foot disc harrow within six hours of application to prevent odors and vector attraction.

"We sample quarterly, making sure we remain above 6.5 pH on all 160 acres of the application fields. We also have groundwater monitoring wells that are sampled and analyzed on an annual basis for metals." The authority reports the data twice a year to the state Department of Environmental Quality and annually to the U.S. EPA.

Before 2009, the primary hay crop was Bermuda grass. Based on its permit, the authority could apply 300 pounds of nitrogen per acre to that crop. That limited the amount of biosolids that could be applied and the authority frequently ran out of acreage. "Randy Coleman, our compliance official, developed a computerized site loading record system that tells us when we're getting close to the nitrogen limit and closing out a particular field," says Dennis.

As a result, the authority worked with the local university extension service to develop information on different crops that would allow an increase of nitrogen loading. "We found that by using clover as a cover crop, we could increase the nitrogen loading to 450 pounds per acre," Dennis says. "That's a 50 percent increase in capacity."

Operator Rob Turnstall collects an effluent sample from the contact tank.

HAY FOR SALE

Today, West Jackson County only closes out about six of the 16 fields in a year due to nitrogen loading. "We're still growing a crop that's beneficial to the community, but now we can keep our fields in operation year-round because of the extra capacity," says Dennis. "We are still in the early phases of this agricultural plan, but with the results we are getting now, I think it will be a win-win situation for everyone."

When the clover crop matures, utility crews cut and bale it using a round or square baler manufactured by New Holland. The utility sells the round bales for cow hay for $35 a bale and the square bales for $5. Area contractors also use the square bales for erosion control, and the authority donates some to schools and community organizations for decorations at Halloween, Thanksgiving and other fall events. The revenue helps offset the utility's costs to produce, cut and bale the hay.

The hay is sold at a competitive price that does not undercut other local suppliers. "Farmers really like it," says Dennis. "It's high in nitrogen content. They drive up in their own trucks and trailers and pick it up."

Working with executive director Tommy Fairfield, the authority has applied for a U.S. Department of Agriculture loan of $850,000 to upgrade and expand its haying equipment. "We started planting rye grass, clover and crab grass in 2009," Dennis says, "and it will take a few years to develop the crop to the point where we can manage it and schedule regular cutting."

IT'S A WINNER

The new equipment would allow the authority to harvest crab grass in the summer, and clover and rye grass in winter. "We'll be able to keep our hayfield operation going year-round," says Dennis.

The beneficial reuse program has drawn plenty of applause, both from local farmers and end-users, and from the wastewater profession and regulatory agencies. In 2005, the National Clean Water Act Recognition Awards Program honored West Jackson with second place in biosolids management for utilities handling less than five dry tons per day.

The award is based on several criteria, including advancement of technology, applicability of the technology to other communities, public acceptance of beneficial reuse, and dedicated individual or team effort. "It was an honor we appreciated, and we value it highly," says Dennis.

Section manager Wayne Dennis.

With the improvements and advancements that West Jackson County continues to make, you can't help but think they'd finish first if they entered again. **tpo**

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From left, operators Jerome Houston and Kyle Lerner, plant supervisor Mitch Stone, and operator Patrick Witcher near one of the plant's sequencing batch reactors from Aqua-Aerobic. (Photography by Parker Michels-Boyce)

Winning the Battle

THE TREATMENT PLANT IN THE HISTORIC VIRGINIA CITY OF APPOMATTOX USED A SIMPLE AND COST-EFFECTIVE SOLUTION TO ACHIEVE REDUCTION OF ZINC LEVELS IN EFFLUENT

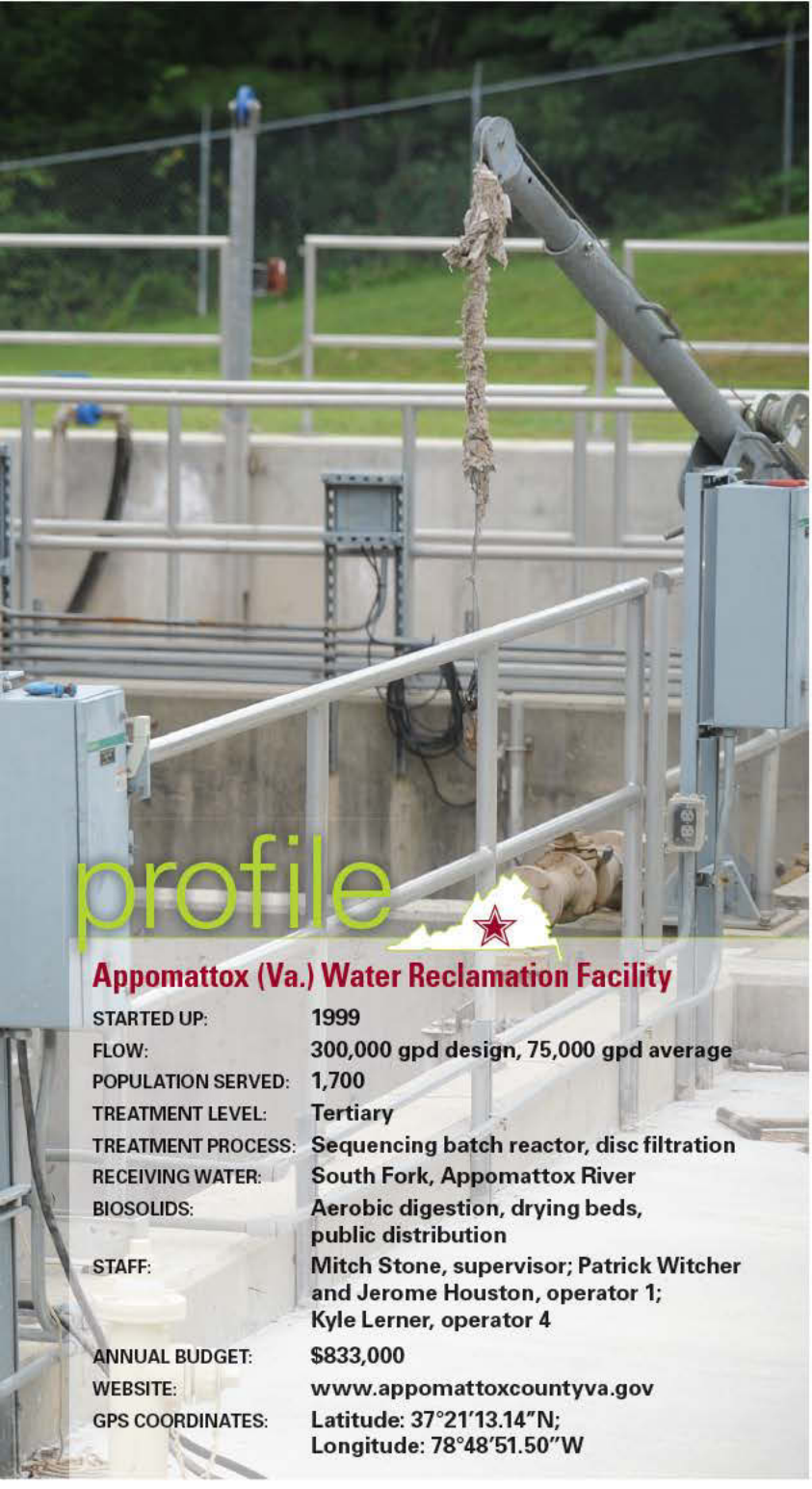
By Jim Force

IN THE BATTLE OF ZINC, THE APPOMATTOX WATER Reclamation Facility is winning. In fact, it has already won. Using lime and soda ash, the plant has reduced zinc that can range from 150 to 220 µg/l in its influent to about 30 µg/l in the effluent.

The treatment approach, simpler and considerably less expensive than some of the alternatives, has enabled the plant to meet removal standards set in a consent order with the Virginia Department of Environmental Quality. "They're happy with what we're doing," says plant operator Patrick Witcher. "And we're sharing our procedures with other plants that have zinc problems."

MODIFIED CYCLES

The Appomattox WRF is a sequencing batch reactor (SBR) plant with a design flow of 300,000 gpd. It is one of two small plants serving the community, both operated by the Appomattox crew, led by supervisor Mitch Stone.



profile

Appomattox (Va.) Water Reclamation Facility

STARTED UP:	1999
FLOW:	300,000 gpd design, 75,000 gpd average
POPULATION SERVED:	1,700
TREATMENT LEVEL:	Tertiary
TREATMENT PROCESS:	Sequencing batch reactor, disc filtration
RECEIVING WATER:	South Fork, Appomattox River
BIOSOLIDS:	Aerobic digestion, drying beds, public distribution
STAFF:	Mitch Stone, supervisor; Patrick Witcher and Jerome Houston, operator 1; Kyle Lerner, operator 4
ANNUAL BUDGET:	$833,000
WEBSITE:	www.appomattoxcountyva.gov
GPS COORDINATES:	Latitude: 37°21'13.14"N; Longitude: 78°48'51.50"W

Wastewater collected from about 700 users enters the plant through an influent channel with a Muffin Monster (JWC Environmental) grinder and a cyclone-type degritter.

There are no primary clarifiers: The flow passes directly to one of two SBR basins (Aqua-Aerobic), each with coarse-bubble diffusers mounted on the tank bottoms. The SBRs are used alternately — while one is going through its treatment cycle, the other is filling. During each cycle, both aeration blowers and mixers are initially turned on to treat the wastewater aerobically. "We keep our dissolved oxygen levels between 2.0 and 4.0 mg/l to facilitate nitrification," says Witcher. "Above 4.0, you really don't gain anything."

In the second step, anoxic treatment occurs as the contents continue to be mixed, but air is turned off. The DO level drops below 0.5, allowing denitrification to occur. After treatment, the contents settle and then are decanted. Treated water flows off the top and passes to an underground basin, where it is stored before being pumped to tertiary filtration and disinfection. Witcher says, it takes at least two decants to get the storage basin full enough to support flow to downstream treatment.

"We cover for each other. We get along very well; we've got each other's backs."
PATRICK WITCHER

The plant staff has modified the original cycling plan for the SBRs, which called for five cycles per day. "We run three eight-hour cycles each day," says Witcher. "We don't have as much solids coming through the system as in the original design, so this gives us a longer cell time. We don't waste as much, and we get good results on BOD, solids, and total nitrogen."

Appomattox uses disc filters (Aqua-Aerobic) to capture remaining suspended solids. The plant operators clean the filter regularly with a high-pressure water hose and disinfect the units about every two months with a solution of sodium hypochlorite. "We dechlorinate the filter with sodium hydroxide before we put it back online," says Witcher.

The flow is then disinfected in a two-bank UV provided by Trojan Technologies. Each bank contains 12 UV bulbs. Flow is directed to one bank while the other is turned off for maintenance or cleaning. For high flows (up to 500,000 gpd), both trains can be used. The staff uses the commercial product LIME-A-WAY to clean the bulbs once a week.

Final effluent is pumped through a two-mile pipe to the South Fork of the Appomattox River. The operation is controlled by a SCADA system and is staffed eight hours a day. A Verbatim (RACO) alarm system notifies the operators of malfunctions during off hours. The team of four operators mans both the WRF and a small trickling filter plant a mile and a half away. "We cover for each other," says Witcher. "We get along very well; we've got each other's backs."

NATURAL TREATMENT

Biosolids generated at the plant receive natural treatment. Collected at the bottom of the two SBR basins, waste activated sludge moves on to a pair of aerobic digesters (Aqua-Aerobic), each with coarse-bubble diffusers. After digestion, the solids (about 10,800 gallons per month) are pumped to the plant's reed beds for further treatment.

There are four beds and in total, comprise an area about the size of a football field. A layer of sand and gravel lies beneath each bed so that the liquid (supernatant) can drain from the biosolids and be returned to the treatment plant. The remaining solids dry in the open air to a dirt-like consistency and are classified as a Class A biosolids.

About every six years, the plant

Soda ash from General Chemical Performance Products is added to raise the pH as part of the plant's approach to reducing zinc in the effluent.

Operator Patrick Witcher records data into the plant operations log.

Appomattox Water Reclamation Facility
PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
BOD	213 mg/l	2.3 mg/l	30 mg/l
TSS	373 mg/l	1.8 mg/l	30 mg/l
TKN	—	1.8 mg/l	5 mg/l
Zinc	150-225 mg/l	32 mg/l	53 mg/l

GOING OLD SCHOOL

Wastewater consultant John Hricko has worked closely with the team at Appomattox to help them solve their zinc-removal problem. He gives plant supervisor Mitch Stone, operator Patrick Witcher and the others high marks for their determination to improve performance. "They are a dedicated, committed group," he says. " They tried other methods that were very expensive or didn't work. But now, they're getting fabulous results."

The solution — adding lime — is an old-school technique that removes zinc while providing other benefits. Lime dramatically increases effluent hardness, reducing the toxicity of dissolved metals in the discharge.

Furthermore, Hricko says, the use of lime increases alkalinity, and that improves nitrification. "The number one call I get is from folks losing their nitrification," he says. "Most plants don't monitor alkalinity in their influent. Without alkalinity it's impossible to get the conversion of ammonia to nitrates. The calcium helps the bugs."

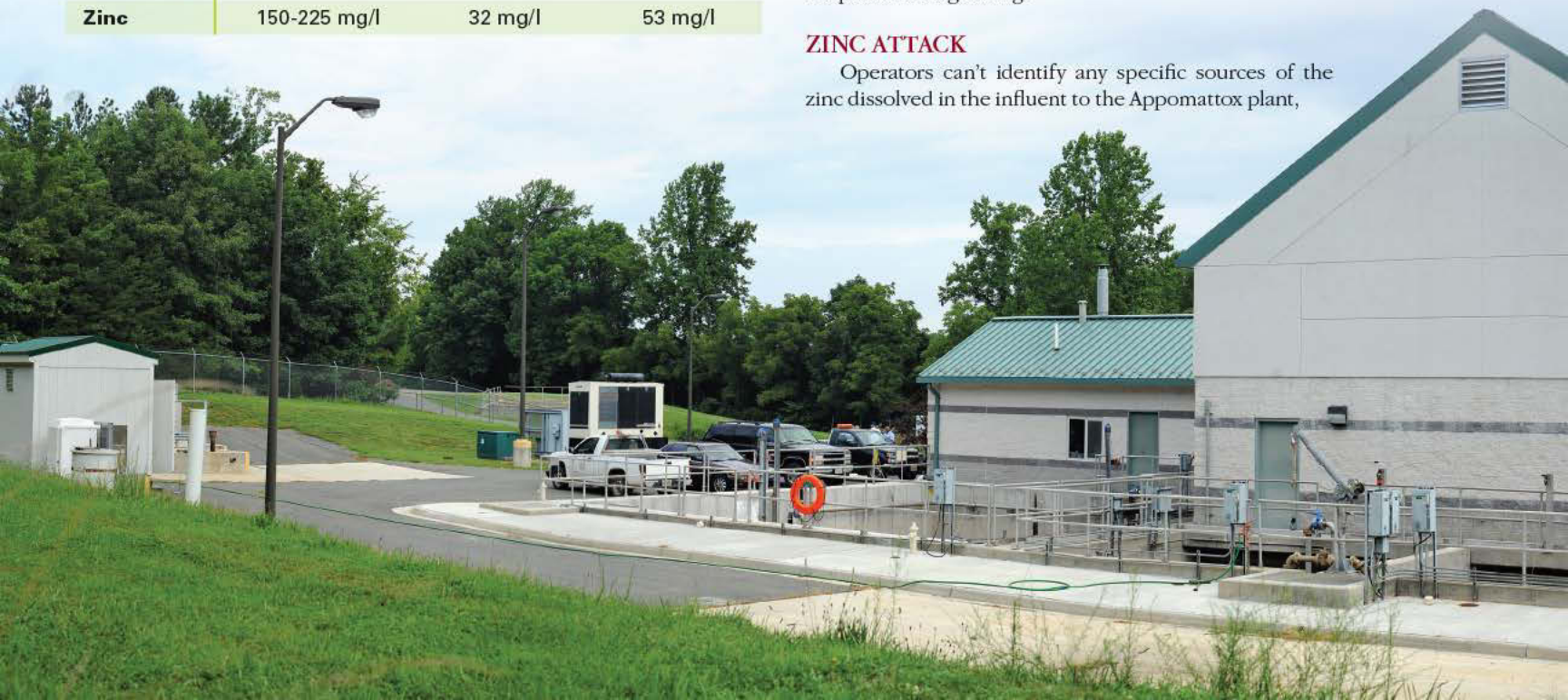
Hricko says that by using lime, the Appomattox team has saved the community hundreds of thousands of dollars versus some of the newer solutions. "It's an example of how much impact operators can have in implementing solutions at their level," Hricko says. "Success doesn't always require expensive engineered treatments or cutting-edge technology — just a true understanding of how some of the most basic treatment principles can work."

staff removes the material from the beds and piles it on a concrete slab at the rear of the plant, where area citizens come by and pick up various amounts for their gardens and lawns. "It's very popular," says Jerome Houston, plant operator. "We don't have much left a couple of years after we dig out the beds."

Reeds growing in each bed provide additional treatment, taking up nutrients and heavy metals. The plants can get up to 10 feet high. "We cut them back every year," Houston says. In dry periods, the beds are flooded to keep the reeds growing.

ZINC ATTACK

Operators can't identify any specific sources of the zinc dissolved in the influent to the Appomattox plant,



"We keep our dissolved oxygen levels between 2.0 and 4.0 mg/l to facilitate nitrification. Above 4.0, you really don't gain anything."

PATRICK WITCHER

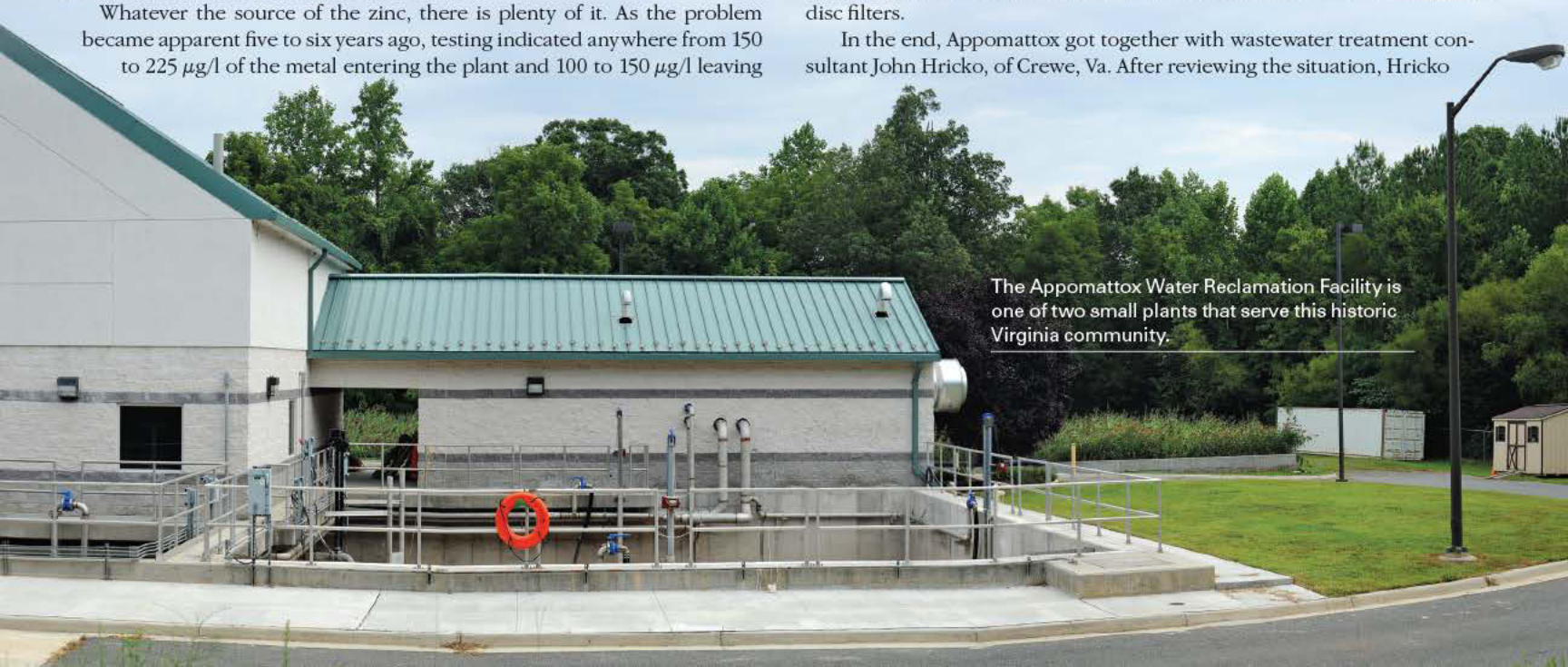
attributing it instead to the corrosive nature of the community's water supply, drawn from several wells. "We think the water dissolves zinc in pipes and plumbing," says plant supervisor Mitch Stone.

Whatever the source of the zinc, there is plenty of it. As the problem became apparent five to six years ago, testing indicated anywhere from 150 to 225 μg/l of the metal entering the plant and 100 to 150 μg/l leaving it. The DEQ consent order mandated that the plant reduce that to a level of 53 μg/l or less.

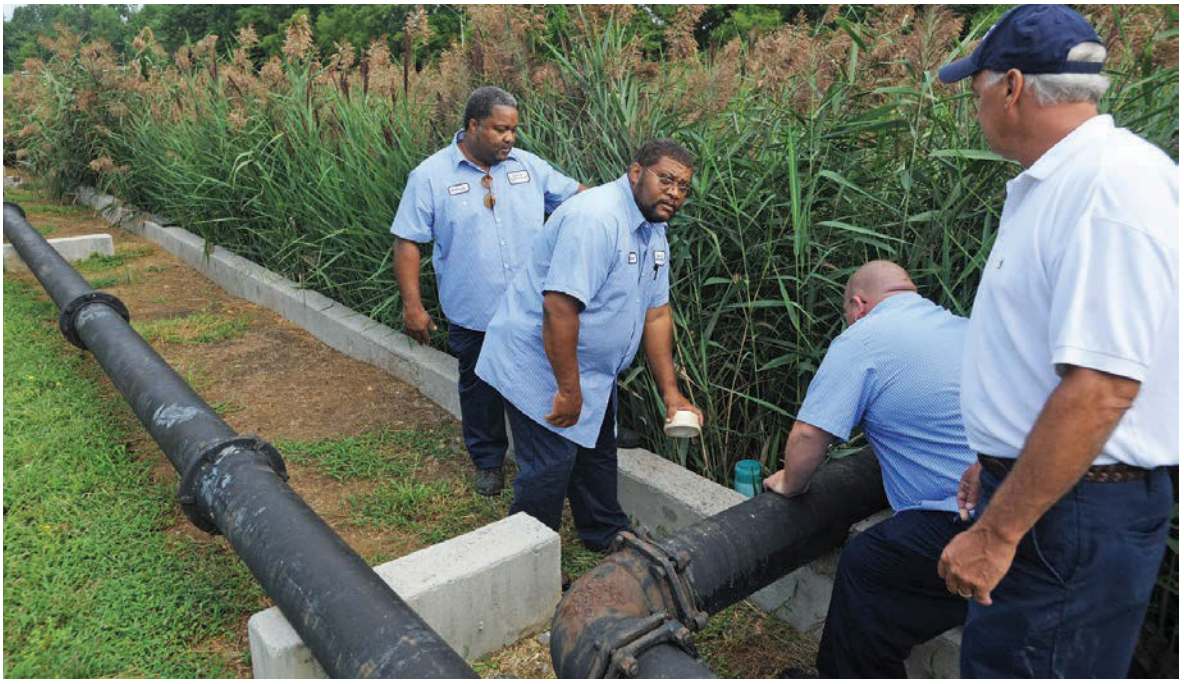
Zinc removal options abound in the wastewater profession. Some of the more high-tech solutions include carbon adsorption, ion exchange and electrocoagulation, a technology Appomattox had looked at seriously in the past, but found too involved and power-intensive.

A chemical feed system using magnesium hydroxide was another possibility. Appomattox had received a comprehensive proposal to supply a new chemical feed system based on magnesium hydroxide as the solution. Stone says the plant tested a pilot system, but found that the chemical clogged the disc filters.

In the end, Appomattox got together with wastewater treatment consultant John Hricko, of Crewe, Va. After reviewing the situation, Hricko



The Appomattox Water Reclamation Facility is one of two small plants that serve this historic Virginia community.



LEFT: From left, operators Patrick Witcher, Jerome Houston and Kyle Lerner and plant supervisor Mitch Stone check the water level of the reed beds used for biosolids treatment. BELOW: Stone checks the pH in a sequencing batch reactor basin. The plant team aims to maintain a pH of 7.8-7.9 to help with the zinc removal.

"Success doesn't always require expensive engineered treatments or cutting-edge technology — just a true understanding of how some of the most basic treatment principles can work."

JOHN HRICKO

recommended trying lime and soda ash addition to increase the hardness of the water and change the pH so that the metal would precipitate. It made even more sense because the treatment would use existing equipment.

"We had a dual-unit lime feeding system onsite, but previous plant staff did not have good luck with it," says Stone. "It scaled up after a few hours." Even though the system had been given up for dead, the plant team took Hricko's advice and decided to run the lime feed system around the clock. That avoided the plugging problems. At present, four 50-pound bags of lime are mixed with water and added to the plant flow on a continuous basis just ahead of the SBRs.

While one unit is operating, the other is shut down for maintenance. Staff member Kyle Lerner cleans the system, hosing it with high-pressure water while taking care to wear the proper protective clothing. In addition to lime, the Appomattox staff adds 100 pounds soda ash at the head of the plant using an existing building equipped with mixing equipment and feed pumps.

The results have been, in Hricko's word, "miraculous." The lime and soda ash have increased the hardness and raised the pH of the wastewater to around 7.8; zinc content in the effluent is consistently in the low 30s (μg/l), and sometimes as low as 22 μg/l. "The result was almost instantaneous," says Stone. "Zinc began to drop in a matter of days."

It has also been cost-effective. Lime is about one-fourth the cost of magnesium hydroxide, which Hricko points out would have provided the hardness sought after to lessen the toxicity of metals, but would not have adjusted the pH enough to actually remove the metals.

The zinc issue may go away in the next year or so. The village is planning to abandon its existing wells and import water from Appomattox County, anticipating that it won't be so corrosive and won't deliver high zinc content to the treatment plant. If that turns out to be true, and the zinc removal orders are lifted, maybe the paperwork should be signed at a local site where another more famous agreement was reached — the Appomattox Courthouse. **tpo**

Kyle Lerner checks process microbiology.

Jerome Houston loads the lime feeder. Lime addition is part of the zinc removal system.

more info:

Aqua-Aerobic Systems, Inc.
800/940-5008
www.aqua-aerobic.com
(See ad page 13)

General Chemical Performance Products LLC
800/585-6844
www.generalchemical.com

JWC Environmental
800/331-2277
www.jwce.com

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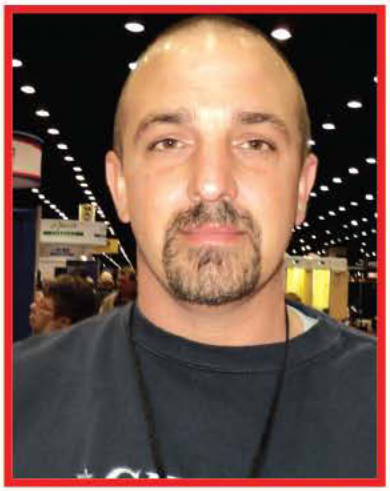

"I came back with some really good ideas."

Billy Bell

Utility Supervisor II – City of Raleigh, N.C.

The 2011 Expo was Billy Bell's first, and he attended with five colleagues. "The most impressive thing was the new technology – the cameras, sewer cleaning equipment and rehab equipment on the exhibit floor," he says. "New technology has helped us tremendously. It's amazing how far it has come from the past. The sales representatives were very helpful. Any questions about the products, they could answer. You really have to see this for yourself."

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Abbott Rubber Company
ABCO Industries Limited
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Acro Trailer
Advance Pump & Equipment, Inc.
Advanced Containment Systems, Inc.
Advanced Drainage Systems
Advanced Pressure Systems
Advanlink International Corp.
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CEMTEC / A.W. Cook Cement Products, Inc.
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Champion Pump Company, Inc.
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Clarus Environmental/Zoeller Pump Company
Clear Computing
Clearstream Wastewater Systems Inc.
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Comet USA, Inc.
Comforts of Home
Compco Industries
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Containment Solutions Inc.
Control Chief
Cosmic Tophat LLC
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Coxreels
Crescent Tank Manufacturing
Cretex Specialty Products
Cross Bore Safety Association
Crown Tank
Crust Buster/Schmitz Bros.
CSI Controls
CST Storage
CUES Inc.
Cusco
Custom Biologicals Inc.
De Neef Construction Chemicals
DekoRRa Products
Del Vel Chemical Co.
Delta Environmental
Ditch Witch
Downey Ridge Environmental Company
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Dyna Flex Inc.
Dyna-Vac Equipment
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Ecoflow - Sustainable Water Solutions
Ecological Laboratories Inc.
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Making the Best of It

A PHOENIX WASTEWATER TREATMENT PLANT FOCUSES ON OPTIMIZATION TO OPERATE MORE EFFECTIVELY, REDUCE COSTS AND PROTECT THE ENVIRONMENT

By Doug Day

The 91st Avenue Wastewater Treatment Plant in Phoenix, Ariz., has a simple mission: meet permits; reduce chemical, energy, and biosolids costs; automate where practical; and innovate. Despite the lack of any large capital projects, the plant has achieved big savings, says assistant plant superintendent Jim Coughenour.

"Electricity has increased by 40 percent, chemical costs are up, and even the price for biosolids land applicators has increased. Still, our division has reduced overall cost for those three from $18.2 million to $15.2 million in five years," Coughenour says. "We expect to reduce it by another $1 million this year. We're trying to craft the entire plant to optimize each step."

The 230 mgd regional facility serves three million people in Phoenix, Glendale, Scottsdale, Tempe and Mesa. It uses single-stage nitrogen removal, single-stage anaerobic digestion, chloramination for disinfection, and a revamped solar drying biosolids operation. "We're looking at this in a little different way," Coughenour says.

HEADWORKS

Process enhancements begin at the headworks. Centrate ammonia from the digested sludge dewatering centrifuges is nitrified to nitrate or nitrite at the Centrate Treatment Facility and recycled to the headworks. The nitrate/nitrite is used up prior to reaching the aeration basin, reducing soluble COD and cutting total nitrogen loading on the aerators by 15 percent. It also serves as an odor control chemical at no cost in the headworks and primary clarifiers. That step alone saves the plant $40,000 a year.

A small dose of ferric chloride in the headworks helps meet sulfide-related air-quality permit limits and causes small particles to come together and settle out in the primary clarifiers.

A Brown Bear tractor aerates biosolids at the 91st Avenue plant. Solar drying has cut land application costs from $5 million a year to $1.9 million.

The Tres Rios wetlands have become an oasis in the middle of the Sonoran Desert. The wetlands polish effluent from the 91st Avenue Wastewater Treatment Plant before it enters the Salt River.

PHOTOS COURTESY OF PHOENIX WATER SERVICES

Optimization of the clarifiers, including the addition of Stamford baffles (NEFCO) has helped reduce BOD load before the aeration phase and so reduce the use of blowers.

PRIMARY CLARIFIERS

The primary clarifiers were updated several years ago to remove much of the plant's BOD load before the aeration phase to reduce the use of blowers. Spiral scrapers and Stamford baffles (NEFCO) were added, along with energy dissipating center wells. Intermittent high-rate pumping was replaced by continuous slow-rate pumping. Density meters and VFDs maintain primary sludge density at about 3 percent.

"The only sludge blankets we have are in the cones, and that is just enough to thicken it to 3 percent," says Coughenour. "We are able to stop acid hydrolysis from occurring in the clarifiers, preventing soluble COD from increasing. With centrate treatment and ferric chloride, we're getting about 80 percent solids removal, almost 60 percent COD removal and 15 percent soluble COD removal."

In the last five years, while the amount of suspended solids and COD coming into the plant has increased sharply, the amount going into the aerators has decreased. "That efficiency has probably saved $600,000 a year," he notes.

CONTROLLING DO

A sophisticated aerator DO control strategy relies on a number of blowers. "The most efficient are the Atlas Copco blowers that have inlet and discharge guide veins," Coughenour notes.

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.**

The plant also uses first-pass and fourth-pass anoxic zones in the aerators, allowing for proper treatment with less oxygen and less blower use. Oxygen is added in the center of the aerator, where ammonia is nitrified and BOD is oxidized, to maintain dissolved oxygen at 2.0 mg/l. About 7 percent of the primary effluent is added to the fourth-pass anoxic zone.

"The fourth-pass feed allows us to pass a small amount of ammonia for chloramination," he says. "Operating the fourth-pass of the aerator, the mixed liquor channel, and the secondary clarifier as anoxic, causes endogenous denitrification, lowering our total nitrogen and freeing up significantly more oxygen."

He says the plant started using the denitrification-nitrification-denitrification strategy in the mid-1990s and has been refining it ever since. "We are using roughly 600 kWh per million gallons here for blowers, as opposed to 900 kWh at our 23rd Avenue plant," Coughenour says. Phoenix Water Services has transferred about 10 mgd of flow from 23rd Avenue to take advantage of the savings at 91st Avenue.

"Electricity has increased by 40 percent, chemical costs are up, and even the price for biosolids land applicators has increased. Still, our division has reduced overall cost for those three from $18.2 million to $15.2 million in five years."

JIM COUGHENOUR

UNUSUAL WATER RECLAMATION

About half of the plant's effluent is piped 50 miles to the Palo Verde Nuclear Generating Station, the largest nuclear plant in the country and the only one not on a lake or river. It uses the effluent for condensing steam into water in its cooling towers. At peak times, about 80 mgd of effluent goes to Palo Verde.

Because it doesn't have to be chlorinated, wastewater destined for Palo Verde is treated in an older part of the plant. It flows by gravity to the power plant. "We saved $50,000 the last two months because we didn't have to pump the water, and we reduced our chlorine cost by $50,000," says Coughenour.

HELP FROM WETLANDS

The plant recently finished a $34 million U.S. EPA-funded Tres Rios Constructed Wetlands Demonstration Project on 750 acres along the Salt River. That cost compares to an estimated $625 million for a plant upgrade.

The first 500 acres are treatment cells called Flow Regulating Wetlands. Water leaving the cells must meet all discharge permit requirements. Currently receiving 45 mgd of treated secondary effluent, the wetlands are designed to accept up to 400 mgd.

"91st Avenue reduces primary effluent total nitrogen from about 50 mg/l to about 6 mg/l," says Coughenour. "The wetlands further reduce it to 3 mg/l."

91st Avenue uses sodium bisulfite to dechlorinate effluent prior to discharge, but chlorine is removed naturally in the wetlands. "Total chlorine residual of 2 mg/l enters the wetlands, and it's all gone before it gets halfway through."

Chlorine analyzers are gathering data and calculating decay rates to determine if peak flows will still be fully dechlorinated. Coughenour believes that as the wetlands mature, they will still remove all chlorine even if the wetlands accept 100 percent of the plant's effluent.

The last 250 acres are called the Overbank Wetlands where a city park will be built. "It will be a great place for people to come and enjoy the environment," says Coughenour.

HANDLING BIOSOLIDS

Plant efficiencies extend to the management of biosolids. Development has taken over much of the property where the plant's biosolids were land-applied. "We decided to see if we could resurrect a

PEOPLE MAKE MACHINES BETTER

The Phoenix 91st Avenue Wastewater Treatment Plant is heavily automated, but assistant plant superintendent Jim Coughenour says it takes people to take advantage of that capability.

"We have a process control group that has become expert on all parts of the plant," he says. "They train staff to meet targets in chemical and energy use, help refine automatic control strategies, and improve displays of power monitoring information for operators."

91st Avenue has around 130 total employees, including about 40 operators and 40 maintenance people. There are seven operators on each shift with two shifts per day.

All employees are part of an O&M Tech program to raise the skills of the plant staff. "Operators and maintenance staff all go through skill blocks to learn operations, maintenance, and instrument and control," Coughenour says. "All of our workers are multi-skilled and trained well enough so a maintenance person can fill in for an operator. They're very good at what they do."

solar drying program we had used many years ago."

Being in the Sonoran Desert presents some advantages in drying biosolids. No greenhouses are needed, the biosolids are just placed on asphalt pads.

"We are drying 20 percent solids cake and getting about 75 percent of the water out using Brown Bear tractors for aeration," he says. "We've reduced what we pay for land application to $1.9 million a year. Five years ago we were spending more than $5 million. We believe we'll be able to reduce it to less than $1 million."

Phoenix Water Services transfers wastewater flow to the 91st Avenue treatment plant because it uses much less energy to operate aeration blowers.

Solar drying creates a product that is essentially Class A. Eliminating odors and vector attraction problems allows land application closer to homes and businesses. "Instead of land-applying 60 to 80 miles away, we are doing it 40 to 50 miles from the plant," Coughenour says. "We're taking trucks off the highway and producing a product that is more attractive to farmers. Demand is growing."

STRATEGIC VIEW

Incremental change has been an effective approach at 91st Avenue. "We're trying to manage lots of different chemical and energy applications," says Coughenour. "We just improved our power monitoring, and the operators have been able to use that to limit when equipment is turned on to reduce our energy bill. That is producing substantial savings."

The staff is using that new ability to find other opportunities to limit equipment and energy use during times of low flow. "Innovation is part of our mission," he adds. "Not just to stagnate and accept what's happened before." tpo

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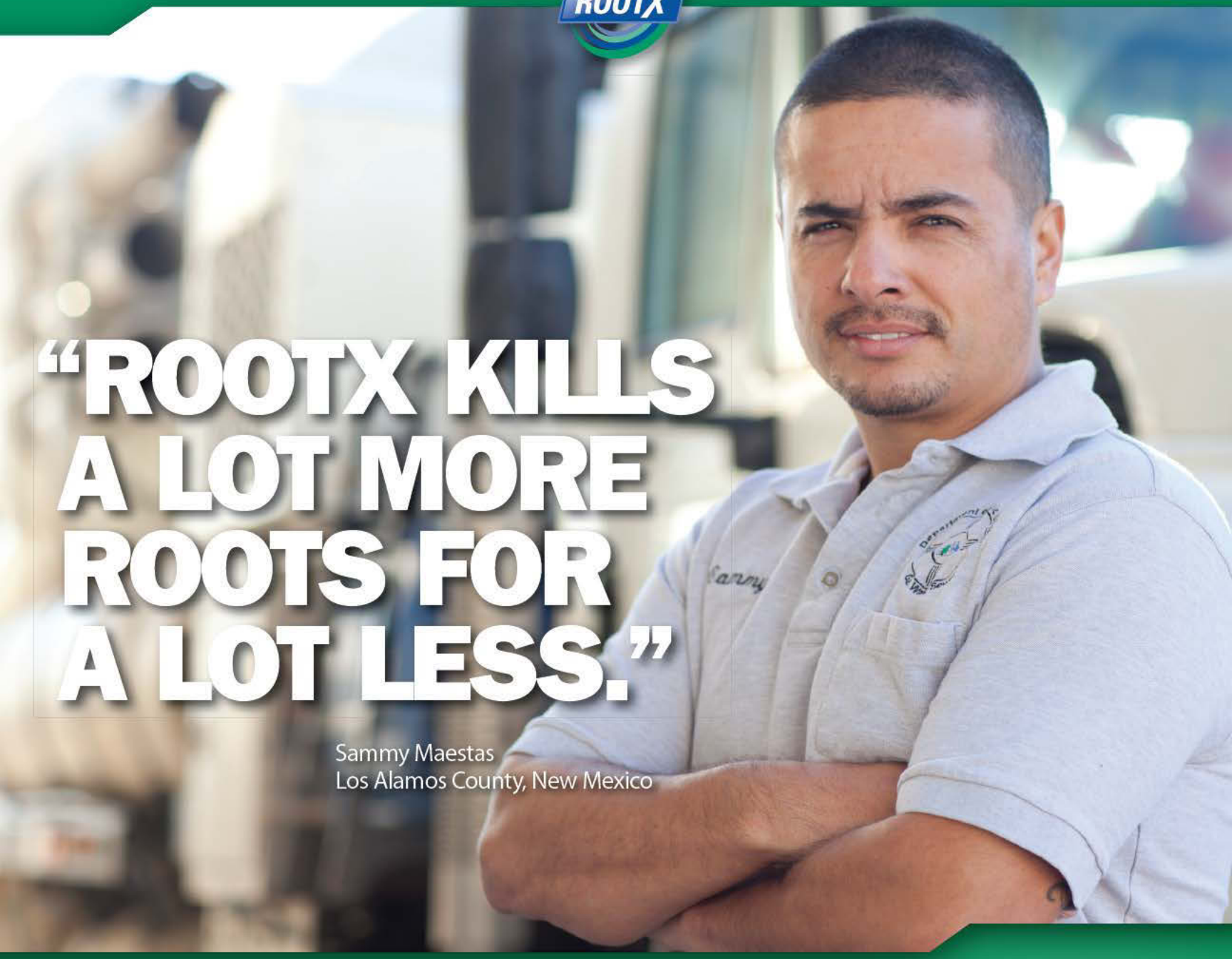

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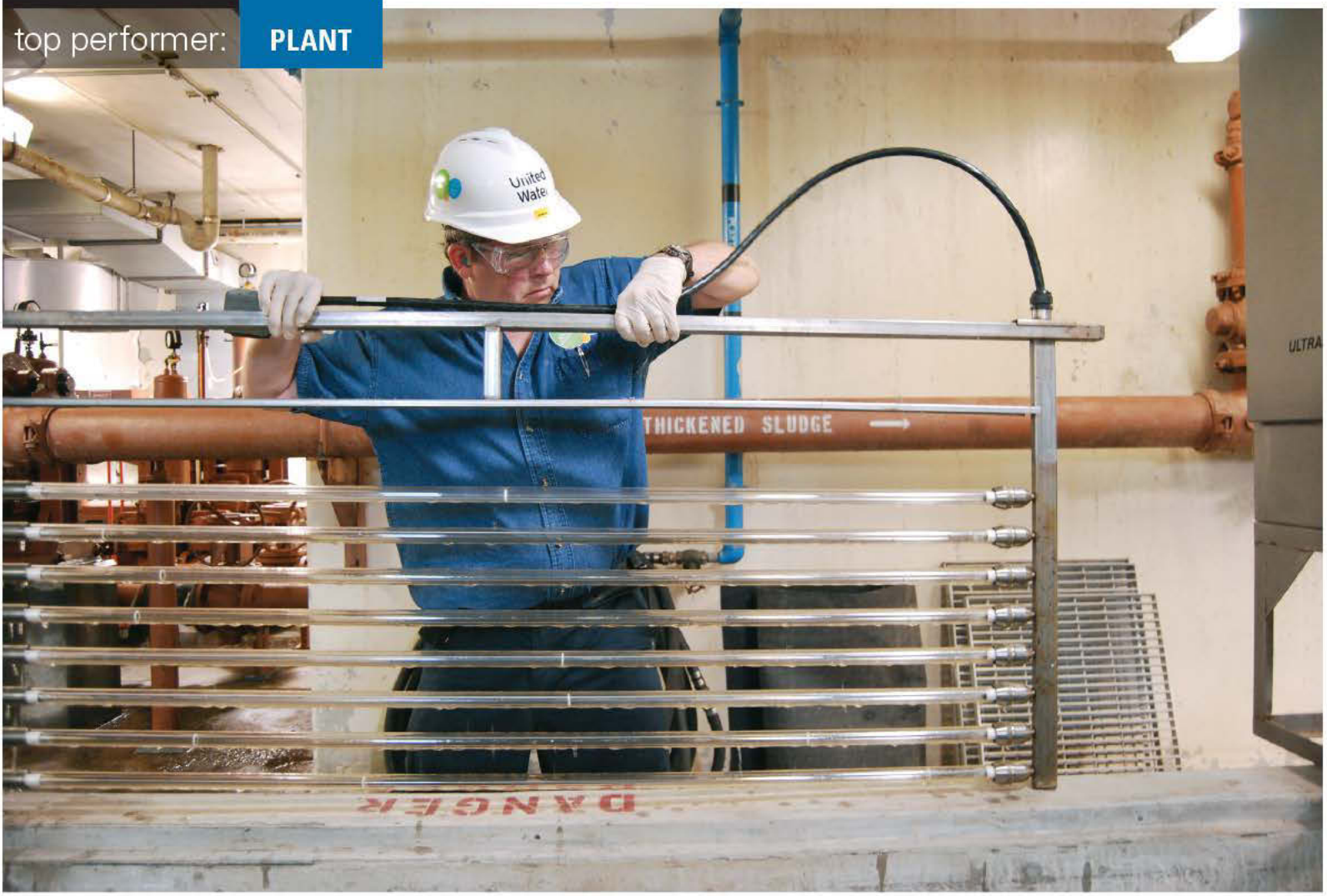

Operations and maintenance technician Mark Byrns prepares to clean UV light panels, part of the Newtown facility's Fisher & Porter disinfection equipment (Ironbrook Partners). (Photography by Margaret Waage)

Ready for Anything

FROM PERMIT COMPLIANCE TO HURRICANE PREPARATIONS, THREE STAFF MEMBERS AT A CONNECTICUT TREATMENT PLANT DO EXEMPLARY WORK THAT EARNS EPA RECOGNITION

By Trude Witham

WHEN THE NEWTOWN (CONN.) WASTEWATER Treatment Plant had trouble meeting its nitrogen limit, the plant manager, operator and mechanic worked as a team to improve nitrogen removal and dissolved oxygen (DO) control, while reducing energy costs.

"Our nitrogen limit in 2006 was 24 pounds a day, which the plant wasn't achieving," says plant manager Julio Segarra. "The oxidation ditch was hard to manage, since the drive for the mechanical mixers ran on high speed most of the time. What we really needed was a variable-speed drive."

An aeration system upgrade in 2007, followed by exceptional teamwork from the plant staff, improved DO control, which in turn improved nitrogen removal and reduced electrical costs by controlling the speed of the mechanical mixer based on DO demand.

The effort paid off: In 2009, the plant was nominated by the state Department of Energy and Environmental Protection for an EPA New England Region 1 Wastewater Treatment Plant O&M Excellence Award, presented in 2010 at the New England Water Environment Association's (NEWEA) annual conference in Boston, Mass.

An Ovivo oxidation ditch at the Newtown Wastewater Treatment Plant. The facility, operated by United Water, won a 2009 U.S. EPA regional wastewater treatment plant excellence award.

ACTIVATED SLUDGE PLANT

Built in 1997 and operated by United Water since 2004, the Newtown plant treats an average of 0.5 mgd and serves 1,126 residential and industrial customers. The influent is screened (Lakeside Equipment) and then pumped through a Jones + Attwood grit chamber (Ovivo) before activated sludge treatment in two oxidation ditches in parallel, each with a mechanical aerator (Ovivo).

A portion of the flow is recycled to a smaller anoxic tank (Ovivo) at the front of each oxidation ditch to help remove nitrogen. The wastewater flows to secondary clarifiers (Ovivo), and the secondary effluent is treated with sand filters (Ovivo), followed by Fisher & Porter UV disinfection (Ironbrook Partners) before discharge to the Pootatuck River.

A portion of the activated sludge from the secondary clarifiers is returned to the oxidation ditch, and the rest is wasted and thickened by a gravity belt thickener (Ashbrook). The biosolids are pumped to a tanker truck for off-site incineration.

Besides Segarra, the staff includes mechanic Thomas Maugeri and operation and maintenance technician Mark Byrns. Maugeri has been with the plant for five years. Byrns has been with the plant for a year and holds Class I operator, Class II collection systems, and E-2 electrical licenses.

Segarra has been with the plant seven years and holds Class IV wastewater and collection licenses, and an E-2 electrical license. He gained electrical experience from working in the steel industry and is now working on his water treatment license. In 2003, he received the NEWEA Operator Award for Excellence in Plant Operations for improved operations and maintenance at the plant.

"It's important to keep track of the weather and to prepare for it, because the last thing any operator wants to do is bypass; that's our bad six-letter word!"

JULIO SEGARRA

The team oversees five pump stations, 89 simplex and 11 duplex grinder pump stations, and 23 miles of pipe. They also manage the Fairfield Hill Water Treatment Plant in Newtown, along with two wells and the distribution system.

GETTING IT DONE

With only three people on staff, everyone works very hard. "There is a lot of operations and hands-on involvement required to maintain quality and customer service," says Segarra. "During disinfection season, May 1 through Sept. 30, we operate and maintain a UV disinfection system, periodically running one bank and taking the other offline so we can hand-wash and clean all the mechanical parts. The staff assists each other, and our strong point is that we are all very versatile."

A joint training program between United Water and the town's public works department has proven valuable in emergencies. For example, during 2011 summer storms, the public works crews cleared downed trees so United Water crews could reach the remote pump station.

When roads were closed from fallen trees, DPW directed United Water staff to clear the roadways. They also helped keep the generators fueled and operating. "It was a great collaborative effort to maintain services to the public," says Segarra.

Operations and maintenance technician Mark Byrns, left, and project manager Julio Segarra inspect the UV disinfection process control panel.

Julio Segarra, project manager, Newtown Wastewater Treatment Plant.

The plant contracts out the programmable logic controller repairs, bearing replacements and state-mandated calibrations. The Newtown staff tests for turbidity and pH, but most water samples are sent to an off-site certified lab.

Wastewater plant operators take turns driving to the water treatment plant, where they perform routine checks on pump operations, chlorine and phosphate residuals, tank levels, and plant security. They also track the amount of treated water sent to the distribution system. The plant, wells and storage tanks are monitored 24/7. The alarm service provider, Precision Alarms, receives automatic alerts if anything goes out of parameter so that they can immediately contact a plant staff member.

Staff members conduct plant tours for the community and school groups and take part in community health fairs. "We offer our plant to the local chapter of Trout Unlimited so they can conduct microinvertebrates research," says Segarra. "They take water samples from the Pootatuck River adjacent to our plant, and they sometimes use our conference room for meetings and training."

AERATION IMPROVEMENTS

The 2007 plant upgrade, Segarra's first project as plant manager, was a joint effort between the Newtown water and sewer authority, the public works department and director Fred Hurley, and Jason O'Brien, area manager for United Water.

"I've worked in other plants, but it wasn't as easy to make changes," says Segarra. "The relationship we have with Newtown and its leaders is second to none."

A WEATHER CHALLENGE

The staff at the Newtown water and sewer department had an interesting time preparing for Hurricane Irene in August 2011. Downgraded to a tropical storm before it hit New England, Irene was packing high winds and heavy rain.

Plant manager Julio Segarra was prepared. "Before the storm hit, I met with the town's public works, health, emergency communications department heads, the fire marshal and staff, and crews from the public works department to review operational and emergency plans," he recalls.

Segarra and Mark Byrns, operation and maintenance technician, were stationed at the plant to monitor the situation. "We requested assistance from the public works crew to build a 2.5-foot-high berm around the water treatment plant and also to sandbag a remote well," says Segarra.

Plant staff raised electrical transformers a few inches higher from the floor and positioned pumps and generators for quick use. They also contracted with a concrete specialist to seal any potential leaks into the water treatment facility. Generator power to the grinder pumps maintained sanitary conditions in the district.

The result was no sanitary bypass events at the wastewater plant or pump stations. "We had a couple of inches of water outside, so we would have lost the transformers if we hadn't built that berm," says Segarra.

Julio Segarra does morning routine water-quality measurements in the lab.

profile Newtown (Conn.) Wastewater Treatment Plant

BUILT:	1997, upgraded 2007
POPULATION SERVED:	1,126
EMPLOYEES:	3
FLOWS:	0.932 mgd design, 0.5 mgd average, 2.6 mgd peak
TREATMENT LEVEL:	Advanced secondary
TREATMENT PROCESS:	Activated sludge
RECEIVING WATER:	Pootatuck River
BIOSOLIDS:	Incinerated
WEBSITE:	www.newtown-ct.gov
GPS COORDINATES:	Latitude: 41°24'45.37"N; longitude: 73°17'5.96"W

Newtown Wastewater Treatment Plant PERMIT AND PERFORMANCE (monthly averages)		
	PERMIT	EFFLUENT
BOD	10 mg/l	1.2 mg/l
TSS	10 mg/l	0.57 mg/l
Ammonia	2 mg/l	<0.5 mg/l
Total nitrogen	19 lbs/day	18 lbs/day
Fecal coliform	200 cfu/100 ml	<1.0 cfu/100 ml
pH	6.0-9.0	Compliant
Total phosphorus (May-Sept.)	1.0 mg/l	<0.4 mg/l
Copper	0.078 kg/day	0.072 kg/day
Zinc	0.356 kg/day	<0.1 kg/day

When the plant had trouble meeting its nitrogen limit, the water and sewer authority and United Water made the commitment to upgrade the aeration system. That meant replacing the 75 hp two-speed motor on the second oxidation ditch aerator with a variable-frequency drive (ABB Inc.) with DO control (Royce Technologies – a Xylem Brand).

Now the aerator can operate at the speed required for optimum DO in summer and winter. The variable-frequency drive results in better nitrogen removal and helps lower energy costs. Segarra and his staff spent six months fine-tuning the aeration system. To learn how to operate the new equipment, the staff read manuals and talked to the design engineers. "As can happen with new equipment startup, we had a few challenges," Segarra says.

For example, placement of the DO probes was influenced by the mechanical mixer, which allowed high DO to bleed into the anoxic portion of the oxidation ditch. By monitoring and tweaking the probes, operators were able to reposition them and establish a set point of 0.9 mg/l to control the nitrification portion of the ditch.

"The DO probes were constantly fouling," says Segarra. "After monitoring the situation, I made a special device to prevent materials in the wastewater from collecting on the probes, resulting in consistent DO readings and reduced maintenance." The probe is inserted into a special PVC sleeve, which is then suspended into the oxidation ditch.

The plant meets its nitrogen limit of 19 pounds per day, with an actual output of 18 pounds. "In Connecticut, we have a nitrogen credit program," says Segarra. "Before the upgrade, the water and sewer authority had to pay $6,000 in credits for not meeting the permit limit. Since the upgrade, they have received a check every year for $800."

ENERGY SAVINGS

The Newtown plant has reduced energy by about 30,000 kWh per month by installing the variable-frequency drive and operating the mixer in a narrow range of +/- 15 percent speed.

The plant reduced natural gas consumption in the filter building by reducing the number of fresh air exchanges. "By resequencing our HVAC system we reduced the outside fresh air intake," says O'Brien. "The intake had been 100 percent, but we were exhausting all the air, so we reduced the intake by 75 percent and shut off the exhaust." United Water had OSHA come in and test the air, and they determined that it was of good quality for the employees.

Natural gas use has dropped from about 9,000 cubic feet per month during winter to less than 2,000 cubic feet. In 2008, the town public works department received the platinum award for energy conservation from the Connecticut Department of Public Utility Control for the largest energy reduction in Fairfield County.

OPERATING CHALLENGES

The plant's greatest challenge, according to Segarra, is "balancing demands with a small staff and consistently meeting permit and effluent quality." Weather is also a factor, as heavy rains can bring significant inflow and infiltration (I&I).

The Newtown team includes, from left, area manager Jason O'Brien, operation and maintenance technician Thomas Maugeri, administrative assistant Lynda Briere San Souci, project manager Julio Segarra, operation and maintenance technician Mark Byrns, and director of public works Fred Hurley Jr.

Mark Byrns hoses down the Ashbrook belt press.

"We had some high flows in the spring of 2011, and we've had I&I of 0.5 mgd and as high as 2.0 mgd," Segarra says. The water and sewer authority purchased monitoring equipment for the collection system to pinpoint the sources of I&I.

By monitoring, the plant staff was able to detect high flows and divert a portion of the influent to an offline tank to maintain the process. "It's important to keep track of the weather and to prepare for it, because the last thing any operator wants to do is bypass; that's our bad six-letter word!" Segarra says.

The staff prepares by communicating, planning, reviewing procedures, monitoring weather conditions, and making changes only when necessary. In some cases, they reduce solids inventory. They also watch all operational parameters, such as solids levels in the tanks, sand filters and headworks.

Another challenge is the occasional issue with industrial customers. Local industries include a paper box manufacturer, a cable communications company and a NASCAR racing team.

"We have had to stay on top of some industrial effluent," says Segarra. "In the past, we had a copper violation and found that an industrial plant's solids were carrying copper to our plant. Once we identified the source, we worked with the company to correct the problem."

FUTURE UPGRADES

The plant is scheduled for an upgrade to the 14-year-old SCADA system, which now allows alarm monitoring only. The new SCADA system will improve operations tracking and history. "As EPA rules become more stringent, we need tighter control of our operational parameters, and that's where the SCADA comes in," says Segarra.

> "In Connecticut, we have a nitrogen credit program. Before the upgrade, the water and sewer authority had to pay $6,000 in credits for not meeting the permit limit. Since the upgrade, they have received a check every year for $800."
>
> **JULIO SEGARRA**

The project is scheduled to start in 2012.

Another planned upgrade is to radio telemetry, Ethernet and fiber optic communications, and data transfer systems that will tie into the wastewater plant, the remote wastewater pump stations, and water treatment plant. Says Segarra, "At one test location, the water and sewer authority has improved security by installing live streaming monitors directly to the police department."

The water and sewer authority has approved a solar power project, to start in 2012, that will reduce the plant's power use by about 30 percent. During optimal days, the plant will be 100 percent solar powered. "We're trying to stabilize our costs over time, and the solar project will help us achieve that," says Hurley. "We may look at wind power down the road, but that's on hold right now." **tpo**

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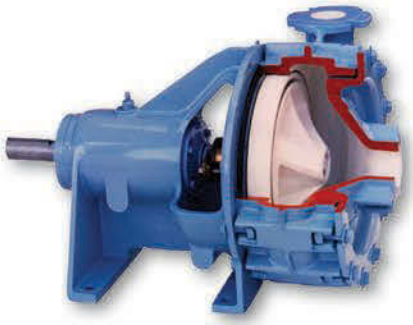

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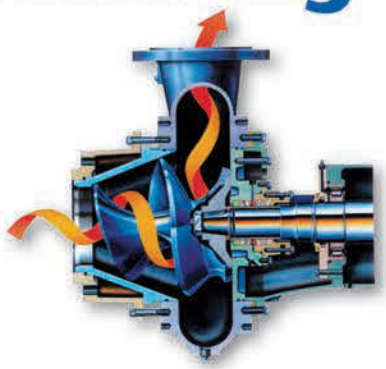

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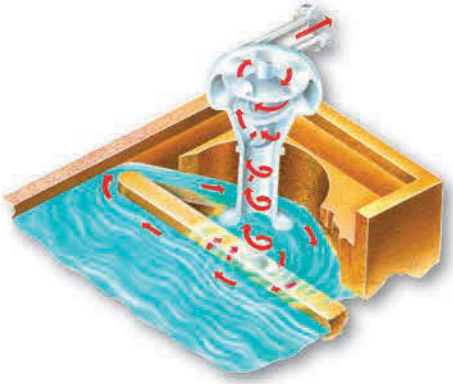

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Disinfecting CSO Water

UV TECHNOLOGY SHOWS PROMISE FOR KILLING PATHOGENS IN THE HIGH-VOLUME, LOW-QUALITY STREAMS TYPICAL OF STORMWATER TREATMENT APPLICATIONS

By Jennifer Muller and Wayne Lem

PHOTOS AND GRAPHICS COURTESY OF TROJAN TECHNOLOGIES

Among facilities using UV is the Cog Moors Wastewater Treatment Works near Cardiff in the southwestern United Kingdom.

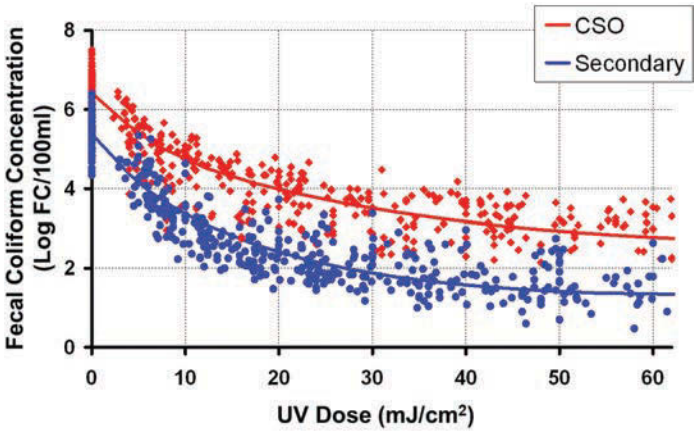

Figure 1. Collimated beam UV dose-response curves compare results with low-quality (CSO) and high-quality (secondary) wastewater. The data shows between-process differences, within-process variability, and the impact of difficult-to-disinfect solids.

Ultraviolet (UV) light is used to disinfect many types of water, including low-quality water like primary treated wastewater and combined sewer overflows (CSOs). CSO treatment is becoming a regulatory requirement in many regions.

Chlorine is traditionally used to disinfect CSOs because of its low cost, but due to the adverse environmental impacts of chlorination byproducts, chlorine residual limits are becoming stricter. UV light is a proven alternative. It is a cost-effective technology for disinfecting low-quality wastewater as long as the system is properly designed.

Because stormwater treatment involves high flows with high suspended solids content, variable temperature, and disinfectant-resistant pathogens, the disinfection system must have rapid oxidation and powerful pathogen-killing capability. In these applications, chlorine systems can require long contact times and thus large equipment footprints and high construction costs.

As in all disinfection technologies, UV disinfection design is a function of the water quality being treated. Because UV disinfection is a physical (not chemical) treatment, the relationships between disinfection and water quality are more easily defined and quantified. Once the relevant water-quality parameters are defined for a stormwater event, it is possible to design a UV reactor to cost-effectively meet the disinfection requirements for future events.

PROPER DESIGN

The objective in UV disinfection is to transfer UV energy into the water. Low-quality wastewater has low UV transmittance, and so the reactor design challenge is greater. The key to proper UV reactor design is to optimize the effective water layer between the UV lamps for the transmittance of the water.

FIGURE 2. Vortex mixers mounted on quartz sleeves housing medium-pressure UV lamps provide additional mixing and direct the low-UV-transmittance water toward the high-intensity light source.

In low-transmittance water, the effective water layers need to be shorter. This can be accomplished with more powerful lamps, narrower spacing, or hydraulic devices that induce streamlines and direct flow toward the lamps.

Each option must be evaluated against its trade-offs. For instance, higher-power lamps can use more energy but allow wider lamp spacing, leading to a lower-headloss reactor design. Alternately, with lower-powered lamps, the required narrow lamp spacing and hydraulic devices can increase headloss.

Higher headloss can result in water level increases in an open-channel UV reactor, leading to a large water layer above the lamps (short-circuiting), or leaving a large section of downstream lamps exposed to air. These zones with large water layers or exposed lamps provide little or no disinfection, and reactors with these hydraulic flaws will fail when challenged in full-scale operation.

Any fraction of the flow that receives less than optimal UV doses will limit reactor performance. These issues can be overcome by using sophisticated computational fluid dynamics (CFD) modeling with accurate irradiation models to design UV reactors for stormwater applications.

CSO CHALLENGES

Low-quality wastewater is typically high in suspended solids, and those particles can harbor microorganisms that resist disinfectants. UV dose-response curves are generated in a laboratory using cali-

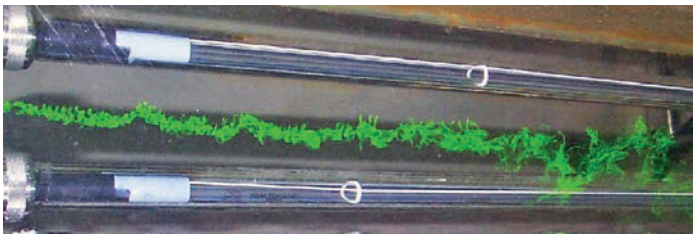

FIGURE 3. Dye tests illustrate potential paths of short-circuiting where water does not reach the UV lamps, resulting in poor performance and potential reactor failure.

FIGURE 4. Vortex mixers add turbulence, ensuring that particles and microorganisms reach the UV lamps.

brated collimated beam devices to quantify the relationship between applied UV dose and microorganism survival.

UV dose-response curves for microorganisms in low-quality wastewater typically have two slopes, characterizing easy-to-disinfect free-floating microorganisms and the more challenging particle-associated microorganisms (Figure 1).

A typical disinfection objective for low-quality wastewater ranges from one to three log reductions of the target or indicator organism. In response, design UV doses to meet these requirements do not need to be excessively high because the limits are typically reached by disinfecting the free-floating microbes.

UV disinfection technology testing is typically done at flow rates lower than those common in CSO applications. Where sampling data is limited, a UV system can be designed using information from a UV dose-response database. Trojan Technologies, for example, has an in-house microbiology laboratory that has analyzed more than 25,000 data points related to wastewater UV dose-responses and has a database that covers more than 20 years. It allows prediction of design UV doses for different indicator organism concentrations and associated statistical limitations.

For stormwater high in suspended solids, the effectiveness of any UV design dose depends on the disinfectability of the water and on the properties of the solids. The relationships between TSS and UV transmittance can be derived from the database and used for disinfection system sizing.

As one example from the database, typical water quality during a stormwater event can be 200 mg/l TSS at first flush and 90 mg/l TSS during the extended storm. UV transmittance varies from less than 20 percent at first flush to greater than 65 percent near the end of the storm.

This data, combined with water-quality data from sampling, provides a high level of confidence that the UV system design will consistently and cost-effectively meet the discharge requirements.

ESSENTIAL FEATURES

Long experience shows that key design features will realize cost-effective UV disinfection for challenging waters. The features described below provide an example of a UV that has been tested, installed and now operates successfully in a number of low-UV-transmittance applications. The design effectively incorporates the features that overcome the challenges related to disinfecting low-quality wastewater.

The objective in UV disinfection is to transfer UV energy into the water. Low-quality wastewater has low UV transmittance, and so the reactor design challenge is greater. The key to proper UV reactor design is to optimize the effective water layer between the UV lamps for the transmittance of the water.

UV energy source

Effluent flows by gravity through a fully submerged, tubular reactor, where it is exposed to high concentrations of UV light generated by medium-pressure (MP) high-intensity lamps. Contoured reactor walls tightly control the water layer around the lamps for consistent disinfection regardless of flow rate or water level.

UV modules house the lamps, quartz sleeves and cleaning system and pivot into the reactor opening at the upstream and downstream ends. Lamps are placed in a staggered array, spaced evenly, and optimized to balance the trade-offs between headloss generated and mixing induced. Vortex mixers optimize performance at lower UV transmittance values (Figure 2). The mixers are mounted on the quartz sleeves and increase flow turbulence and mixing around the lamps (Figures 3 and 4).

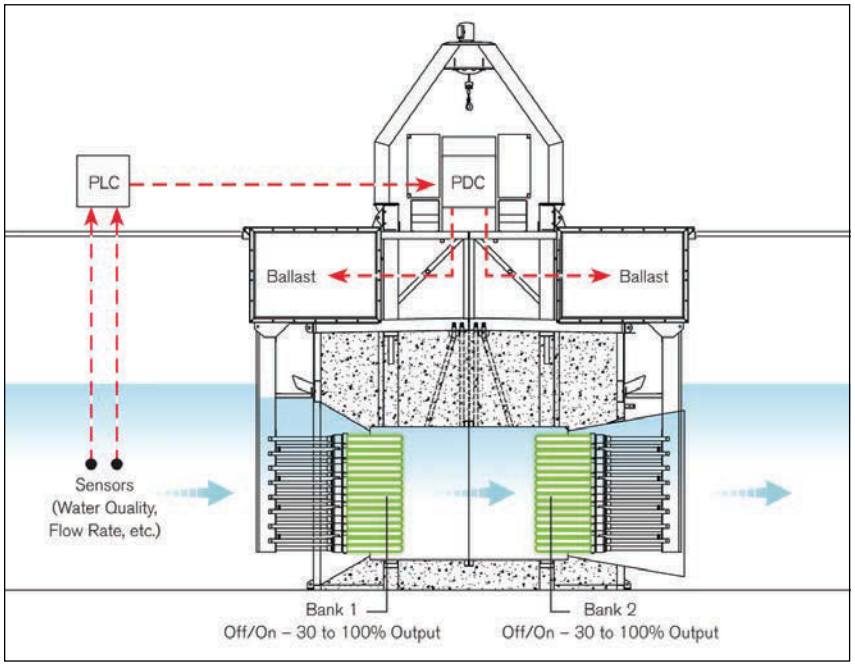

FIGURE 5. A typical monitoring scheme for UV disinfection includes UV intensity sensors, an online UV transmittance device, PLC controller, and variable-output power supplies to vary light intensity in varying operating conditions.

Monitoring

An effective system must respond to varying water quality during a storm to ensure full treatment and optimize power and lamp use. Key monitoring equipment includes UV intensity sensors to measure lamp output, flowmeters, and online UV transmission monitoring to track water quality (Figure 5). As operating conditions and water quality fluctuate, the UV system controller automatically and continuously calculates the power settings required to achieve the necessary UV lamp output and ensure adequate disinfection.

(continued)

Maintenance

The design must consider the quartz sleeve fouling rate and extent and provide for fouling removal. The rate and degree of fouling on the sleeves can be accelerated in stormwater applications. Options for fouling removal include manual cleaning and semi-automatic or automatic cleaning mechanisms. Some UV systems today offer automatic mechanical and chemical cleaning to remove fouling completely, optimize UV light delivery, and reduce operator maintenance.

FULL-SCALE APPLICATION

An estimated one billion gallons per day of stormwater or very low-quality wastewater is being treated today with UV disinfection in North America, Europe, Australia and Asia. Among facilities using UV is the Cog Moors Wastewater Treatment Works near Cardiff in southwestern UK.

To protect public health, notably on local beaches, the Environment Agency Wales limits stormwater spills to three per bathing season. The plant uses activated sludge secondary treatment and has storm tanks to capture and store storm flows.

The plant team evaluated intermittent UV disinfection (during storm events only) against adding stormwater storage capacity. An analysis found that UV disinfection would cost significantly less and produce one-tenth the greenhouse gas emissions.

A pilot study was conducted to confirm the effectiveness of UV disinfection for the Cog Moors CSO effluent, since it was the first UV plant in the UK designed to treat stormwater flows. Since commissioning in 2009, the UV plant has operated successfully. Effluent quality monitoring has shown the plant meets the required bacteriological reductions, ensuring safe beaches.

KNOWLEDGE IS POWER

To ensure reliable stormwater disinfection, the equipment manufacturer must know and understand the quality of the water being treated, as well as proper UV reactor design, including the science of delivering UV energy to the pathogens of concern.

The equipment selected should be from a manufacturer with good scientific understanding and a demonstrated history of applying UV for low-quality wastewater. The design trade-offs in headloss and power consumption, which are a function of UV lamp intensity, lamp spacing and mixing, must be evaluated. Finally, the UV reactor configuration must be verified through field testing and independent bioassay validation to guarantee performance at full scale.

ABOUT THE AUTHORS

Jennifer Muller is municipal UV market director and Wayne Lem is market manager with Trojan Technologies, a manufacturer of UV disinfection systems based in London, Ont. They can be reached at jmuller@trojanuv.com and wlem@trojanuv.com. tpo

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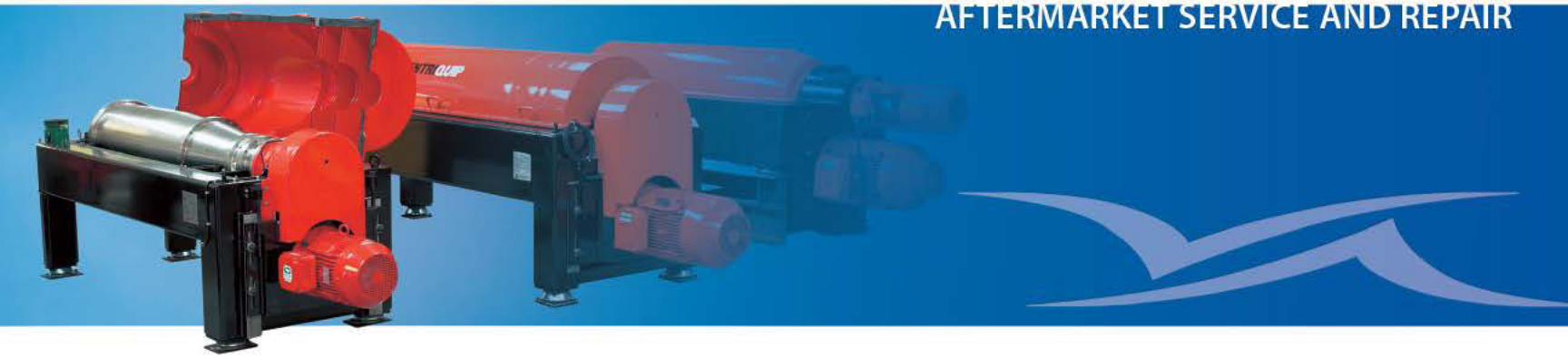

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AllightPrimax 1107 E Black St., Rock Hill, SC 29730 803-328-2035 Fax: 803-328-2036 renee.fisher@allightprimax.com www.allightprimax.com See ad page 69				YES				
Ashbrook Simon-Hartley 11600 E Hardy Rd., Houston, TX 77093 800-547-7273 281-985-4473 Fax: 800-999-6737 ken.medlin@as-h.com www.as-h.com See ad page 41	YES			YES				
BJM Pumps 123 Spencer Plain Rd., Old Saybrook, CT 06475 877-256-7867 860-399-5937 Fax: 860-399-7784 sales@bjmpumps.com www.bjmpumps.com	YES		YES	YES		YES	YES	
Blue-White Industries 5300 Business Dr., Huntington Beach, CA 92649 714-893-8529 Fax: 714-894-9492 sales@blue-white.com www.blue-white.com See ad page 4		YES			YES			
Boerger, LLC 2860 Water Tower Place, Chanhassen, MN 55317 612-435-7300 Fax: 612-435-7301 america@boerger.com www.boerger.com See ad page 61		YES	YES				YES	
Dragon Products, Ltd. 816 W Barbours Cut Blvd., La Porte, TX 77571 877-231-8198 281-470-1903 Fax: 281-470-1954 sales@modernusa.com www.dragonproductsltd.com See ad page 11	YES							
DSI Dynamatic PO Box 0361, Sturtevant, WI 53177-0361 800-548-2169 Fax: 262-554-7041 sales@drivesourceusa.com www.dynamatic.com See ad page 29								
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Fluid Metering, Inc. 5 Aerial Way, Ste. 500, Syosset, NY 11791 800-223-3388 516-922-6050 Fax: 516-624-8261 pumps@fmipump.com www.fmipump.com See ad page 13		YES						
Flygt – a Xylem Brand 14125 S Bridge Circle, Charlotte, NC 28273 704-409-9700 Fax: 704-295-9080 www.xyleminc.com See ad page 3	YES		YES	YES			YES	
Global Pump 10162 E Coldwater Rd., Davison, MI 48423 866-360-7867 810-653-4828 Fax: 810-658-0632 sales@globalpump.com www.globalpump.com See ad page 71	YES			YES				YES
Gorman-Rupp Company 600 S Airport Rd., Mansfield, OH 44903 419-755-1011 Fax: 419-755-1251 grsales@gormanrupp.com www.GRpumps.com See ad page 55	YES			YES	YES	YES		YES
Komline-Sanderson 12 Holland Ave., Peapack, NJ 07977 800-225-5457 908-234-1000 Fax: 908-234-9487 info@komline.com www.komline.com See ad page 70								YES
KSB, Inc. 4415 Sarellen Rd., Henrico, VA 23231 804-222-1818 Fax: 804-226-6961 sales@ksbusa.com www.ksbusa.com	YES					YES	YES	

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						YES	YES	YES		YES	YES			
							YES			YES				
							YES	YES		YES				
						YES				YES	YES		YES	Specialty
	YES	YES												
									YES	YES	YES			
							YES	YES		YES		YES		
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	YES	YES		YES			YES							
	YES		YES											Chlorination
				YES		YES	YES			YES	YES		YES	
							YES	YES		YES	YES		YES	
						YES	YES			YES	YES		YES	
			YES				YES	YES		YES				
							YES	YES			YES		YES	

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Meltric Corporation 4640 Ironwood Dr., Franklin, WI 53132 800-433-7642 414-817-6160 Fax: 414-817-6161 mail@meltric.com www.meltric.com See ad page 70								
Mersino 600 W Dryden, Metamora, MI 48455 866-637-7466 810-678-8085 Fax: 810-678-8518 contact@mersino.com www.mersino.com	YES			YES				YES
Met-Pro Global Pump Solutions 700 Emlen Way, Telford, PA 18969 800-392-7621 215-723-8155 Fax: 215-723-2197 info@mp-gps.com www.mp-gps.com	YES	YES						
Milton Roy Company 201 Ivyland Rd., Ivyland, PA 18974 800-693-4295 215-441-0800 Fax: 215-441-8620 info@miltonroy.com www.miltonroy-americas.com See ad page 53		YES			YES			YES
Moyno, Inc. 1895 W Jefferson St., Springfield, OH 45506 877-486-6966 937-327-3111 Fax: 937-327-3177 mipinfo@moyno.com www.moyno.com See ad page 23		YES		YES		YES	YES	YES
Netzsch Pumps North America, LLC 119 Pickering Way, Exton, PA 19341 610-363-8010 Fax: 610-363-0971 npa@netzsch.com www.netzschusa.com See ad page 8		YES					YES	
Penn Valley Pump Co., Inc. 998 Easton Rd., Warrington, PA 18976 800-311-3311 215-343-8750 Fax: 215-343-8753 info@pennvalleypump.com www.pennvalleypump.com See ad page 35		YES			YES			
Revere Control Systems 2240 Rocky Ridge Rd., Birmingham, AL 35216 800-536-2525 205-824-0004 Fax: 205-824-0439 revere@reverecontrol.com www.reverecontrol.com								
seepex Inc. 511 Speedway Dr., Enon, OH 45323 937-864-7150 Fax: 937-864-7157 sales@seepex.net www.seepex.com See ad page 30		YES	YES				YES	
Smith & Loveless, Inc. 14040 Santa Fe Trail Dr., Lenexa, KS 66215 800-898-9122 913-888-5201 Fax: 913-888-2173 answers@smithandloveless.com www.smithandloveless.com See ad page 40	YES					YES		
SPX Flow Technology 611 Sugar Creek Rd., Delavan, WI 53115 800-252-5200 262-728-1900 Fax: 262-728-4904 ft.amer.info@spx.com www.spx.com	YES				YES			
USABlueBook PO Box 9006, Gurnee, IL 60031 800-548-1234 847-689-3000 Fax: 847-689-3030 customerservice@usabluebook.com www.usabluebook.com See ad page 76	YES	YES		YES	YES	YES	YES	YES
Vaughan Company, Inc. 364 Monte-Elma Rd., Montesano, WA 98563 888-249-2467 360-249-4042 Fax: 360-249-6155 info@chopperpumps.com www.chopperpumps.com See ad page 75	YES		YES					

Metering	Peristaltic	Piston/Plunger	Progressive Cavity/Screw	Pump Alignment/ Vibration	Pump Controls	Pump Parts/ Components	Pump Repair/ Service	Rotary Lobe	Solids/Sludge	Submersible	Vacuum	Vertical/ Lift Station	Other
				YES									
YES		YES			YES	YES							
					YES	YES	YES						
						YES			YES	YES		YES	Rental
					YES	YES				YES		YES	Dry Pit
		YES	YES		YES	YES	YES						
			YES		YES	YES	YES		YES			YES	
			YES			YES			YES	YES			
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			YES		YES	YES	YES		YES	YES			
					YES	YES	YES		YES			YES	Immersible
YES						YES	YES	YES					
YES	YES		YES		YES	YES		YES	YES	YES	YES	YES	
									YES	YES		YES	

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	Centrifugal	Chemical Feed	Chopper	Dewatering/ Bypass	Diaphragm	Effluent	Grinder/Sump	High Pressure
Watson-Marlow Pumps Group 37 Upton Technology Park, Wilmington, MA 01887 800-282-8823 978-658-6168 Fax: 978-658-0041 support@wmpg.us www.wmpg.com		YES						YES
Weir Specialty Pumps / WEMCO Pump 440 West 800 S, Salt Lake City, UT 84101 801-359-8731 Fax: 801-530-7828 wsp.info@weirsp.com www.weirpowerindustrial.com See ad page 37	YES		YES	YES		YES		YES
WILO USA LLC 9550 W Higgins Rd. Ste. 300, Rosemont, IL 60018-4961 866-945-6872 708-338-9456 Fax: 708-338-9455 info@wilo-usa.com www.wilo-usa.com				YES			YES	

Metering	Peristaltic	Piston/Plunger	Progressive Cavity/Screw	Pump Alignment/ Vibration	Pump Controls	Pump Parts/ Components	Pump Repair/ Service	Rotary Lobe	Solids/Sludge	Submersible	Vacuum	Vertical/ Lift Station	Other
	YES								YES				Positive Displacement
									YES	YES		YES	
									YES	YES		YES	

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Secure Seal

A SPRAY-ON POLYURETHANE COATING HELPS A TREATMENT PLANT REHABILITATE A BUILDING HOUSING A CHEMICAL STORAGE SYSTEM

By Mary Shafer

The sludge transfer chemical feed system at the Southport Advanced Wastewater Treatment Plant serving metro Indianapolis, Ind., needed an overhaul.

Three 4,000-gallon fiberglass-reinforced plastic closed-vessel tanks inside the building stored ferrous chloride, which is pumped into the sludge being conveyed from Southport to the city's Belmont plant to control odors caused by hydrogen sulfide.

By June 2010, the 9-foot-diameter, 12-foot-tall chemical storage tanks had significantly exceeded their design life and had developed small cracks that allowed the corrosive chemical to leak out. In addition, small spills from tank filling had corroded the concrete floors beneath and walkways around the tanks. Two chemical metering pumps and various other metal HVAC, plumbing and electrical equipment were also badly corroded and needed replacement.

PHOTOS COURTESY OF CONCO SPRAY SOLUTIONS

A Conco Spray Solutions crew member applies SprayWall structural polyurethane lining to the tank structure.

REPAIR, NOT REPLACE

CH2M HILL designed and executed the overhaul. Project manager Matthew Thomas thought it made sense to gut the corroded metal parts to make way for repair and coating of the concrete floor, instead of tearing the whole building down. "It's a separate building, only used for storage, so we could take it offline and keep operations going," Thomas says.

> "Time constraints were a primary consideration. We were trying to limit the shutdown to a few months in spring, when we could get everything installed and finished and bring the tanks back online before the weather got too warm. SprayWall could be applied in one to two days after surface preparation."
>
> **MATTHEW THOMAS**

Because the building would remain a chemical storage unit, it was imperative to protect the new concrete from more spill-related corrosion. Traditional epoxy paint was deemed too thin to protect adequately. Heavier-duty epoxies were considered, but adhesion to the concrete substrate around joints and cracks was a concern.

The city and CH2M HILL had experience with SprayWall polyurethane from Sprayroq and chose that product. "Because it's sprayed on so thick, we could almost make a kind of bathtub effect in our containment area and seal it up," says Thomas.

LEFT: The sludge transfer room during preliminary cleaning and preparation. RIGHT: The rehabilitated and protected substrate surface after application of SprayWall.

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TIME CRITICAL

"Time constraints were a primary consideration," Thomas recalls. "We were trying to limit the shutdown to a few months in spring, when we could get everything installed and finished and bring the tanks back online before the weather got too warm. SprayWall could be applied in one to two days after surface preparation."

That consisted of cleaning the concrete floor and concrete block walls, then repairing all corrosion damage. Most of the concrete had only surface pitting, but a few spots had a couple of inches of material missing. Crews used a cement mortar patching compound to smooth the surface before grooves were cut to aid coating adhesion.

Patching took about a week, and the material cured for 28 days. Because the polyurethane requires a clean, dry substrate to adhere and cure properly, a portable dehumidifier was used to stabilize the room after the patch had cured.

Sprayroq director of business development Chip Johnson, P.E., working with Thomas and Conco Spray Solutions, a Sprayroq Certified Partner, planned a 480-square-foot application. Based on stress and deflection factors calculated to accommodate three new 8-foot-diameter tanks, Johnson settled on a coating thickness of 250 mils.

He specified grooves in the surface every 48 inches to ensure proper adhesion, and a 12-inch vertical wall tie-in to be built after the tanks were installed. The original wall had to be knocked out to enable tank replacement. The cost estimate for the application was $12,000.

ONE SPRAY DAY

The Conco team completed the main floor and sidewalls application in a single spray pass in one workday. For slip protection, sand was sprinkled across the coating surface before it cured on the walkways around the tanks.

An area of concern was the fill station, where trucks pump the chemical into the tanks. Some minor spillage there is unavoidable, so a collection box was installed and lined with SprayWall to contain any spills and limit surface damage.

Since part of the containment wall was missing, it was easy for the spray applicators to monitor coating thickness for accuracy. They also sprayed a sample and left it for the construction manager. Cure time on the initial application was six hours.

After the new tanks were installed and the wall section rebuilt, the crews returned to coat the new section. They covered the wall all the way to the top, creating one solid coating to contain any future leaks when the tanks show their age. The second application adhered seamlessly to the first. No special equipment was needed other than what Conco usually uses to maintain consistent temperature and humidity during application.

Jay Thorne, deputy project manager for the Department of Public Works, believes the new floor will be easier to clean, but he was happiest about the future savings from the rehabilitation. The corroded equipment would have had to be replaced in any case, but without the coating, he says, "We would have had to replace the building as well as the equipment, rather than having the project become part of a long-term solution." **tpo**

A Conco Spray Solutions crew member cuts grooves into the cleaned and prepped surface before applying the polyurethane coating material to ensure optimum adhesion and uniform coverage.

PHOTOS COURTESY OF LEMNA TECHNOLOGIES

Filling the reactor produces a champagne fizz at the surface. Both sides of the unit have a stack of six ammonia polishing modules and six BOD polishing modules attached to an air rack fed by an air line controlled by a ball valve at the aeration header.

Polished to Perfection

A TREATMENT PROCESS WITH AEROBIC AND ANAEROBIC CELLS AND A POLISHING REACTOR ENABLES A PLANT IN NORTHWEST IOWA TO MEET AMMONIA PERMIT LEVELS

By Scottie Dayton

The three-cell, 6-acre aerated lagoon at the Remsen (Iowa) Wastewater Treatment Plant could not meet new ammonia permit levels of less than 4 mg/l in winter and 2 mg/l in summer. The lagoon averaged 14 mg/l in summer and 27 mg/l in winter.

Each 12-foot-deep cell held 5 million gallons, but the primary cell had six feet of sludge in areas. "We were losing quite a bit of detention time and had no idea because we didn't use a Sludge Judge (Nasco)," says chief operator Mike Ruden.

The complete-mix cell had 20 submerged coarse-bubble diffusers and the partial-mix cell had four, but dissolved oxygen still hovered about 6 mg/l in winter. The third cell was the quiet zone.

The city hired DeWild Grant Reckert and Associates Co., consulting engineers in Rock Rapids, to upgrade the plant. They selected the LemTec biological treatment process from Lemna Technologies, a combination of aerobic and anaerobic cells followed by a polishing reactor. Since its installation, the plant has achieved year-round effluent readings of 4 mg/l BOD and TSS, 2 mg/l ammonia, and 6 mg/l DO. The city has the only LemTec system in northwest Iowa.

"The agent from the Department of National Resources arrived just after the UV system went online. I grabbed a sample and held it next to a beaker of tap water for him. He couldn't tell the difference and was really impressed."

MIKE RUDEN

Air racks distribute air evenly and help move water through the polishing modules.

LAYING THE GROUNDWORK

The 317,000 gpd (design) treatment plant handles on average 250,000 gpd from 300 homes within the city's one square mile. Remsen has 1,700 residents. "To meet new requirements, the plant needed a redundant system," says Keith Miller of Lemna Technologies. "We redesigned cells 1 and 2 to mirror each other and treat the split flow from the plant after it passed through a 1/4-inch bar screen at the headworks."

Two baffles divide each cell into complete mix, partial mix and settling. Then the wastewater moves to the polishing reactor and disinfection. The baffles also reduce short-circuiting. To prepare for the system, Ruden's staff drained the lagoon, removed the aerators, and land-applied the sludge. They squeegeed the bentonite clay liner in the first two cells, checked for leaks and found none.

Share Your Idea

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Workers from Penro Construction of Pender, Neb., then installed four Lemna mixers and 24 fine-bubble submerged diffusers in the complete-mix zones and 28 in the partial-mix zones. Each zone has a 30 hp Gardner Denver blower. A third unit serves as backup. "This is not an economical process," says Ruden. "Our electric bill went from $800 to $1,700 the first month. Activating the UV system increased it to $4,000 a month, but we're getting the desired result."

ATTACHED GROWTH

Simultaneously, Penro workers decommissioned the third cell, then used the space to pour the 60-foot-long polishing reactor basin with two 7.5-foot-square by 10-foot-deep treatment zones. Workers also poured the open basin for the UV3000B disinfection system from Trojan Technologies and installed and plumbed the 3-foot-wide by 2-inch-deep stainless steel channel.

Stacks of 6-foot-square, 8-foot-tall treatment modules arrived with hooks welded to the tops for lifting them into the basin. The modules, assembled from honeycomb-like layers alternating 90 degrees to each other, are secured by a threaded rod.

"Both reactor zones have six stacks of 48-density modules to treat BOD and ammonia," says Rhett Arens of Lemna Technologies. Depending on the performance requirements, zones can be designed with two different media densities for cross-use on BOD or ammonia. Units are attached to an air rack, fed by an airline controlled by a ball valve at the aeration header. Each polishing zone is dedicated to a treatment cell.

To enhance system kinetics, retain heat, control odor, and prevent algae growth in the two cells, Penro workers assembled the LemTec insulated modular cover as soon as the water returned to operating levels. They fastened the 6- by 40-foot sections together on shore, floated them across using winches, and anchored the ends with cables and deadmen.

Workers from Penro Construction unload 6-foot-square, 8-foot-tall polishing modules and place them on pallets.

PLANT MAINTENANCE

Besides sampling and testing the effluent, Ruden removes buildup on the treatment modules with occasional blasts of air. "The units are like king-sized trickling filters where bacteria collect on the rocks," he says. "If air won't dislodge the scum, we lift out the modules and power wash them or disassemble the layers to clean them."

It is too soon for Ruden to tell how often he will have to clean the sludge in the polishing reactor. "It leaves a lot of suspended solids, so right now I'm backwashing it twice a year," he says. "I'm not complaining. The reactor is a key component to us meeting our ammonia permit limits." **tpo**

Ball valves in the aeration header (right) control the flow through the feeder lines to the air racks.

SNUG AND WARM

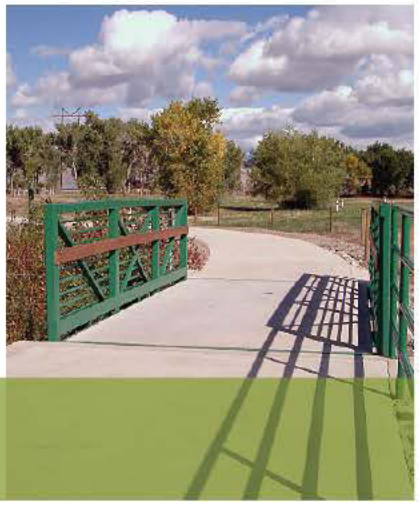
"The first cell was covered last January during a particularly cold winter," says Ruden. "When the men finished, they were working in ice and subzero temperatures."

Within days, Ruden saw a rise in water temperature as the black cover absorbed and transferred heat. With the second cell covered, water temperatures rose to 43 degrees. The lowest temperature Ruden recorded that winter was 41 degrees.

The disinfection system went online in August. Effluent runs from the polishing reactor to a collection box, which slows the flow before releasing it into the channel with 10 banks of four energy-efficient amalgam lamps on either side.

"The agent from the Department of National Resources arrived just after the UV system went online," says Ruden. "I grabbed a sample and held it next to a beaker of tap water for him. He couldn't tell the difference and was really impressed." The sample Ruden pulled on *E. coli* showed less than 16 colonies per 100 ml.

Sensitivity monitors on the lights indicate when they need cleaning, at which time Ruden pulls them out and squirts them with diluted muriatic acid. "It's just like washing a window," he says.



PHOTOS COURTESY OF CLEFTON WATER TREATMENT PLANT

Green on the Vine

A COLORADO TREATMENT PLANT CREATES A MORE SUSTAINABLE SITE BY PLANTING A VINEYARD AND CULTIVATING ACREAGE FOR A WILDLIFE HABITAT

By Jeff Smith

ABOVE LEFT: A reclaimed lagoon area shows prairie grasses and an irrigation stream. UPPER RIGHT: A restored lagoon area shows newly planted grape vines with trestle posts, support wires and irrigation pipes. LOWER RIGHT: A portion of the Colorado Riverfront Trail that runs across the plant grounds.

Growing grapes and developing a vineyard might not be the first thing wastewater operators think of doing to upgrade the landscape of a treatment plant. But that's exactly what the Clifton (Colo.) Sanitation District did to help transform a former biosolids lagoon site into a sustainable agricultural area and wildlife habitat.

When the two sanitation districts in Clifton merged in 2006, they agreed to build a new 2.5 mgd extended-aeration activated sludge treatment plant and reclaim the land once occupied by the three lagoon systems that had served both districts for 54 years.

Plant manager Brian Woods says that from the beginning, they wanted a vineyard as the focal point of the 37-acre reclaimed area. So far, nearly four acres are producing grapes, and another 10 acres may be added. The grapes are harvested and processed by a local vintner into a Cabernet varietal. Money from sale of the grapes will help offset maintenance costs.

PAYING IT BACK

"We expect a payback of our original investment in the vineyard within six or seven years," says Woods. Plant personnel water the grapes and do the mowing to keep the rows clean, but the vintner does the spraying, trimming, trellising and picking the grapes.

The plant has partnered with other agriculture producers who also provide revenue. A local farmer also harvests more than 17 acres of alfalfa hay, and another five acres next to the plant, owned by the sanitation district, may also be converted into crops.

It was no small task to decommission, reclaim and restore the lagoon property. About 20 percent of the more than 100,000 cubic yards of sludge removed was processed through the new plant, dewatered and dried. A clay liner had to be removed. After treatment to meet Class A compost requirements, the biosolids were used for soil amendment and to create berms and other landscaping to form a deepwater pond and wetlands.

Upland tall grasses, trees and shrubs were planted over many acres to establish a sustainable wildlife habitat that attracts a variety of species, including ducks and pheasants. Irrigation water travels in a stream that meanders through the wildlife area to the Colorado River. Although the area is not open to public hunting, the district takes part with the state Division of Wildlife in an upland bird release program, and supervised youth hunting is allowed.

> "The result was that we took $155,000 and landscaped four times the area for which those dollars were originally allocated. The whole project came in under budget. If you want something bad enough, you'll see that it gets done."
>
> **BRIAN WOODS**

MANY FUNDING SOURCES

Paying for the reclamation project wasn't easy. "We have had a tremendous amount of resources that we used from a lot of different areas," says Woods. For example, a grant from the Division of Wildlife covered the costs to build the ponds and construct the wetlands along the riparian corridor to the river.

A grant from the National Resources Conservation Service paid for the on-site irrigation system, the pond liner, and more than 7,000 wetland plants, trees, shrubs and

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grasses. The grants totaled $200,000. For the lagoon reclamation, the district provided a dollar-for-dollar match for a $500,000 Energy Impact Grant through the state Department of Local Affairs.

"The Conservation Service grant was based on water conservation, because our irrigation process slows and stops the deposition of selenium into the river," says Woods. All the irrigation is done with four water cannons. "We don't have a gravity irrigation system available to us, so the grant also paid for the drip and spray system used in the vineyard, and the standpipes and underground distribution for irrigation on the alfalfa fields," says Woods.

VOLUNTEER SUPPORT

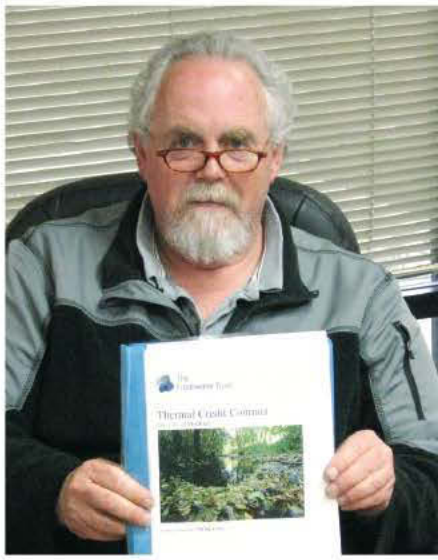
Labor to install pipes, poles and wires, and to plant all the grapes came with help from inmates at a minimum-security correctional institute. Other tasks fell to volunteers fulfilling community service obligations. "Our own staff handled landscaping around our plant construction," says Woods. "As we hired and trained the staff while the plant was being built, they helped with the landscaping during slow periods."

Woods and others at the district managed the project. "The result was that we took $155,000 and landscaped four times the area for which those dollars were originally allocated," Woods says. "The whole project came in under budget. If you want something bad enough, you'll see that it gets done." tpo

Getting the Heat Out

AN OREGON TREATMENT FACILITY AFFECTED BY TEMPERATURE LIMITS IN ITS PERMIT LOOKS TO PLANTING TREES TO SHADE ITS RECEIVING STREAM INSTEAD OF ACTUALLY COOLING ITS EFFLUENT

By Ted J. Rulseh



Dennis Baker, manager of the Water Reclamation Division for the City of Medford, Ore., with a copy of the city's thermal mitigation plan for the Rogue River.

Back in the day, there was controversy over thermal pollution from electric power plants (notably nuclear plants) that used lake or river water to cool their turbines. Today, attention is turning to thermal contributions from wastewater treatment plants, notably in areas with cold-water streams that harbor salmon and trout.

One plant dealing with that issue is the Medford Regional Wastewater Reclamation Facility in Central Point, Ore. It faces a state Department of Environmental Quality requirement to reduce thermal loading to its receiving stream, the Rogue River. Rather than actually cool its effluent, the facility is looking to reduce heat load to the river by planting trees along the banks to create cooling shade.

Medford's story is of interest not just because of the thermal issue itself but because it represents another case of looking beyond the treatment plant for reductions in pollutants of various kinds.

"We're not a massive thermal load, but we are in fact a load, and the goal is to mitigate all loads if possible. Being over is being over."

DENNIS BAKER

For example, the State of Wisconsin has a phosphorus rule that says treatment plants can deal with phosphorus permit levels not just by changing their own processes but by undertaking watershed-based activities, like encouraging farmers to adopt cropping practices that reduce runoff into receiving streams.

And in the eastern states, where nitrogen is a huge issue (notably around the Chesapeake Bay), there is activity on trading of nitrogen credits in addition to better nitrogen-removal treatment processes.

Dennis Baker, manager of the Water Reclamation Division for the City of Medford, talked about his organization's river shading program in an interview with *Treatment Plant Operator.*

tpo: Please tell us about Medford and its surroundings.

Baker: Medford is in south central Oregon, about 30 miles north of the California border. It has a population of about 70,000. The Rogue River runs just outside the city, and it supports a lot of sporting and outdoor activities. The timber industry used to be huge here; it has dwindled quite a bit, although it is still a significant employer.

Agriculture is growing. Pears are a big crop in the river valley, and our wine industry is getting larger every year. The Rogue River has a lot of salmon in it. It's a good-sized river and is classified as a Wild and Scenic River. It has some rapids and is a pretty spectacular waterway. Fishing is huge in the area.

tpo: How would you describe your treatment plant and its process?

Baker: We are a regional plant that takes wastewater from the City of Medford as well as Central Point, Jacksonville, Phoenix, Talent, Eagle Point, and unincorporated areas of Jackson County. We have an average design dry-weather flow of 20 mgd and currently average about 17 mgd. The existing plant was built in the late 1960s and has been through a lot of changes, but the core of it is still pretty much intact.

We have preliminary treatment with bar screens, followed by aerated grit basins and primary sedimentation. Then we send the flow to a biotower, after which it goes into activated sludge with fine-bubble aeration. That's followed by secondary settling, disinfection and discharge to the river.

We have two permit cycles. The winter cycle is 30 mg/l BOD and TSS, and our summer cycle is 10 mg/l BOD and 20 mg/l TSS, with an ammonia limit of 13 mg/l.

tpo: What is the history of the thermal loading issue?

Baker: It goes back about five years to when the DEQ first looked at TMDLs (total maximum daily loadings) on the rivers and at fish habitats in general across the state. For the major rivers, they came up with TMDLs for several constituents, but the main one concerning us on the Rogue was temperature.

tpo: Why the concern about your plant? Does your effluent account for a large share of the river's flow at the outfall?

Baker: Not really. According to DEQ requirements, there are only a couple of weeks out of the year where we would currently be discharging any excess thermal load, and then it's only about one-third of a degree Fahrenheit that we're above the limit. The time of year of note is in October, if the river flow is in the Q7-10 stage —

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which means the lowest-flow seven consecutive days in a 10-year period — we would be over our limit by about one-third of a degree. We're not a massive thermal load, but we are in fact a load, and the goal is to mitigate all loads if possible. Being over is being over.

As the population increases over time, our thermal impact will increase, and that is factored into our load compliance schedule.

tpo: Do you have salmon spawning in the river at those times of year?

Baker: Yes, that time of year is during the spawning season for the salmon, and is the driving concern.

tpo: What is the timetable for complying with this permit provision?

Baker: We have a 10-year compliance schedule in our new permit to get to a minimum of 177 million kilocalories per day (or thermal credits), with an end goal of about 300 million thermal credits over 20 years.

tpo: What options were explored before you chose the shading program?

Baker: We looked at a cooling tower, but the trouble was that during the time of year in question, there isn't enough differential between the air temperature and the water temperature to get any kind of cooling that way. Then we thought about mechanical chillers, which would definitely work, but when we costed that out, it was in the neighborhood of $15 million.

Then there are some old lagoons next door to us that belong to our sister organization, Rogue Valley Sewer Services. The thought was that we could excavate those out. The engineering work showed they would need to be dug from their current depth of about 12 feet to about 30 feet. Then we could send a certain amount of effluent over there, allow it to cool, and discharge it from the bottom — essentially taking advantage of geothermal cooling. However, that again would cost some $15 million, not counting upkeep on the transfer and discharge pumping systems we would have needed.

tpo: How did the idea of shading the river come up?

Baker: Temperature trading was actually the option favored by the DEQ. We're partnering with a group called The Freshwater Trust to implement the program. They've been around for about 30 years doing environmental projects. When all is said and done, the cost of the temperature trading program is about $8 million.

tpo: How will this project actually work?

Baker: It's a 20-year program. We have a 10-year contract with The Freshwater Trust with a 10-year renewal. They will go out and determine the areas on the Rogue River and its tributaries where geographically it would be worthwhile to add shading. Then they have to negotiate with the landowners to get easements. There will be payments to the landowners for the use of the land. Then they will have to clear off whatever brush is there and plant native tree species that over time will grow tall enough to offer enough shading to provide mitigation credits.

The choice of trees will be a mix of cottonwood, alder, willow and maple. The varieties planted will be dictated by site-specific conditions.

tpo: How is it possible to measure the impact of this shading on river temperature?

Baker: There is a computer program called Shade-A-Lator where you plug in various data and it will give back the amount of heat mitigation you can generate from a given tree planting program.

tpo: Do you have a feel for the scope of the planting program that will be required to reach the goal?

Baker: It's estimated we will have to add shading to about 25 to 30 miles of river. It's a pretty daunting task. All the field work will be done by The Freshwater Trust, since we don't have the staff or expertise in-house to undertake a project like that. The area where we can operate starts at River Mile 62, which is 62 miles upstream from where the Rogue discharges to the ocean, and extends about 100 miles upstream from that point to our location.

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>
> **DENNIS BAKER**

In addition, we can do work on about 300 miles of tributaries to the Rogue, although these offer a much lower kilocalorie yield. We're going to look at the highest-yield areas first and try to work on those that give us the most kilocalories of mitigation per individual project.

tpo: How soon will work begin?

Baker: We've got approval from our city council and we have a contract signed with The Freshwater Trust. So now that we have our new NPDES permit, which was issued in mid-December, we'll be able to get started.

tpo: How will this effort be paid for?

Baker: We'll pay as we go. We have worked very diligently to avoid incurring debt, so our projects are solely based on the resources we have. Our rates are among the lowest in the state. We're pretty frugal, and with a conservative financial approach we have been able to maintain a surplus of project money. So we're able to do this without having to go out for bonds or loans.

tpo: Is there any precedent for this type of project in Oregon?

Baker: Clean Water Services, which takes care of Washington County, one of the state's most populous areas, has done a program similar to this to meet their temperature requirements. We are the first agency in the state to do this with a partner and only the second agency (after Clean Water Services) to have a trading program. It's a big trial for us and a big trial for The Freshwater Trust, which was the only organization that responded when we issued our request for proposals.

> "The program is looked on very favorably, in part because I think it does make sense. So we feel we have a pretty good chance of getting this done."
>
> **DENNIS BAKER**

We have had a pretty good level of support and interest from the community at large. The program is looked on very favorably, in part because I think it does make sense, the landowners will receive improvements to their property with the clearing of invasive brush and the planting of native trees, plus a certain level of financial support for participating. So we feel we have a pretty good chance of getting this done. **tpo**

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Pumps

By Briana Jones

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Peristaltic pumps for metering (LPP-M) from Flowrox are designed for pumping diverse slurries and accurately metering a wide range of media while upholding chemical resistance. Made from thermoplastic materials, the pumps use tube technology to ensure secure operating conditions for the environment and operators. The pumps provide superior accuracy because the flow rate is not affected by variation of the discharge pressure. Positive displacement of the tube bore with zero slip provides the same output volume on every cycle. **410/636-2250; www.flowrox.com.**

PERISTALTIC HOSE PUMPS

Abaque Series peristaltic hose pumps from Blackmer

Abaque Series peristaltic hose pumps from Blackmer handle abrasive, aggressive, shear-sensitive and viscous materials. The pumps are constructed with ductile iron and steel, allowing discharge pressures to 217.5 psi. The seal-free design eliminates leaks, contamination and product loss while reducing maintenance and repairs. Hoses are available in natural rubber (resistant to diluted acids and alcohols), Buna or NBR (wear resistant to oily products), and EPDM (high chemical resistance with concentrated acids, alcohols and ketones).

The pumps are available in nine sizes and in flow rates of 0.7 to 211 gpm and are self-priming to 29.5 feet manometric lift. They can run dry continuously, handle high solids concentrations, and run in forward or reverse. **616/241-1611; www.blackmer.com.**

SUBMERSIBLE MIXERS

Amamix and Amaprop horizontal submersible mixers from KSB

Amamix and Amaprop horizontal submersible mixers from KSB mix, homogenize and suspend sludge. The Amamix has a tandem mechanical sealing that seals the shaft, while a leakproof cable entry prevents wicking inside the motor. The pumps have a closed-coupled design, direct-drive motor, and cable plug that can be plugged and unplugged without an electrician. The mixer resists clogging by fibrous material, has long maintenance intervals, and requires minimal spare parts inventories.

Available in multiple sizes, the Amaprop mixer is a low-speed gear-drive submersible mixer/agitator with break-proof propeller. The propellers have diameters up to eight feet and are configured and positioned for energy efficiency. The system offers hydraulic drive for reduced energy costs, and has a tandem mechanical seal with leakage reservoir to contribute to its three-stage sealing. Both mixers require oil change intervals every 16,000 operating hours or two years. **804/222-1818; www.ksbusa.com.**

CAVITY PUMPS

All-Optiflow series progressive cavity pumps from Colfax Fluid Handling's Allweiler brand

All-Optiflow series progressive cavity pumps from Colfax Fluid Handling's Allweiler brand offers up to twice the flow of standard pumps for application up to 87 psi differential pressure. In addition to increased flow, the pumps reduce sliding velocity by 20 percent and reduce power consumption.

Shaft diameters are 30 percent smaller than in standard pumps, reducing friction by nearly 50 percent. The shaft sealing life is enhanced. The honeycomb stator surface works in tandem with the sharkskin rotor surface to provide lower starting and operating torque, resulting in a smooth startup. This allows the pump to perform at high efficiency and offers stable performance curves throughout operation. **704/289-6511; www.colfaxcorp.com.**

HEAVY-DUTY PUMPS

Millennium Series wastewater pumps from Liberty Process Equipment

Millennium Series heavy-duty wastewater pumps from Liberty Process Equipment are designed for industrial applications with robust construction that allows for up to 25 feet of suction lift with minimal shear to pumped materials and offers true versatility with multidirectional pumping. **847/540-7867; www.libertyprocess.com.**

SEWAGE PUMPS

Little Giant 9SN and 10SN sewage pumps from Franklin Electric

Little Giant 9SN and 10SN sewage pumps from Franklin Electric feature Permanent Split Capacitor (PSC) motors, providing low current draw, energy efficiency and improved performance. The cool-running pumps are built for durability and long motor life. Built on the 9S platform, the 4/10 hp 9SN consumes 8.4 amps while producing 110 gpm at 5 feet of head, and reaching a maximum shutoff of 20 feet.

The 10SN consumes 9.5 amps with a 1/2 hp motor and produces 120 gpm at 5 feet of head, while reaching a maximum shutoff of 25 feet. Both units feature cast iron covers, volutes and motor housings. They are available with piggyback mechanical float switch, integral snap-action float switch or manual operation. Designed for extended or continuous use, the heavy-duty pumps are made for effluent and dewatering applications. **405/228-1204; www.franklin-electric.com/lg.**

DRY PIT VERTICAL PUMP

Fybroc 5530 series vertical pump from Met-Pro Global Pump Solutions

The Fybroc 5530 series vertical pump from Met-Pro Global Pump Solutions is corrosion resistant and suitable for dry pit applications including acids, bleaches and caustics. It is also well-designed for odor control scrubber systems. The design offers lower cost than in-tank vertical pumps; outside-the-tank mounting; FRP construction and FRP-wrapped shaft (18 inches); heavy-duty column, shaft and bearings; and optional high-pressure shaft seal. The pump is available in 16 sizes with capacities to 1,400 gpm and heads to 400 feet. **800/392-7621; www.mp-gps.com.**

COMPACT POLYMER PUMP

Rotary lobe pumps (S8 and S16) from LobePro Rotary Pumps

Rotary lobe pumps (S8 and S16) from LobePro Rotary Pumps fit the newest S frame size. The S8 has 72 gpm maximum capacity (8 gallons maximum flow per 100 rpm), and 175 psi maximum working pressure. The S16 has 144 gpm maximum capacity (16 gallons maximum flow per 100 rpm), and 150 psi maximum working pressure.

With a rate of 0-900 rpm, the pumps feature six wing lobes and have options for stainless steel components. GS8 and GS16 are for general use; SS8 and SS16 are for sludge, mud and slurry; and CS8 and CS16 are for chemical and corrosive materials. These are available as API 676 compliant pumps. The corrosion-resistant stainless steel pumps are suited for pumping most polymers because of their near pulseless measured flow, which produces the correct pressure without valves. The S pumps feature field rebuildable cartridge seals. **888/997-7867; www.lobepro.com.**

ReliaPrime emergency bypass station from Gorman-Rupp Co.

BACKUP SYSTEM

The ReliaPrime emergency bypass station from Gorman-Rupp Co. operates on natural gas, making it quiet and environmentally friendly. The unit features a 6-inch Super T Series pump capable of passing 3-inch spherical solids and offers a soundproof, lightweight aluminum enclosure with padlocked door panels and removable for maintenance. The unit is a complete backup package, ready for hookup. **419/755-1011; www.grpumps.com.**

SUBMERSIBLE TRASH PUMP

Submersible trash pump from Griffin Pump & Equipment

The 10-inch electric submersible trash pump from Griffin Pump & Equipment can handle flows up to 5,500 gpm, up to 90 feet of head, and 5-inch solids. The unit includes a 77 hp motor. **866/770-8100; www.griffinpump.com.**

Series 500 hydraulic metering pumps from Neptune Chemical Pump Co.

HYDRAULIC METERING PUMPS

Series 500 hydraulic metering pumps from Neptune Chemical Pump Co. offer quality construction and long-term reliability for chemical metering applications found in water and wastewater.

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PIPE STRAIN MEASUREMENT

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The OPTALIGN SMART pipe strain wizard from LUDECA measures the effects of pipe strain on shaft alignment. The program checks for strain from external sources acting on machines. The measured valves are quantified in terms of offset and angularity. The vector values are combined for both vertical and horizontal directions. This check can prove the existence of pipe strain on a pump or conduit strain on a motor. External stress on a machine frame can result in frame distortion. Measurement files can be saved or printed in PDF format directly from the alignment tool. **305/591-8935; www.ludeca.com.**

E, F and G Series centrifugal pumps from Griswold Pump Company

CENTRIFUGAL PUMPS

E, F and G Series centrifugal pumps from Griswold Pump Company are available with an enlarged pump suction and discharge nozzles to cut down on friction losses. The F Series pumps are certified by NSF to ANSI/NSF Standard 50.

The pumps offer capacities up to 3,300 gpm, heads to 310 feet, and a broad range of sizes and configurations. They come with close-coupled NEMA electric motors or frame-mounted with coupling to electric motors, engines, steam turbines or belt drives. The 360-degree mounting capabilities increase extension options, as do close-coupled configurations that can be mounted vertically when space is at a premium. The back-pullout design permits removal of the entire pump assembly. All models are flanged in accordance with ANSI B 16.1 for 125 psi pumping applications. **800/843-9222; www.griswoldpump.com.**

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mRoy series pumps from Milton Roy

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2000 HS system from Moyno

TWIN-SCREW FEEDER

The 2000 HS system from Moyno features an integral hopper with a twin-screw auger feeder and Moyno G4 progressive cavity pump that handles semi-dry, high solids, dewatered sludge to over 50 percent solids. The feeder supplies a constant, pressurized feed rate to the pump resulting in a 100 percent pump cavity fill rate. The design on the Ultra-Feed pump rotor head further contributes to high volumetric efficiency. The non-pulsing flow lowers operating pressures, while the VFD controls for both the pump and twin-screw feeder reduce energy loss, horsepower requirements, and noise. **877/486-6966; www.moyno.com.**

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LEAKPROOF PUMPS

S pumps from Grundfos include the SmartTrim impeller clearance adjustment system and the SmartSeal for leakage prevention. SmartTrim allows the operator to adjust the factory-set impeller clearance to maintain maximum pump efficiency. The SmartSeal auto-coupling gasket provides a leakproof connection between the pump and the base unit of the auto-coupling system.

S pumps from Grundfos

The shaft seal can rotate in either direction. When the pumps are installed with separate pipework, sludge sedimentation can be avoided by backflushing the system at regular intervals. The pumps are suitable for applications including transfer of unscreened raw sewage, transfer of raw water, pumping of water containing sludge, and pumping of industrial effluent. **800/921-7867; www.grundfos.us.**

MULTIPURPOSE PUMP

H2O Works Multipurpose Vertical Turbine pump from Patterson Pump Company

The H2O Works Multipurpose Vertical Turbine (MPVT) pump from Patterson Pump Company handles stringy solids and is widely used in municipal and industrial solids handling, water treatment, flood control and water supply applications. An internal vane prevents stringy material from wrapping around the shaft. The design produces high hydraulic performance with low vibration and noise. Pumping sections can be staged as necessary to meet desired pressure requirements.

The pump requires minimal floor space and operates in low NPSHA applications. The aboveground discharge, motor and controller allow easy access for safe maintenance. Bowl sizes from 12 to 40 inches deliver capacities from 1,500 to 20,000 gpm and above. A standard unit has a cast iron discharge head, fabricated steel column, stainless steel head and bowl shaft, alloy steel line shaft and cast iron bronze fitted bowl. Open line shaft construction is also standard. **706/886-2101; www.h2oworkspumps.com.**

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The unit operates from standard 1x120 VAC, 15-amp circuits with a 5-15P grounded plug. The drive has an HOA switch with a 10-turn potentiometer for manual control and will accept a 4-20 mA process signal through a standard 1/2-inch UNF connector. Sensors and connector cables in various lengths are available. The effective speed range is 20-600 gpm. The vector capability of the VFD has an internal sensorless feedback system for excellent yet economical speed control and stability. **937/864-7150; www.seepex.com.**

DAF PUMPS

EDUR DAF pumps from Shanley Pump and Equipment

EDUR DAF (dissolved air flotation) pumps from Shanley Pump and Equipment provide low cost and long service life. Dissolved air flotation incorporates the production of microscopic air bubbles (less than 30 microns) mixed with wastewater containing the suspended contaminants, leading to separation efficiencies of 95 percent or more. The pumps are made with 316 and 329 stainless steel depending on the application. The units eliminate ASME coded air saturation tanks and reduce the overall DAF equipment footprint. **847/439-9200; www.shanleypump.com.**

DOUBLE DISC PUMP

Double Disc pump from Penn Valley Pump Co.

The Double Disc pump from Penn Valley Pump Co. is used for various sludge handling applications: dewatering feed, thickened sludge, digested sludge, primary sludge, scum, septage and lime slurry. The simple design does not reply on close tolerances to generate flow. This provides a low wear rate and reduces maintenance costs. The pump runs dry without damage. It incorporates a maintain-in-place hinged housing that allows complete servicing without disturbing the piping. **800/311-3311; www.pennvalleypump.com.**

SMART CONTROL PANEL

ECO SMART STATION control panel from SJE-Rhombus

The ECO SMART STATION control panel from SJE-Rhombus offers energy-efficient pump control in municipal lift stations. The unit, housed in the ARC ARMOR enclosure, features a microprocessor-based controller with color touch-screen HMI, data storage and communication technology. The Energy View controller is powered by kW Logix software. Auto-tuning searches for the Best Efficiency Frequency (BEF), which uses the least energy for each gallon pumped. I-Link provides cellular-based remote monitoring and reporting. The pre-engineered control panel is available in 29 models from 10 to 100 hp. **888/342-5753; www.ecosmartpanel.com.**

AIR DISTRIBUTION PUMPS

Advanced Series Metal Air-Operated Double-Diaphragm (AODD) pumps from Wilden are available with a specialized air distribution system including the Pro-Flo X system, which features an efficiency management system (EMS) that optimizes the unit for specific operation parameter, regardless of the application demands or pump size. The results are lower operational and energy costs.

Advanced Series Metal Air-Operated Double-Diaphragm pumps from Wilden

The pumps are offered in die-cast aluminum, stainless steel and alloy C, with a variety of elastomer options, including PTFE, that enable them to meet abrasion, temperature and chemical compatibility concerns. The bolted configuration ensures product containment while the redesigned liquid path reduces internal friction. They are available in five sizes, from 1/4 to 3 inches with flow rates to 270 gpm and can handle solids to 3 inches. **909/422-1730; www.wildenpump.com.**

REPLACEMENT HOSES

VERDERFLEX-Direct interchangeable replacement hoses and lubricant from VERDER

The VERDERFLEX-Direct interchangeable replacement hoses and lubricant for Watson-Marlow Bredel hose pumps from VERDER provide extended hose life. They are available in sizes from 10 to 100 mm and made of natural rubber, EPDM, Buna-N and Hypalon. The VERDERBLUE lubricant is available in 1-, 5- and 55-gallon sizes. **877/783-7337; www.verderusa.com.**

620 series pump for sodium hypochlorite from Watson-Marlow

SODIUM HYPOCHLORITE PUMP

The 620 series pump for sodium hypochlorite from Watson-Marlow features off-gassing to prevent vapor lock while maintaining ± 0.1 percent accuracy in hypo metering. The high accuracy levels reduce chemical usage. The unit handles harsh chemicals including sodium hypochlorite, ferric chloride, sodium bisulfate, aluminum, fluoride, carbon and lime slurries, polymers, aqueous ammonia, potassium permanganate and caustic slurries. It has no valves or seals to clog, requiring minimal maintenance. **800/282-8823; www.wmpg.com. tpo**

Thank You.

"People appreciate me, and I think highly of that.
I'm not afraid to tell people what I do for a living.
I'm a wastewater treatment professional."

Emphasis on professional.

Thank you.

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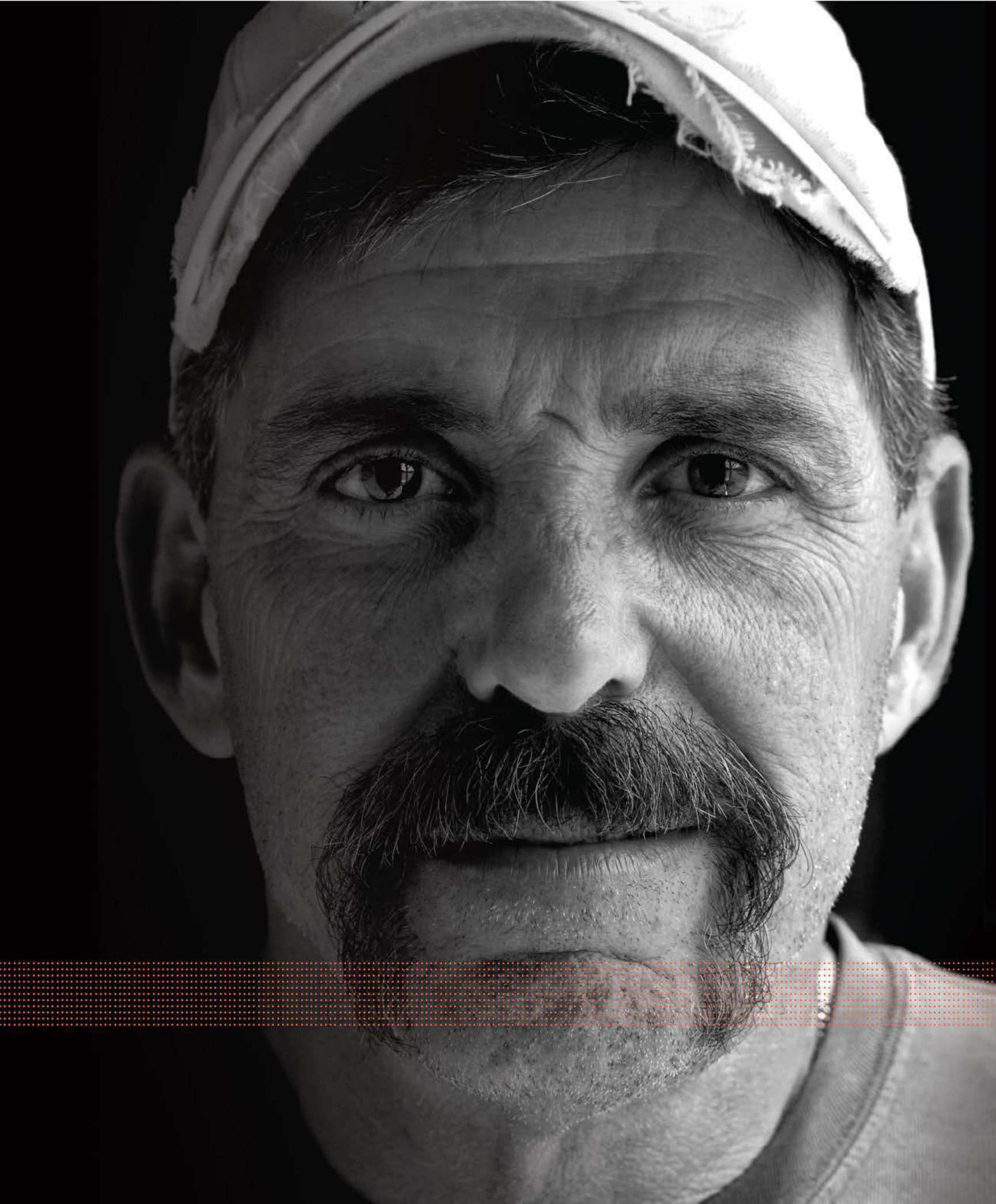


By Scottie Dayton

System solves accuracy drift

Problem

The Bethpage (N.Y.) Water District metered caustic soda with diaphragm pumps, but accuracy drifted between maintenance periods and the check valves needed routine service.

Solution

The district replaced the pumps with the **CTS Valveless Piston Pump system from Fluid Metering.** The only moving part, a rotating and reciprocating ceramic piston, controls all fluid functions. The sapphire-hard ceramic internals provide drift-free accuracy of better than 1 percent for millions of cycles without recalibration.

RESULT

Downtime was almost eliminated. The system uses less power and has a smaller footprint than the original pumps. **800/223-3388; www.fmipump.com.**

Retrofit vitalizes pump stations

Problem

The Town of Wolcott, Conn., needed to rehabilitate four pumps in two aging pump stations. "They are deep can stations, making it difficult to mobilize materials and modify the piping," says administrator for sewer and water Phil Olmstead. "It also was crucial not to disturb the integrity of the steel chamber's shell, which welding could do."

Solution

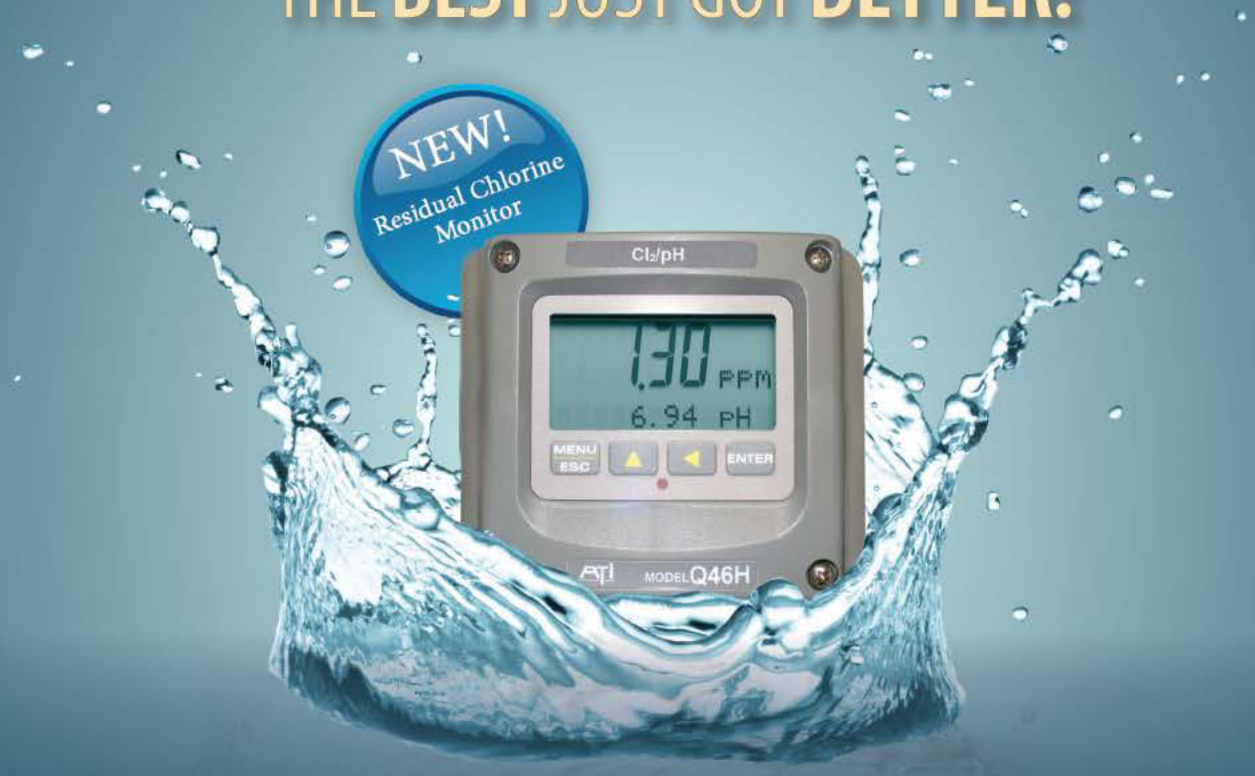
Without any modifications, **Smith & Loveless After Market replaced the pumps with vertical 4B2A S&L non-clog pumps** on stands. The units, which dropped in and were bolted in place, have oversized stainless steel shafts, bronze mechanical seal housings, and cast iron balanced impellers. The combination, with NEMA-rated premium efficient motors, limits the potential of mechanical seal failure.

RESULT

One pump station increased efficiency a minimum of 9 percent and the other by 5 percent. **800/898-9122; www.smithandloveless.com. tpo**

FREE CHLORINE MONITORING

THE **BEST** JUST GOT **BETTER!**



ATI's NEW Series Q46H Monitoring System

simplifies documenting disinfectant residuals in water distribution systems. Providing continuous measurement of chlorine, pH and temperature, the monitor delivers all the data required for insuring compliance with disinfectant contact-time (CT) requirements. Three isolated 4-20 mA outputs are available for interface to DCS or telemetry systems.

For digital systems, a Profibus communication option is available now, with Modbus and Ethernet systems available shortly.

FEATURES

Chlorine, pH & Temperature in one, compact unit.

3 SPDT relays standard

Pre-assembled system panels available

Option for 3 additional low power relays

Profibus-DP, Modbus, or Ethernet communications

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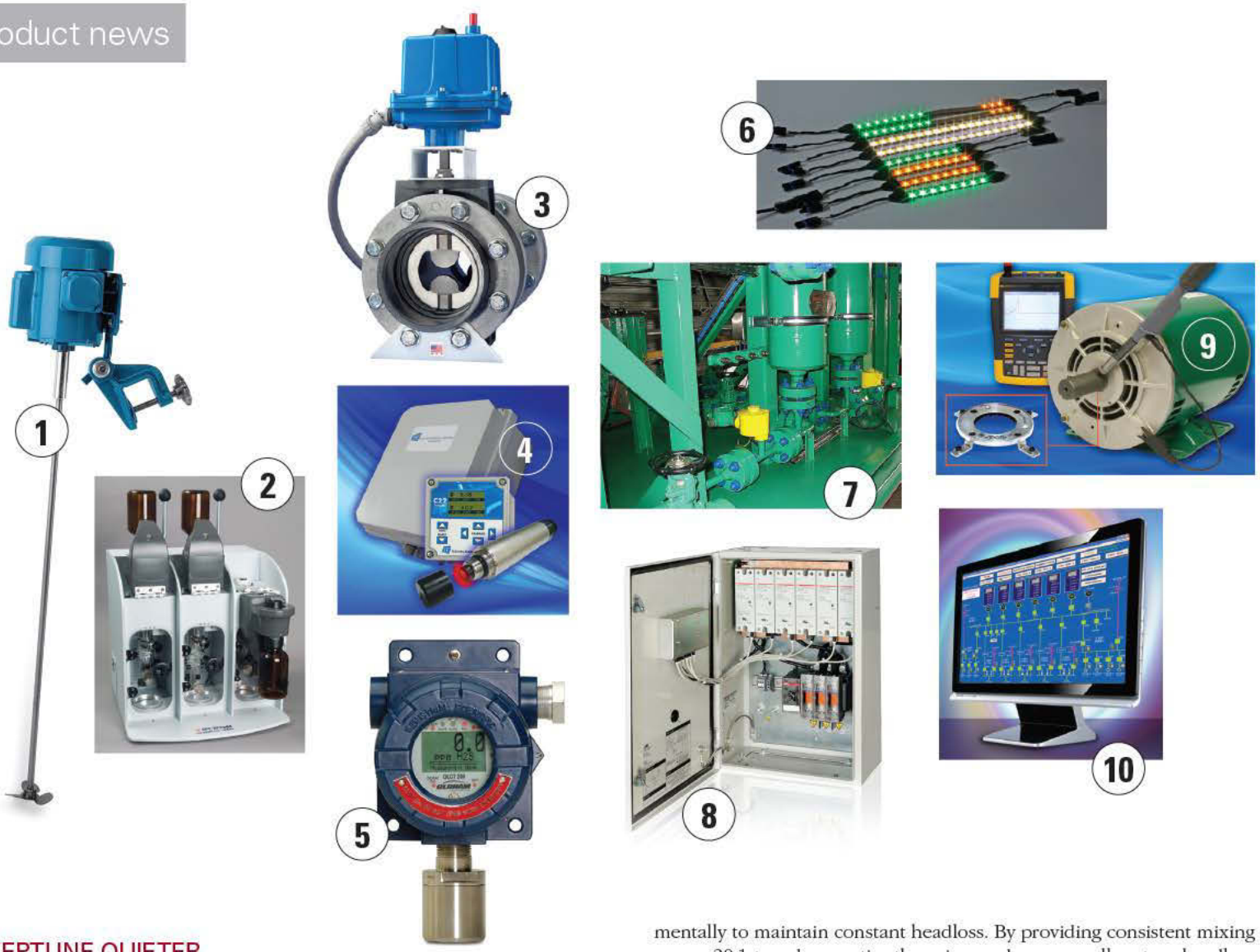


1. NEPTUNE QUIETER OPERATING MIXERS

Quieter operating mixers from Neptune Mixer Co. feature steel helical gears, high-quality bearings and high-grade lubricant. The level 9 American Gear Manufacturers Association quality class mixers feature tighter manufacturing tolerances on the mesh and backlash and improved running-surface finish. **215/699-8700; www.neptune1.com.**

2. ENVIRONMENTAL EXPRESS EXTRACTION SYSTEM

The SPE-XPress solid phase extraction system from Environmental Express is designed for the extraction and evaporation required by U.S. Environmental Protection Agency Method 1664 for oil and grease analysis. The system extracts the sample and evaporates the n-Hexane, eliminating the transfer step, and verifies the sample vessel is empty, utilizing a fluid sensor for greater accuracy. The system can run multiple samples simultaneously on up to six stations. The system flushes itself clean, preps the extraction disk, then filters and extracts the sample through sodium sulfate with n-Hexane. In the final stage, the system automatically transfers the extract to a pre-weighted aluminum pan where it is evaporated to dryness. **800/343-5319; www.envexp.com.**

3 WESTFALL VARIABLE FLOW STATIC MIXER

The Model 2900 variable flow static mixer from Westfall Manufacturing Co. optimizes mixing and minimizes headloss by employing two inline wafer-type mixers, one fixed and one variable, which adjust incrementally to maintain constant headloss. By providing consistent mixing over a 20:1 turndown ratio, the mixer reduces overall system headloss at high flow rates and permits the use of smaller pipes. Available in sizes from 3/8 to 120 inches I.S., the fixed mixer has a 0.9 Beta ratio and the variable mixer has a 0.7 Beta ratio. **888/928-3747; www.westfallmfg.com.**

4. ECD DO MONITORING SYSTEM

The Triton DO8, self-cleaning dissolved oxygen monitoring system from Electro-Chemical Devices includes Triton DO8 sensor, AC10 air-blast spray cleaner and C-22 container. The sensor has a maximum error rate of less than 2 percent, resolution of 0.01 ppm or 0.01 percent saturation. It can withstand ambient temperatures from 0 to 140 degrees F, records measurements at temperatures from 20 to 120 degrees F and withstands pressure up to 145 psi. The spray cleaner is available as either a single or dual channel system and helps maintain sensor measurement accuracy in turbid water by preventing the buildup of biofilms. **800/729-1333; www.ecdi.com.**

5. OLDHAM OLCT 200 GAS MONITOR

The OLCT 200 fixed transmitter from OLDHAM is made for monitoring multiple gas detection technologies, including electrochemical sensors (H_2S, NH_3, O_2) and infrared sensors that provide detection of combustible gases in more severe environmental conditions where the presence of poisons like H_2S could harm the use of a catalytic cell. Suited for monitoring applications in remote, hazardous or difficult to reach

locations, the unit can be configured for two-wire and three-wire 4-20 mA analog output, Modbus RTU digital output, HART communications and wireless communication. **800/338-3287; www.oldhamgas.com.**

6. GROTE EMERGENCY EGRESS LIGHTING FILM

LightForm emergency egress lighting film from Grote Industries features LED lighting technology and requires no lens or bezel. It resists water and concussion. The film conforms to the shape of most doors and exits, while its adhesive backing adheres to most surfaces. **800/628-0809; www.grote.com.**

7. FCI PUMP PROTECTION SWITCH

The FlexSwitch FTP pump protection flow switch from Fluid Components International LLC monitors the flow and temperature of liquids, gases, slurries, syrups, lubricants and coolants. The Alarm 1 switch detects low flows between 0.01 and 3 fps, alerting the control system or operator. Alarm 2 signals when the feed line to the pump is running dry. The switch has a range of settings and a maximum service operation of 2,350 psig at 500 degrees F. **800/854-1993; www.fluidcomponents.com.**

8. ABB SURGE PROTECTION

The OVR NE 12 enclosed surge protection device from the ABB Low Voltage Products division is a UL 1449 third edition certified Type 2 SPD contained within a NEMA Type 12 enclosure, designed for indoor installation on the load side of the main breaker or fuse. Each unit comes with status lights, alarm and auxiliary contacts, EMI filtering and a fused disconnect. **888/385-1221; www.abb.us/lowvoltage.**

9. AEGIS SHAFT VOLTAGE TEST KIT

The shaft voltage test kit from AEGIS enables users to measure and document damaging VFD-induced voltages, eliminating possible bearing damage and equipment downtime. The kit includes replaceable probe tip with conductive microfibers that ensure continuous contact with a rotating motor shaft. **866/738-1857; www.est-aegis.com.**

10. RUSSELECTRIC SCADA SOFTWARE

Custom SCADA software for power control systems from Russelectric provides interactive monitoring, real-time and historical trending, comprehensive reporting, distributed networking and alarm management. The system enables operators to monitor and control a facility's entire power system using full-color point-and-click interactive displays at the console. **781/749-6000; www.russelectric.com.**

(continued)

product spotlight

Grit Removal System Adds Simplicity and Efficiency

By Ed Wodalski

Mectan V induced vortex grit removal system from John Meunier, Inc., a Veolia Water Solutions & Technologies company.

The Mectan V induced vortex grit removal system from John Meunier, Inc., a Veolia Water Solutions & Technologies company, is engineered to remove a range of particle sizes in municipal wastewater pretreatment.

The system offers multiple outlet channel positioning options, low headloss, energy savings and a small carbon footprint. The paddle-mixer design optimizes grit removal while limiting accumulation of organics in the grit well. The system can remove 68 percent of grit particles smaller than 150 microns and 96 percent of particles 300 microns or larger.

An evolution of the original Mectan conical grit removal system, the Mectan V preserves the system's simple operation and full access to all mechanical components, while adding flexibility and increased efficiency, says Martin Couture, equipment department director.

The device is available in models from 4 to 24 feet in diameter and can handle flows from 0.8 to 78 mgd. "There's no minimal flow because you can use a smaller model to address very low flows," he says.

Influent is fed tangentially into the lower portion of the separation chamber, ensuring proper flow and velocity inside the conical tank. Paddles maintain the influent at maximum rotational velocity, holding organics in suspension while allowing grit to settle.

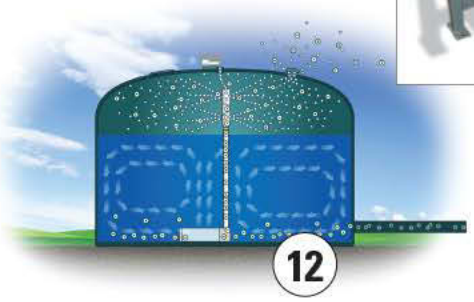
"If we didn't have the paddles or a motion-inducing system inside the tank, we would have more organics being removed, which is not the purpose," Couture says. "The chambers are made to remove grit. Grit eventually touches the sidewalls inside the cone and falls to the bottom of the cone, where it is slowly brought back into the main grit hopper in the middle of the equipment and removed."

Water escapes through the top of the separation chamber and is redirected toward the outlet channel. A steel disc in the tank separates the vortex grit removal zone from the flow outlet zone, so the outlet channel can be positioned in any direction. "It could be straight in line with the inlet channel. It could be 90 degrees; it could come back the other way," Couture says.

The system is essentially self-cleaning: grit is contained in a single hopper and transferred from the well by an airlift device or extraction pump. An optional scour using air, water or both fluidizes the bed before grit removal.

The system requires minimal maintenance and can operate for extended periods when properly serviced. "This is mechanical equipment, so you need to grease it periodically, and do inspections to make sure you don't have any wearing or tearing of parts," Couture says. "The main paddle drive is turning all the time."

The system's small footprint makes it easily adaptable to smaller treatment plants or for retrofitting older facilities. "Many of these units are fabricated for retrofits," Couture says. "The units can be manufactured in steel tanks or simply cast in concrete to fit existing basins in wastewater treatment plants, if required." **888/638-6437; www.johnmeunier.com.**



11. WITTE EQUIPMENT LEG EXTENSIONS

Equipment leg extensions from The Witte Co. are available for vibrating fluid bed dryers and coolers, screeners, dewatering equipment, vibrating conveyors and other process equipment. The customized height promotes ergonomic access to machine internals and product in process for constant viewing, easy cleaning and safe removal. The painted, steel leg extensions raise machine inlets, intakes and infeeds to accommodate the position of the upstream process equipment for uninterrupted material flow, often eliminating the need for connecting conveyors, ramps or ductwork. **908/689-6500; www.witte.com.**

12. SOLARBEE SPRAY NOZZLE THM REMOVAL SYSTEM

The spray nozzle THM removal system from SolarBee Inc. removes four types of regulated trihalmethanes from medium and small tanks, enabling municipalities to comply with EPA Stage 2 DBPR (disinfectants and disinfection byproducts rule). Providing tank mixing and THM removal in one package, a submersible pump pushes water through the spray nozzles, where THMs are volatilized and removed from the water. Simultaneously, some of the pump flow is directed through a mixer in the bottom of the tank, ensuring water exiting the nozzles is well mixed with the remaining water in the tank. In cold climates, the spray nozzle function can be switched off while allowing the mixing function to perform, preventing ice damage in the tank. The entire removal system is portable and pre-packaged. It includes nozzle assembly, tank mixing system, submersible pump, piping and tank adapter. **866/437-8076; www.solarbee.com.**

13. METSO ONLINE MEASUREMENT TECHNOLOGY

Low Solids Measurement online technology from Metso enables treatment plants to measure media in difficult applications, including centrifuge centrate. Based on LED and laser technology, the system has the ability to keep measurement optics clean for continued accurate readings. It also can control polymer usage to improve throughput and centrifuge function. The device can be connected to the process and measure continuous sample flow through the system by utilizing an integrated centrifugal pump. Light sources measure absorption, scattering and depolarization. **www.metso.com. tpo**

Pump Solutions Names Buscher VP-PSG Commercial

Pump Solutions Group appointed Karl Buscher to the newly created position of senior vice president-PSG Commercial. Buscher brings 20 years experience to his position, including business-to-business sales and marketing.

Karl Buscher

CSI Adds Factory Representative

CSI Controls, manufacturer of control panels for the water and wastewater industries, added DC Sales as its wholesale factory sales representative for Texas, Oklahoma, Louisiana and Arkansas.

Extech Instruments Relocates to New Hampshire

Extech Instruments relocated its headquarters to a new facility in Nashua, N.H. The location will house administrative and corporate offices, customer service and technical support, marketing and sales, quality control, NIST calibration laboratories, repair services and a warehouse, as well as FLIR's infrared training center.

Grand Rapids Named Hach Fan Favorite

The City of Grand Rapids, Mich., wastewater treatment facility won Hach's See the BIG Picture Fan Favorite contest. It will receive $40,000 in Hach equipment. Grand Rapids treats an average of 49 mgd from a collection system that includes more than 1,000 miles of maintained sewer pipe and 262,000 customers.

Rita Smith, executive director of NCADV, accepts a donation from Grant Salstrom and Godwin's Charitable Contributions Committee.

Godwin Donates to National Coalition Against Domestic Violence

Pump manufacturer Godwin made a donation to the National Coalition Against Domestic Violence. The organization works to eliminate domestic violence, empower battered adults and children, promotes and unifies direct service programs, alerts and educates the public and promotes partnerships.

WEF Names O'Neill Deputy Executive Director

The Water Environment Federation promoted Dr. Eileen O'Neill to deputy executive director and Matthew Ries to chief technical officer. Serving as WEF's chief technical officer, O'Neill joined the federation in 1991 as manager of industrial programs. Ries joined WEF in 2005 as managing director of technical and educational services.

Synagro Donates $25,000 to Park Restoration

Synagro Technologies Inc. presented the Hawaii Softball Foundation with $25,000 in support of the restoration of the Sand Island Recreation Park softball fields as well as new equipment for 25 members of the youth softball team. **tpo**

tpo CLASSIFIED ADVERTISING

MARCH

BUSINESSES

Looking to purchase existing septic businesses in Western CT. All inquiries will be kept confidential. Please call Tony at 203-648-1301, CT. (P04)

DEWATERING

22-yard dewatering box w/steel rolling tops. Does not include filter media or polymer injection system. Asking $18,000. 770-917-0377, GA. (PBM)

DRAINFIELD RESTORATION

Soil Shaker 2000. Universal skid steer attachment for drainfield restoration. Buy factory direct $6,250. www.soilshaker.com or call 320-293-6644. (PBM)

TERRALIFT FOR SALE: 1995 LT 11 model, recently rebuilt and painted. Very well maintained and runs great. $10,500. Contact Brian 218-428-0391, MN. (PBM)

TERRALIFT: Huge discounts on new and used Terralift machines. Call Dick Crane, your authorized dealer, at 1-800-223-2256. (PBM)

EDUCATION

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

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1997 Freightliner with Presvac, 2,300 gallon, DOT certified vacuum tank, Presvac PV750 vacuum pump with new paint and tank inspections. KLM Companies, 617-909-9044. (P03)

MISCELLANEOUS

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

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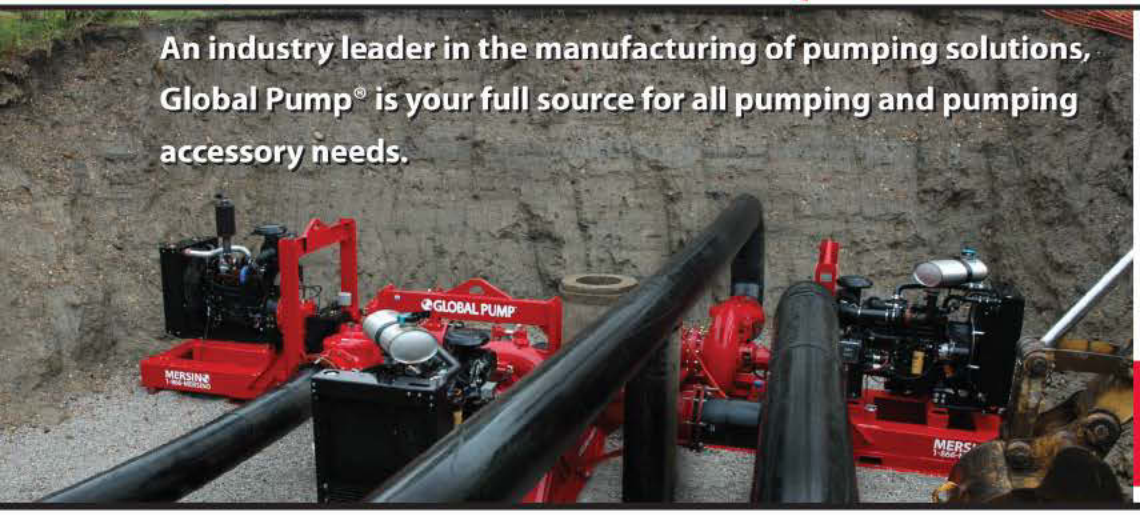

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people/awards

The **Town of Provincetown (Mass.)** received the 2011 Wastewater Utility Award from the New England Water Environment Association.

John Gibson, the City of Raleigh wastewater facility manager at the Smith Creek Wastewater Treatment Plant, was named the 2011 North Carolina recipient of the Water Environment Federation's William D. Hatfield Award.

Advanced Waste Services of West Allis, Wis., received the Fleet Safety Award (driving between 4 million and 9 million miles with zero DOT-reportable accidents) and the Gold Safety Award (highest point total score in the heavy-duty specialty category) from its insurer, Raffles Insurance Ltd.

The **Brush Creek Wastewater Treatment Plant,** Cranberry, Pa., received the 2011 Facilities Safety Award from the Western Pennsylvania Water Pollution Control Association.

Jim Mahony, area manager Mid-Central for HOBAS Pipe USA, was inducted into the Select Society of Sanitary Sludge Shovelers by the Nebraska Water Environment Association.

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

Canada

The Maritime Provinces Water and Wastewater Association will hold its annual seminar, "The Earth Is Our Island: How We Protect It," in Charlottetown, Prince Edward Island, April 22-25. Visit www.mpwwa.ca.

Michigan

The Michigan Water Environment Association has these courses:

- March 22 – Lagoon Seminar, East Lansing
- May 8 – Lab Practices Seminar, East Lansing

Visit www.mi-wea.org.

Ohio

The Ohio Water Environment Association has these courses:

- March 1 – Government Affairs Workshop, Lewis Center
- April 5 – Watershed Workshop, Columbus
- May 10 – Collection Systems Workshop, Lewis Center

Visit www.ohiowea.org.

South Dakota

The South Dakota Water and Wastewater Association will hold a Wastewater Operators Seminar May 1-2 in Sioux Falls. Visit www.sdwwa.org.

Texas

The Texas Water Utilities Association has these courses:

- March 13 – Wastewater Collection, Carrollton
- March 19 – Management, Texarkana
- March 20 – Safety, New Braunfels
- March 27 – Safety, Longview

Visit www.twua.org.

Virginia

The Virginia Water Environment Association has an Industrial Waste and Pretreatment Seminar March 5-6 in Charlottesville. Visit www.vwea.org.

Wisconsin

The Wisconsin Wastewater Operators Association is offering the following:

- March 21 – Spring Biosolids Symposium, Stevens Point
- April 2 – Young Professional Leadership Academy, Madison

Visit www.wwoa.org.

The Wisconsin Department of Natural Resources is offering the following courses:

- March 6-7 – Ponds and Lagoons, Introduction and Advanced, Manitowoc
- March 13-14 – Disinfection, Introduction and Advanced, Green Bay
- March 19-23 – General Wastewater Treatment, Introduction and Advanced, Chippewa Falls
- March 26-27 – Mechanical Sludge Handling, Introduction and Advanced, Oconomowoc
- April 11 – Wastewater Math, Chippewa Falls
- April 16-17 – Activated Sludge-Introduction, Madison
- April 18-19 – Activated Sludge-Advanced, Madison
- April 23-24 – Phosphorus Removal, Introduction and Advanced, Madison
- April 25-26 – Lab-Advanced, Madison

Visit www.dnr.state.wi.us.

The University of Wisconsin Department of Engineering-Professional Development is offering the following courses:

- March 26-27 – Upgrading Your Sanitary Sewer Maintenance Program, Madison
- March 28-30 – Wastewater Pumping Systems and Lift Stations, Madison
- April 24-26 – Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment

Visit www.epdweb.engr.wisc.edu. **tpo**

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

CALENDAR OF EVENTS

March 11-13
South Carolina Environmental Conference, Myrtle Beach Convention Center, Myrtle Beach. Call 803/358-0658 or visit www.sc-ec.org.

March 13-14
Georgia Association of Water Professionals Industrial Conference & Expo, Callaway Gardens Convention Center, Pine Mountain. Visit www.gawp.org.

March 19-22
Illinois Water Environment Association and the Illinois Section of the American Water Works Association Joint Annual Conference, Crowne Plaza Hotel, Springfield. Visit www.iweasite.org.

March 24-28
Missouri Water Environment Association Annual Conference, Osage Beach. Visit www.mwea.org.

March 25-28
Water Environment Federation Residuals and Biosolids 2012: Advancing Residuals Management: Technologies and Applications, Raleigh Convention Center, Raleigh, N.C. Visit www.wef.org.

April 10-13
The Water Environment Association of Texas-Texas Water 2012, San Antonio. Visit www.weat.org.

April 15-17
North Carolina-American Water Works Association Annual Conference, Wilmington. Call 919/784-9030 or visit www.ncsafewater.org.

April 15-18
Alabama Water Environment Association Annual Conference. Call 205/349-0067 or visit www.awea-al.com.

April 15-18
Water Environment Federation Odors and Air Pollutants 2012, Kentucky International Convention Center, Louisville, Ky. Call 703/684-2441 or visit www.wef.org.

April 16-19
Illinois Association of Water Pollution Control Operators Annual Conference, Crowne Plaza Convention Center, Springfield. Call 815/303-3745 or visit www.iawpco.org.

April 17-18
Georgia Association of Water Professionals Spring Conference and Expo, Columbus. Visit www.gawp.org.

April 17-20
California Water Environment Association Annual Conference, Sacramento Convention Center. Visit www.cwea.org.

April 17-20
Water Environment Association of Utah Annual Conference, Dixie Center, St. George. Visit www.weau.org.

April 21-25
British Columbia Water & Waste Association Annual Conference, Penticton Trade and Convention Centre, Penticton. Call 604/433-4389 or visit www.bcwwa.org.

April 22-24
Water Environment Association of Ontario Technical Symposium and Exhibition, The Ottawa Convention Centre. Call 416/410-6933 or visit www.weao.org.

April 24-25
Nevada Water Environment Association Annual Conference, John Ascuaga's Nugget, Sparks. Visit www.nvwea.org.

April 29-May 2
Arkansas Water Works & Water Environment Association Annual Conference, location to be announced. Visit www.awwwea.org.

May 1-3
Montana Water Environment Association and Montana Section of the American Water Works Association Joint Conference, Holiday Inn Grand, Billings. Call 406/546-5496 or visit www.montana-awwa.org.

May 7-10
Alaska Water Wastewater Management Association Annual Conference, Westmark Hotel & Convention Center, Fairbanks. Call 800/544-0970 or visit www.awwma.org.

May 13-18
New Jersey Water Environment Association Annual Conference, Bally's Atlantic City, Atlantic City. Call 201/296-0021 or visit www.njwea.org.

May 20-23
West Virginia Water Environment Association Annual Conference, Grand Pointe Conference and Reception Center, Parkersburg. Visit www.wv-wea.org.

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