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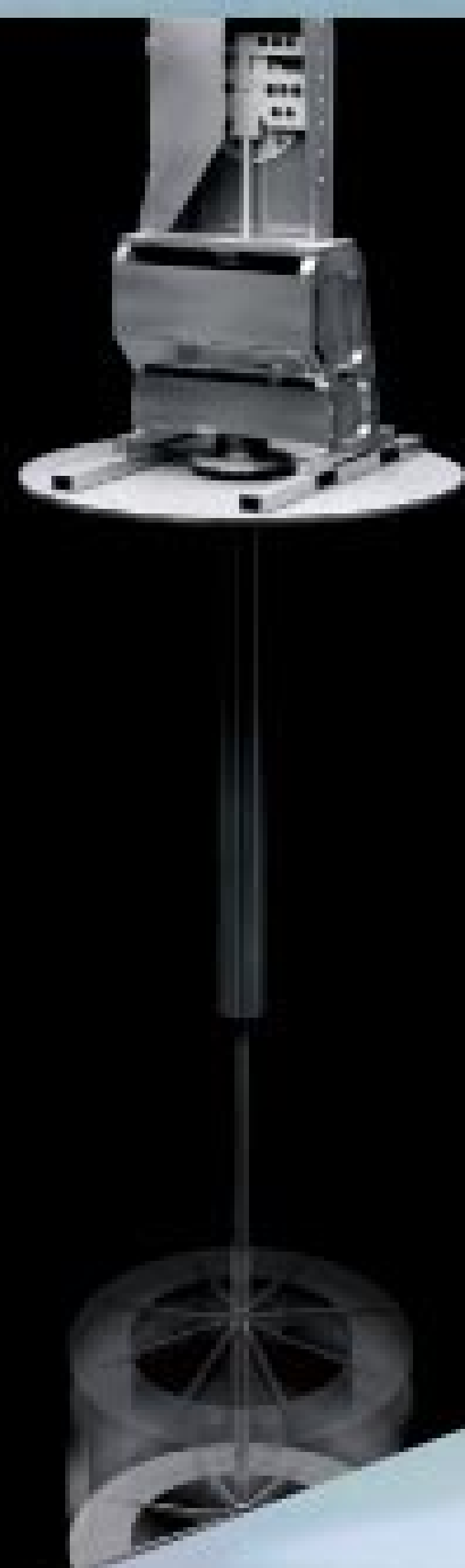
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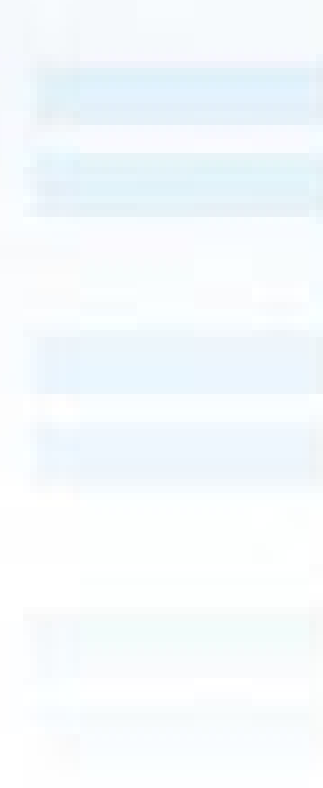
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More on Cavitation

To the editor:

I did a big double-take when I saw the large-type excerpt in the pump cavitation article in the January issue of *TPO* ("A Remedy for Pump Cavitation") stating that, "A solution to eradicate pump impeller cavitation has not been discovered," and in smaller print elsewhere that "The solution to pump impeller cavitation lies in finding a material that can (stand up to cavitation)."

This is like saying that the best way to deal with toxic influent that is killing the bugs in your plant is to develop a super-strain of microbes that eats those toxics for lunch. Cavitation is a symptom of problems with your system or pump, not the problem itself.

And in the same way that you would look for and eliminate a toxic illegal discharge to your plant if your

bugs started dying, the first step in dealing with cavitation is to find the cause and eliminate it.

No pump is designed or intended to run under cavitating conditions. Usually, the cause of cavitation can be determined and remedied, frequently at a low cost. I have no doubt that the material referred to in the article is excellent and does what is advertised, but this type of solution should be the absolute last resort, when the true cause of the cavitation has been determined and all other options are exhausted.

Sincerely,

Lee R. Harrison, P.E.
Ruxville Engineering, P.C.
Moseley, Va.



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By Diane Gow McDilda

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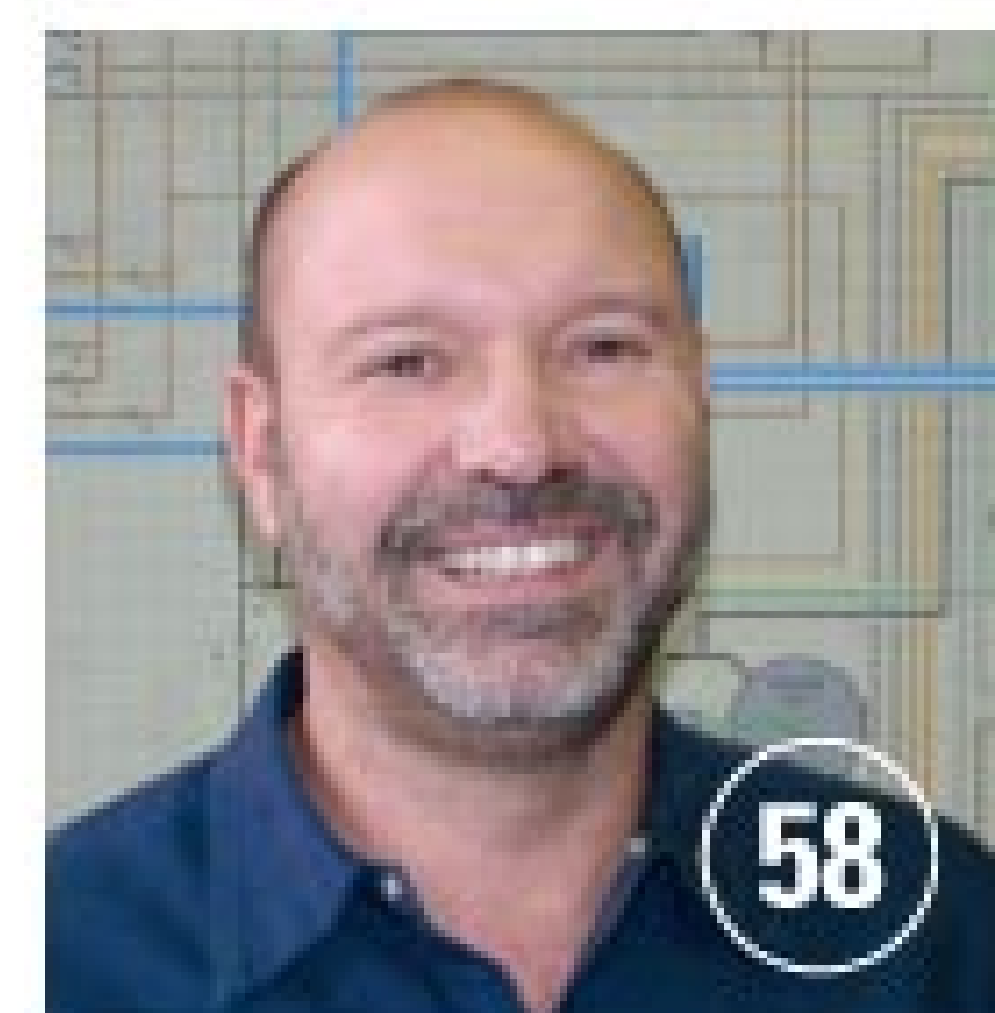
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- How We Do It: Process improvements in Charlton, Mass.
- PlantScapes: Marine park in Vancouver, Wash.
- Greening the Plant: LEED-certified lift station in Hillsboro, Ore.
- In My Words: A young operator's perspective on the profession
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on the cover

Tim Woodward, superintendent of the award-winning Turkey Creek (Ind.) Regional Sewer District Wastewater Treatment Plant, had to give up a baseball career because of an injury. He turned his passion to protecting water resources, notably Lake Wawasee, a popular vacation spot. (Photography by Joe Kois)

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let's be clear

What Exactly Do You Do?

THERE'S A SIMPLE, HONEST, EFFECTIVE ANSWER TO THIS QUESTION THAT MORE OPERATORS AND OTHERS IN THE INDUSTRY SHOULD CONSIDER GIVING OFTEN

By Ted J. Rulseh, Editor

During a past life in advertising, I represented a company that made a safety device for loading docks — in essence a hook that held a semi-truck in place at the dock, so the driver could not pull away while a forklift was depositing a pallet load inside.



They called the device the Dok-Lok vehicle restraint (in fact, they still do, and it's hugely successful). The accidents this product prevents are truly catastrophic. Picture a 5-ton forklift and load tumbling out the back end of a truck, the operator falling off onto the driveway below, and ...

It's not a pretty picture. One of this company's salespeople had an interesting way of telling what he did for a living. When asked, he'd say, "I save lives." And it had the advantage of being true.

Notice he didn't say anything about loading docks, or trucks, or forklifts, or factories, or warehouses.

He stripped it right down to the essentials. It made people take notice, and once they did, he could tell them more.

So, as a wastewater treatment operator, what do you do for a living? You already know the answer: You make clean water. Now, how often do you say that when someone asks about your profession?

NOT SO DELICATE

A while back in one of these columns, I asked readers how they answered when people said, "What do you do?" I called it a "delicate subject" — because if you used words like *wastewater* and *sewage*, you might trigger the "yuck reflex." But now I wonder: Is the subject really delicate? It isn't if you give a simple, honest, effective answer. Yet among the readers who responded to that column, not a single one reported answering, "I make clean water."

I suppose that's because, like anyone else, treatment operators get too close to what they do. You spend the days

dealing with headworks, aeration basins, lab tests, microorganisms, RAS, WAS, BOD, NPDES. Pretty soon the idea of what it's all for recedes in consciousness.

Or maybe operators see a comment like "I make clean water" as an oversimplification.

As corny. As a euphemism.

As something that trivializes what is after all a profession that takes education, training, and practice.

But perhaps it's time to leave all that aside and bring that idea — "I make clean water" — back to top of mind, and keep it there. And say it often enough that people remember it.



SAY IT EVERYWHERE

Because you know what actually happens (with most people anyway) when you say you run the wastewater treatment plant. Why do we suppose what we once knew as AMSA (Association of Metropolitan Sewerage Agencies) is now NACWA (National Association of Clean Water Agencies)? Surely not because the word *sewerage* evokes pleasant images.

The industry is about clean water. It always has been. It grew up, after all, under something called the Clean Water Act.

As a wastewater treatment operator, what do you do for a living? You already know the answer: You make clean water. Now, how often do you say that when someone asks about your profession?

Those two words, "clean water," are the best friends people in the business have.

If I ran a treatment plant (or should I say "clean water plant"?), I'd encourage the people on my team to tell the public, "I make clean water." I'd have those words on T-shirts, caps, coffee mugs, pickup trucks, business cards, notepads, pencils. And I'd have a sharp little graphic to go along: water droplet, fish, rainbow, river.

Of course, I don't run a plant, but I do write each month for tens of thousands of people who do, and once in a while, some take notice. So, what about this idea? Any takers out there? **tpo**

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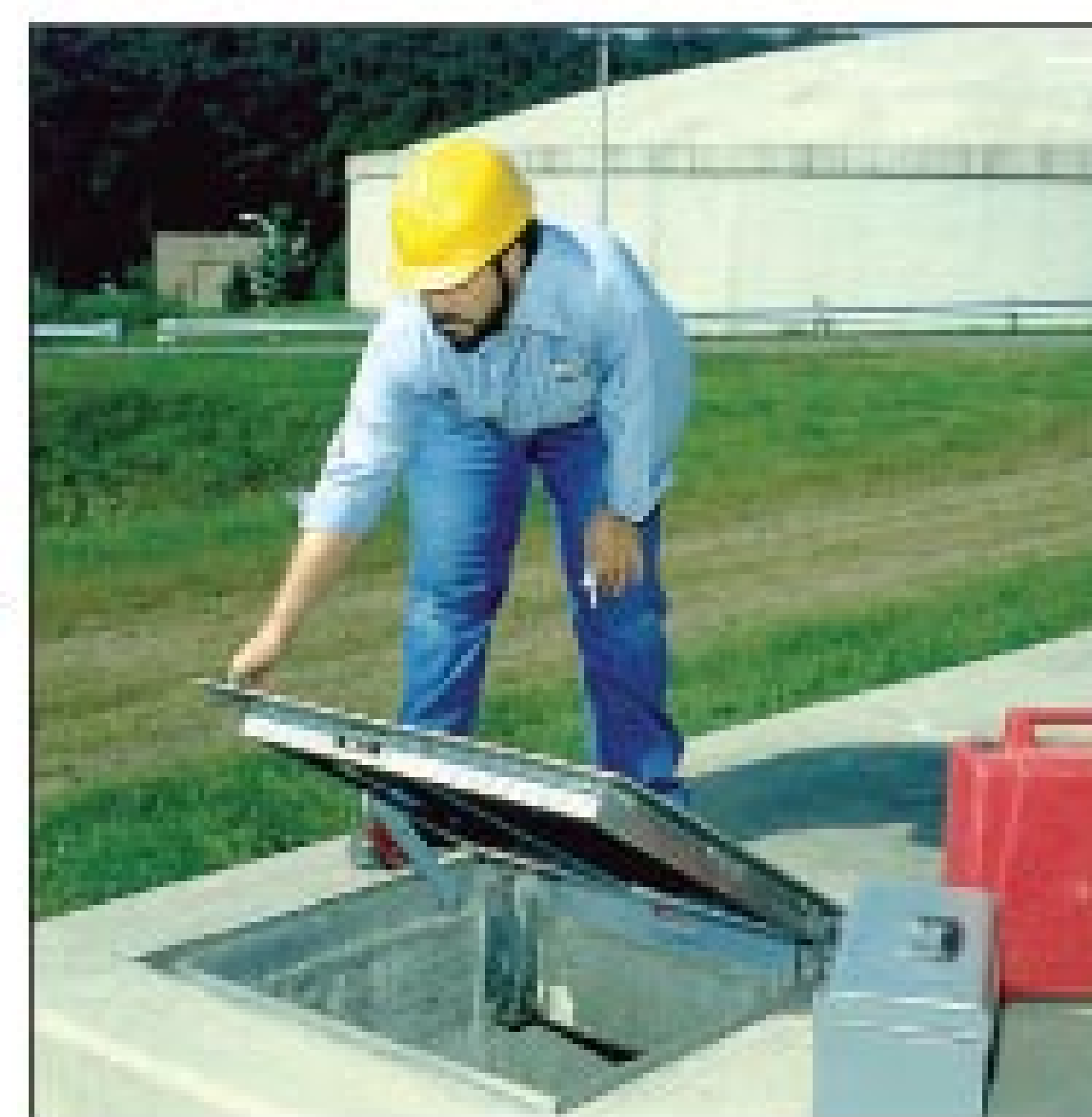
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Getting the Scoop

WITH A ROLL OF THE DICE, STUDENTS IN TACOMA TRAVEL THROUGH A SEWER, THEN A WASTEWATER TREATMENT PLANT, NEGOTIATING HAZARDS ALONG THE WAY

By Diane Gow McDilda

Milton Bradley has nothing on the City of Tacoma, Wash., and its EnviroChallenger educators. With their custom-made Toxic Toilet board game, educators Jacqueline Fuller and John Inch coach elementary school students to roll the dice and move block by block through the sewer system. Across the board, players contend with common threats to the system, such as grease, hair, cleaners, and medications.

"The kids repeat the problem and come up with a solution," says Fuller. "Afterwards, we come together and talk about each one." Students often offer ingenious solutions like using a coat hanger to dislodge a clog rather than a chemical clog remover. The game continues as players navigate the sewer and pass through the treatment plant. The first one to the river wins.

In Tacoma, the river at the game's endpoint is a waterway that flows into Commencement Bay and then on to Puget Sound. By bringing Toxic Toilet and other activities into the classroom, city representatives teach students what it takes to treat wastewater and why treatment is so important.

COMPLETE PROGRAM

Usually paired with Toxic Toilets is After the Flush: The Scoop on Poop. Once the topic is introduced and the giggling mellows, students are transformed into wastewater engineers.

"I try to add a little sparkle," Fuller says. She personalizes the presentation with stories about her brother and two cousins who work as wastewater treatment plant operators.

As part of The Scoop on Poop, students first dirty up their water-filled beakers by adding coffee grounds. Then Fuller walks them through the cleanup

process. The kids pour the contents of the beakers through a screen, removing most of the coffee. Then they wait as smaller particles settle out of the filtrate. In the meantime, Fuller explains the mecha-



City of Tacoma educators use a Toxic Toilet board game to teach kids about wastewater treatment. It leads players through the sewers and the treatment plant — first one to the river wins!

nisms involved in straining and settling wastewater at the treatment plant and tells the kids to be careful about what they put into a toilet or sink drain.

To make the most of the classroom activities, the EnviroChallenger educators also use their Web site. All programs they offer are summarized online, along with pre-visit activities and teacher tips that help get the kids up to speed and make the most of the classroom visit.

GETTING AROUND

For Fuller, a former teacher, it was important for the EnviroChallenger lessons and activities to meet state standards and criteria. For municipalities preparing their own educational programs, she suggests involving a teacher, or at least having an educator review the material.

Fuller also knows the local school district's science curriculum well enough so that she can tell teachers how and where EnviroChallenger fits in. "I can say, 'We have a water cycle lesson, and it fits with what you're teaching at this time,'" she says.

The EnviroChallenger team visits public and private schools, as well as after-school programs, homeschoolers, scouts, and other groups. "Because we're paid by the ratepayers, we have to stay within the Tacoma city limits, and at least 50 percent of the participants have to be city residents," Fuller says.



In an exercise called After the Flush: The Scoop on Poop, students use coffee grounds to create "wastewater" and then go through various steps to "treat" it.

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@tpo-mag.com or call 877/953-3301.



The Toxic Toilet game engages kids in Tacoma's EnviroChallenger education program.

"Education is critical to preserving, enhancing and saving the environment. It's especially critical in wastewater treatment, because our service is largely invisible. Our collection system is underground. Our treatment plants are hidden in industrial districts or camouflaged and fitted with odor-control and noise-reduction technology."

DAN THOMPSON

The YMCA is a prime spot for making contact with homeschoolers, many of whom hold physical education classes there. She also visits community events, handing out business cards and explaining the program.

No matter the audience, one thing doesn't change: the potty humor. When she tells how her cousin found a diamond in the bar screen at the wastewater treatment plant in Malibu, kids hold their stomachs and moan and groan. "They act like they're queasy, but they're not," says Fuller. "That's just how kids are."

MAKING IT STICK

The activities have an impact beyond giving students a break from their routine. "We believe that teaching kids stewardship is fundamental to fostering an environmental culture that recognizes the importance of water quality and places a value on maintaining a

healthy environment," says Dan Thompson, Ph.D., acting assistant public works director and manager of the environmental services department.

He believes the connection between wastewater and the environment isn't always straightforward for the general public, and that given a history of industrial impact, the bays in Tacoma are vulnerable.

"Education is critical to preserving, enhancing and saving the environment," Thompson says. "It's especially critical in wastewater treatment, because our service is largely invisible. Our collection system is underground. Our treatment plants are hidden in industrial districts or camouflaged and fitted with odor-control and noise-reduction technology."

Since EnviroChallenger began in 2000, more than 130,000 students have taken part, not counting events outside of the classroom. So while the mechanics of treatment may be hidden, folks like Fuller, Inch, and Thompson are shedding some light, along with some laughter. **tpo**



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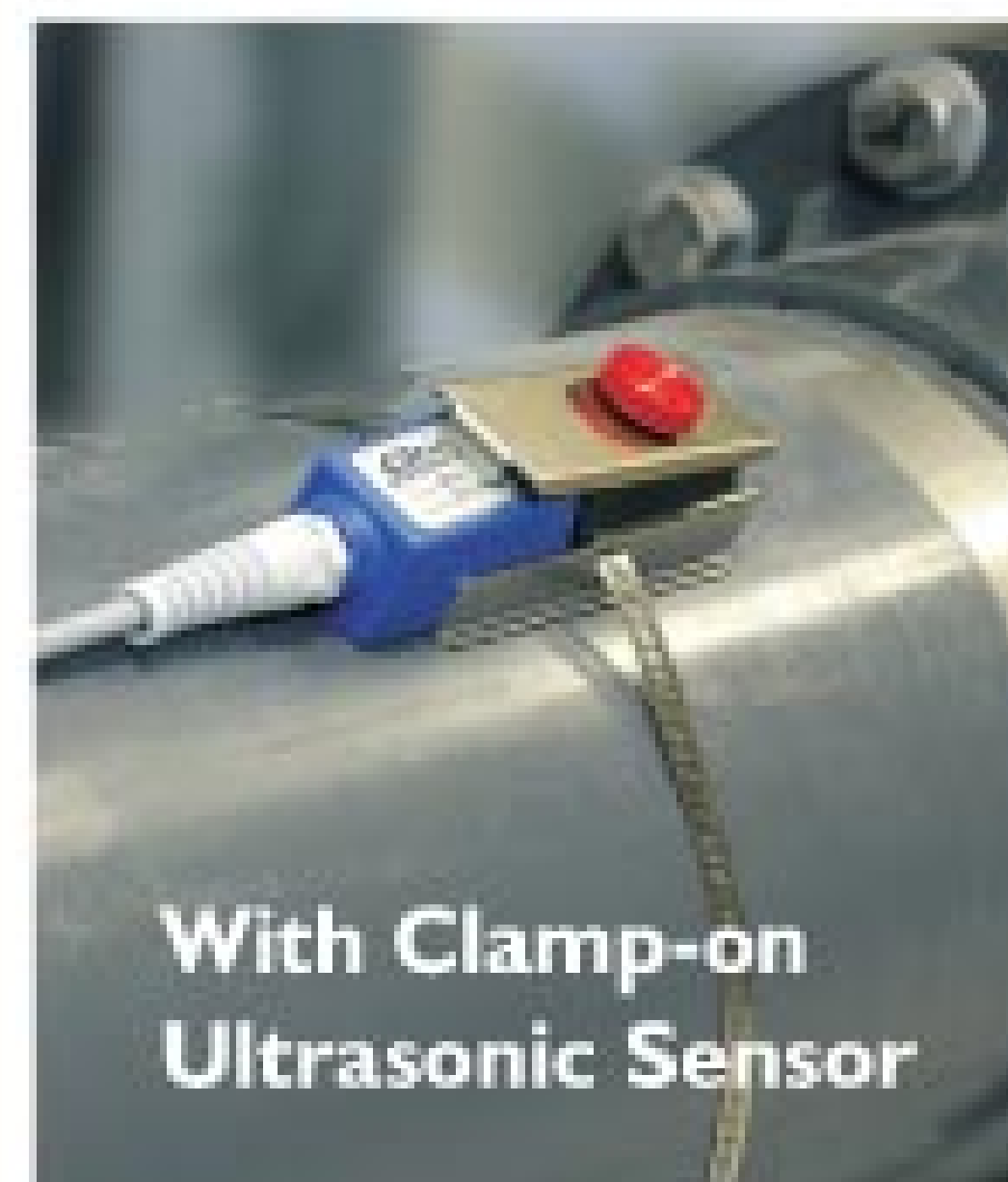
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Ebensburg Wastewater Treatment Plant manager Bernie Kozlovac inspects outfall. The effluent is so clean that kids swim in the water about a mile downstream. (Photography by Gary M. Baranec)

No Corners Cut

SAFETY IS PRIORITY ONE AT THE EBENSBURG WASTEWATER TREATMENT PLANT, AN AWARD-WINNING FACILITY THAT DISCHARGES HIGH-QUALITY EFFLUENT TO A TROUT STREAM

By Jim Force

WHAT DO COAL MINING AND WASTEWATER TREATMENT have in common? Plenty, says Bernie Kozlovac, manager of the Ebensburg (Pa.) Wastewater Treatment Plant.

Safety was imperative when he worked in the mines at the start of his career, and later as he operated acid mine drainage treatment plants for Bethlehem Coal and industrial wastewater treatment facilities for Sony. And now he stresses safety above all else as he supervises the 2.0-mgd sequencing batch reactor plant that serves the 2,100 residents of Ebensburg, between Pittsburgh and Altoona.

It's paying off. The Central Pennsylvania Water Quality Association gave Ebensburg its 2008 Class 1 Facility Safety Award. The plant received the highest score among all facilities in the 30-county central Pennsylvania region.

"No one is ever left alone during those first days. We have standard operating procedures clearly spelled out for all tasks and operational functions, and a new hire must become completely familiar with those SOPs before he or she even picks up a wrench."

BERNIE KOZLOVAC

"Safety is always at the forefront of our operation," says Kozlovac. "We follow stringent policies and procedures to ensure safety guidelines are met daily. We indoctrinate new hires in safety. We want you to be aware of what you're getting into."

Severn Trent Services operates and maintains the Ebensburg plant under a public-private partnership that began in 2004 and has been renewed for five more years. Two recent projects have modernized treatment.



Tony Baran (left) and Mark Wirfel, who work in maintenance at the Ebensburg plant, try out a decanter cleaning wand they had just fabricated.

profile



Ebensburg (Pa.) Wastewater Treatment Plant

BUILT:	1959 (last upgraded 2007 and 2008)
POPULATION SERVED:	2,100
STAFF:	6
FLOWS:	2.0-mgd design, 1.2-mgd average
TREATMENT LEVEL:	Secondary
TREATMENT PROCESS:	Sequencing batch reactor
BIOSOLIDS:	Aerobic digestion, centrifuge dewatering, cake to landfill
WEB SITE:	www.ebensburgpa.com



SAFE FOR TROUT

The Ebensburg area prides itself on good fishing waters, including a number of stocked trout streams nearby. One of these is the receiving stream for the Ebensburg Wastewater Treatment Plant.

Plant manager Bernie Kozlovac and his crew turn out a high-quality effluent with minimal BOD, suspended solids, nutrients, and fecal coliform units. Kozlovac credits sound plant design and a new UV disinfection system for the sparkling performance. “The four-basin design (L. Robert Kimball & Associates) gives us excellent flexibility and has really helped us deal with varying flows and waste strength,” he says.

The UV system contains a pair of 12-lamp banks and a variable lamp output feature that automatically matches the UV dose to effluent flow. “If our flow is only 50 percent of capacity, then our lamps operate at 50 percent of their maximum intensity,” Kozlovac says. “If the flow is higher, then the intensity goes up accordingly.”

The intensity will go to the maximum level in emergency conditions, such as a power outage when the backup generator kicks in. “We err on the conservative side,” he says. The variable-intensity feature, plus high-intensity lamps that reduce the number of required lamps, saves operating cost while assuring effective disinfection. “We get a very good kill rate,” Kozlovac says.

EBENSBURG WASTEWATER TREATMENT PLANT PERMIT AND PERFORMANCE (YEARLY AVERAGES)

	INFLUENT	EFFLUENT	PERMIT
BOD	159 mg/l	2.1 mg/l	25 mg/l monthly 38 mg/l weekly
TSS	205 mg/l	1.4 mg/l	30 mg/l monthly 45 mg/l weekly
Phosphorus			1.5 mg/l monthly 2.3 mg/l weekly
Ammonia nitrogen	20 mg/l	0.06 mg/l	2.0 mg/l monthly 3.0 mg/l weekly

Bernie Kozlovac with one of the recent upgrades to the facility: a Trojan 4000 UV disinfection unit.

In 2007, a Centrisys 21-inch centrifuge replaced an old belt filter press in the dewatering section, increasing cake solids from 12 or 13

percent to better than 20 percent. And in 2008, the plant underwent a complete hydraulic upgrade, designed by L. Robert Kimball & Associates Engineers. Design flow increased from 1.25 to 2.0 mgd, and hydraulic peak capacity went from 4.0 to 5.5 mgd.

FIRST THINGS FIRST

Today, average flow of about 1.2 mgd enters the plant through a headworks containing a grit classifier (Jim Myers & Sons Inc.) and a new Parkson automatic bar screen. “The screen has been in operation for about a year,” Kozlovac says. “Before, we had to manually clean and remove screenings with a muck rake. After hours, the screen would clog up, which wasn’t very efficient.”

Once grit and debris are out of the way, the wastewater moves on to the SBR, a four-basin design provided by ITT’s Austgen Biojet (Water & Wastewater - Sanitaire) that uses fine-bubble diffusers. “We essentially operate four mini treatment plants,” says Kozlovac. “Each one cycles through its own separate process of aerating, mixing, settling, and decanting. The four basins operate intermittently, controlled by a PLC that regulates the operation and monitors underflow and buildup of mixed liquor. This is a true batch process.”

Treated effluent passes to a Trojan 4000 UV disinfection unit, which replaced chlorination-dechlorination as another phase of the 2008 upgrade.

Plant effluent discharges into a trout stream that ultimately flows to Wilmore Dam. The sensitivity of the receiving stream requires a high degree of treatment. The summer fecal limit is 200 colonies per 100 ml, and average performance is about 25.

Waste activated sludge is pumped to aerobic digesters that occupy old clarifier tanks, where it is thickened before dewatering. The resulting cake is landfilled. Kozlovac and a staff of lead operator Mark Wirfel, maintenance specialist Tony Baran, and laboratory technician/operator Sharon Burkett run the plant eight hours a day.

On weekends, a part-time staff is on site for four hours each Saturday and Sunday. All vital plant functions are tied into the PLC system, and alarms trigger a RACO Chatterbox automatic call system, so that an operator can be on site within minutes.

A NEW LEAF

In the old days, the Ebensburg plant had seen a number of problems. Today, however, the operation is violation-free, and there were no lost time incidents during the last calendar year. “We follow all the standard safety procedures here,” says Kozlovac. “That includes complete safety instructions for all employees, the required inoculations, and CPR training for all staff.”

But Ebensburg goes way beyond these basics, using a mentoring program and monthly safety sessions to make sure everyone is fully aware of safe operating procedures for every task from one end of the plant to the other.



From left, Bernie Kozlovac, plant manager; Sharon Burkett, operator/lab technician; Mark Wirfel, maintenance/lead operator; and Tony Baran, maintenance specialist.



UPPER PHOTO: An Austgen Biojet device (ITT Water & Wastewater - Sanitaire) decants final effluent. LOWER PHOTO: The RACO Chatterbox automatic call system.

"We look for anything that needs to be corrected before an accident happens. And then we follow up closely to make sure the necessary actions have been taken. Our target is zero accidents, and our philosophy is that we simply can't accept them."

DAVE REGAN

In the mentoring system, experienced hands take each new hire under their wing and explain safe operation of all the plant processes and equipment. "During the first 30 days of employment, a new hire works directly with the main operator of the equipment the new employee will be working with," Kozlovac says.

"No one is ever left alone during those first days. We have standard operating procedures clearly spelled out for all tasks and operational functions, and a new hire must become completely familiar with those SOPs before he or she even picks up a wrench. If they have any questions or issues, we want to address them. We need to be sure all new employees are fully aware of all potential hazards before they start."

Kozlovac and his staff pay particular attention to the tasks he considers most prone to accidents at the plant. His top three:

- Changing out heavy waste activated sludge pumps where operators work close to basin edges and proper hoisting techniques must be followed.
- Cleaning basins properly so contact with wastewater is avoided.
- Parts replacement, like belt changes, on any piece of automatically operated machinery where lock-out/tag-out is a must.

TALKING IT OVER

The monthly safety meetings are organized around specific safety topics; they are planned in advance and involve hands-on training activities for all staff members.

"The Severn Trent Health, Safety and Environment Group creates presentations on certain safety topics that apply across the board, such as confined-space entry, slips and falls, fire protection, cutting and welding," Kozlovac says. "The materials are sent to me electronically in advance, and then I participate in a conference call with the company's safety group to discuss the materials and the best way to present them."

"Each month we meet with the staff and go over the materials, practicing the exercises and completing the quizzes. In addition to the general materials, we add specific information relating to potential safety issues at our plant. During these meetings, we can call our company safety manager if we have questions about the procedures."

Kozlovac usually serves pizza at the meetings. "We get a little more interaction that way," he says. Each employee gets credit for hours of safety training by attending the meetings. Participation is 100 percent.

"It's a very efficient process," Kozlovac says. "We get people into each sit-



Operators can control the entire plant from the HMI control touchscreen.

uation, and then it sinks in. We simply must be careful in everything we do and avoid accidents.”

In addition to the meetings, Severn Trent conducts safety inspections at all its contract-operated facilities at least once a month, and in some cases more often.

“We look for anything that needs to be corrected before an accident happens,” explains Severn Trent regional safety manager Dave Regan. “And then we follow up closely to make sure the necessary actions have been taken. We are proactive on safety. We don’t just wait for something to happen. Our target is zero accidents, and our philosophy is that we simply can’t accept them.”

“You’ve got to be safe. Everybody has to listen and pay attention. That’s the real reason for safe operation — your own protection. I learned early on that you want to get through life with all your fingers.”

BERNIE KOZLOVAC

The safety record at Ebensburg has been spotless, and that motivated staffer Burkett to apply for the Central Pennsylvania award. “She took the initiative and filled out the application,” says Kozlovac. “It was great to see that buy-in.”

WELCOME MAT

You expect a safe and well-performing plant when you drive into the Ebensburg facility. The buildings are maintained, the grounds are groomed, trees are trimmed, and grass is mowed. “We’re here eight hours a day, so it



Sharon Burkett, operator/lab technician, performs an ammonia nitrogen test on a sample.

just makes sense that we want to work in a nice place,” Kozlovac says. “We make the most of it.”

The staff even goes out of its way to make visitors feel welcome by voluntarily mowing the sides of the township roadway that leads into the plant. “We want it to be like a red carpet to our door,” says Kozlovac.

Still, safety is topic one. “You’ve got to be safe,” says Kozlovac. “Everybody has to listen and pay attention. That’s the real reason for safe operation — your own protection. I learned early on that you want to get through life with all your fingers.” **tpo**

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The exterior lighting fixtures at the Slinger Wastewater Treatment Plant have full cutoff optics that direct all light downward to prevent spill light (peripheral bleed) or uplight (skyward bleed). These features help reduce light pollution.

Slow in the Land of Speed

LANDSCAPING AT THE VILLAGE OF SLINGER (WIS.) WASTEWATER TREATMENT PLANT PROVIDES EYE APPEAL AND ADDS A LEVEL OF PROTECTION FOR SURROUNDING WETLANDS

PHOTOS COURTESY OF VILLAGE OF SLINGER

By Mary Shafer

In a town whose speedway has given birth to some of auto racing's rising stars for the past 60 years, you might not expect a treatment plant upgrade to aim to slow things down. But that's exactly what happened when the Village of Slinger, Wis., renovated its 26-year-old facility.

Buildings were retrofitted to slow their energy consumption. Natural plantings slow maintenance requirements. A vegetated berm and spillway slow surface runoff to nearby wetlands. Natural detention basins detain overflow and provide filtration. And modern lighting slows the deterioration of night sky views in the village's rural surroundings.

PROTECTING A LAKE

Situated on roughly 6 acres, the Slinger Wastewater Treatment Plant was the state's first orbal oxidation ditch system, designed by the Ruekert/Mielke engineering firm in 1980. When the plant reached functional capacity, the village embarked on a major upgrade with the same firm in July 2006.

The upgrade doubled capacity to 1.5 mgd. Heading the project were Greg Moser, superintendent of utilities, and James Haggerty, P.E., village engineer and director of public works. The \$7.9 million renovation was completed in January 2009.

The plant is surrounded by wetlands at the headwaters of the Rubicon River and discharges to a tributary. Permit parameters are strict because the plant also protects popular Pike Lake and Pike Lake State Park, a few miles downstream.

CAPTURING RUNOFF

At the facility entrance, two infiltration basins planted with a prairie

mix of natural grasses and wildflowers detain water up to 24 hours before it percolates into the ground. The system functions as a rain garden, handling roof flow from plant buildings and runoff from the parking lot and lawns.

If runoff exceeds the soil infiltration rate, it can spill over into the wetland, so a vegetated berm and spillway were designed to slow that flow. As the detention pond fills, overflow moves through a landscaped weir engineered into the berm. Once it passes through this square-shaped notch, it is filtered through a channel planted with turf lawn, which plant staff members mow regularly.

Another visible feature of the plant is a solar panel array mounted on the south-facing, asphalt-shingled roof of the new Return Activated Sludge building. In a triangular configuration 38 feet wide at the base, the 4.5-kW array stands 10 feet high. It produces 6,000 kWh.

The system serves as an educational tool as well as an energy saver. "We own our own municipal electric utility," Haggerty says. "We have a test project going with these solar panels to show school groups that we can produce our own energy, right here on site, and put it back into the grid."

This process is monitored via Web-based software called Solar Plant Vision (Fat Spaniel Technologies). Visitors can watch the read-out on Internet-connected computers. The software tracks the flow of electricity back into the utility system.

Share Your Ideas

TPO welcomes news about interesting features of your facility's grounds, signage or buildings for future articles in the PlantScapes column. Send your ideas to editor @tpomag.com or call 877/953-3301.

The plants in the infiltration basin can tolerate a range of moisture conditions, from periodic dry stretches to up to two days of inundation.

CONTROLLING LIGHT POLLUTION

Some of the electricity feeds new exterior light fixtures designed to minimize light pollution: Residents moving to rural areas value a dark night sky. The fixtures have directional hoods that focus light downward.

The public was invited to an Open House event in September 2009. About 50 residents attended, Haggerty recalls. "We gave tours and got very positive response. They appreciated our foresight in planning the highest quality into our renovation. They seemed satisfied that we're looking out for the best interests of the community." **tpo**



"We gave tours and got very positive response. They appreciated our foresight in planning the highest quality into our renovation. They seemed satisfied that we're looking out for the best interests of the community."

JIM HAGGERTY

The berm is seeded with a no-mow grass to cut down on maintenance.

more info:

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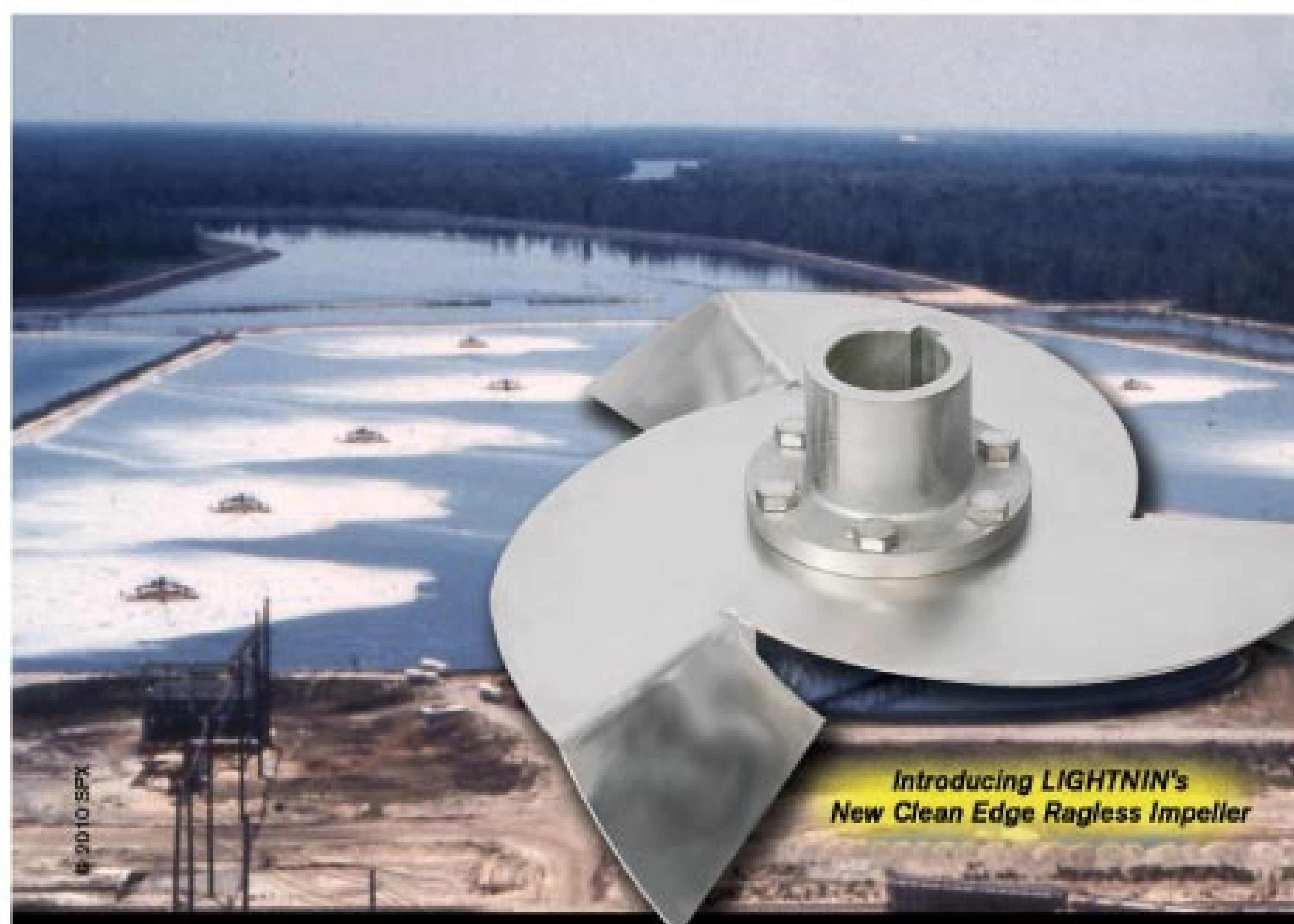
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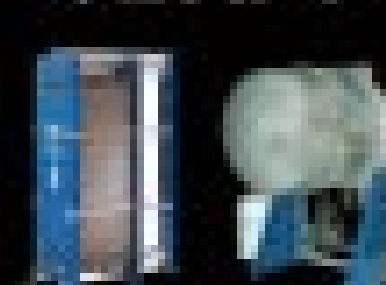
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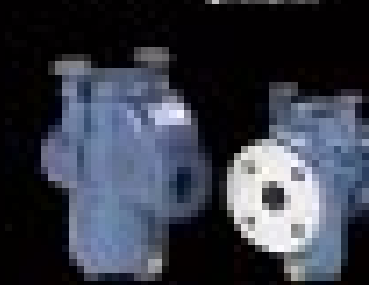
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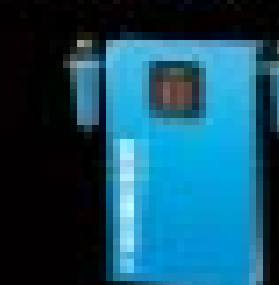
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Mix Mastery

AUTOMATIC SAMPLERS HELPED AN OHIO TREATMENT PLANT MEASURE PRIMARY SLUDGE AND WAS SOLIDS CONTENT AS PART OF AN EFFORT TO OPTIMIZE ANAEROBIC DIGESTION

By Bill Werra

In the early 1990s, the Jackson Pike Wastewater Treatment Plant in Columbus, Ohio, upgraded its single-stage anaerobic digestion system.

That change, aided by the industry's first large installation of multi-port sliding valve mixers, plus improved heating and continuous sludge feeding, would enable six digesters to do work that required 16 digesters under the earlier two-stage process.

But boosting the new system to peak efficiency depended on finding the right recipe to feed it. After six years of experimenting, with the help of automatic sampling, Jackson Pike found the key to fine-tuning its new system, and a new way to cut costs and nearly eliminate the plant's most time-consuming and least pleasant task: collecting sludge samples for analysis.

The automatic samplers gave the plant an accurate way to assess the solids content of primary and waste activated sludges fed to the digesters. That in turn helped the staff determine the optimum mix of sludges for efficient digestion.

FINDING THE BLEND

The Jackson Pike plant, built in 1937, has an average flow of 80 mgd. Sludges harvested from primary and secondary clarifiers are processed by anaerobic digestion. About 15 percent of the resulting digested biosolids is dewatered by centrifuges to 10 percent solids

and hauled away in tank trucks for land application. The remainder is centrifuged to 20 percent solids and incinerated, producing ash that can be recycled into various commercial uses, such as cover material.

Bringing the new digesters up to peak performance was complicated because primary and waste activated sludge (WAS) are digested together. "Having committed to single-stage digestion, our big challenge was to

maximize WAS digestion using the plant as-is, with no substantial equipment changes," says assistant plant manager Doug Wise.

Primary sludge and WAS initially were piped to a mixing vessel, and whatever blend occurred there was fed to the digesters. "Sometimes it worked well and sometimes it didn't," he says. "We

didn't know when it would or wouldn't, or why.

"We get highest efficiency when the solids ratios in both sludges are correctly balanced, so digestion of both components will be completed at the same time. If there's too much WAS, it gets only partially digested and foams up into the digester's fabric canopy. We refer to that as the digester getting sick.

"Our first step toward learning how this works was to re-route the two sludges into separate holding tanks so we could vary the mixture and study how different solids ratios affected digestion. Then we experimented with many different blends of WAS and primary sludge, also trying them on different types of anaerobic digestion to see what technology would work best with our plant equipment. For that, we needed to draw and test a lot of samples.

"The key to pushing the system to its limit without overloading it is knowing the solids ratios of both sludges going in, and controlling the solids ratio of the blend by varying the proportions of both sludges."

NUISANCE TASK

For the first few years, samples were gathered manually: Someone went out every two hours to turn a spigot, fill a cup and dump it into a jar to build up a 24-hour composite sample for analysis. "With about 28 sampling points in our sludge handling stream, this became the most time-consuming aspect of our work," he observes.

"It's also stinky and sloppy, because when you open a line under pressure, the sludge just shoots out, especially at spigots installed in pump volutes where the pressure is greatest," Wise notes. "You can't just crack the spigot open a little, or the sample just gets the thin liquid part; not a true representative grab of the solids. In other words, if you try to minimize the mess, you end up minimizing the integrity of the sample."

Making matters worse, each composite was the work of different people across three shifts, and each person sampled differently. "After several years of experiments based on manual sampling, we saw that reaching an accurate conclusion would require more lati-

PHOTOS COURTESY OF JACKSON PIKE WASTEWATER TREATMENT PLANT.



Vic Purcell, wastewater plant operator, changes sample bottles used in the Jackson Pike treatment plant's sludge sampling system.

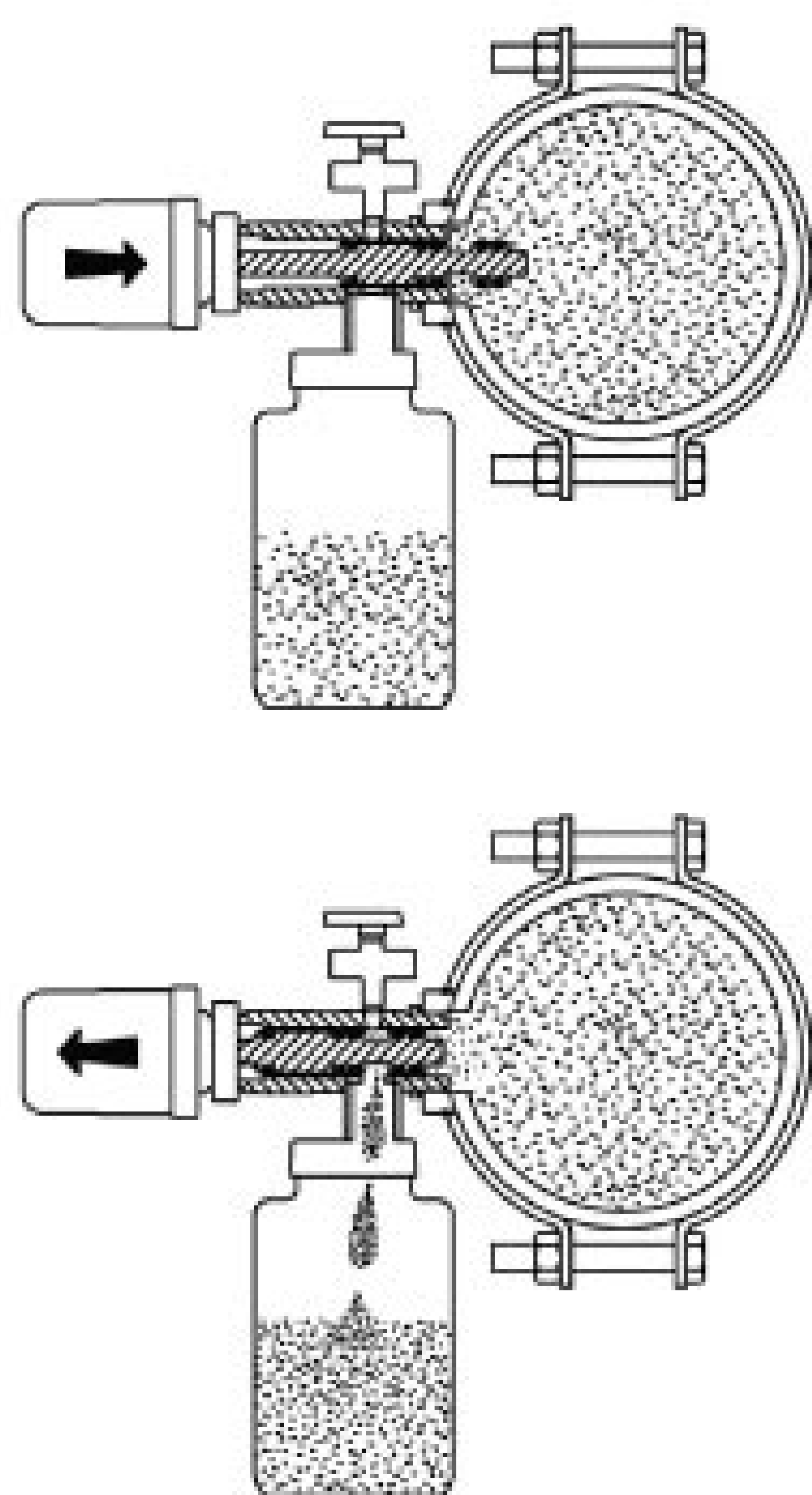
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The digesters at the Jackson Pike treatment plant.



The *ISOLOK* samplers have a positive-displacement design that draws measured samples while keeping the process pipeline closed to the atmosphere. **UPPER:** The cylindrical plunger extends the spool into the sludge line, pushing any earlier accumulation out of the port, while seals behind the spool keep the port closed. **LOWER:** When the plunger retracts, a measured amount of material is trapped in the spool between the seals and drops into a closed external container, while the seals in front of the spool maintain port closure. An air pulse directed downward from above the sample ejection port helps remove thicker, slower-flowing material.

sample remains contained within the sampler body until discharged.

The samplers are actuated pneumatically from a control panel. Cycle time, user-programmed within the panel, was set at six minutes to gather enough samples to nearly fill a 2-liter bottle within 24 hours. The panel also directs a pulse of compressed air through a port above each sampler's discharge opening to eject any sluggish material within the sample.

The eject air enters through a three-way valve that doubles as a flushing device. When the valve handle is turned 180 degrees, the air-line is blocked and water is allowed to wash through the sampler body to clean out any residual build-up inside.

"Automatic sampling done consistently every six minutes obviously produces a much more reliable composite than manual sampling done inconsistently every two hours," Wise says. "It also reduces labor costs considerably."

SUBSTANTIAL SAVINGS

A study conducted by a plant team credited the five automatic samplers in the blending/digesting system, plus two others monitoring the initial sludge outflow from the primary clarifiers, with savings of more than \$81,000 per year in labor. Each sampler requires an operator visit only once a day to harvest the composite sample. Lab testing primarily checks total solids and volatile solids.

"Automatic sampling done consistently every six minutes obviously produces a much more reliable composite than manual sampling done inconsistently every two hours. It also reduces labor costs considerably."

DOUG WISE

tude in blending the digester input, and more reliable sampling of the material going into and coming out of the digesters."

For that purpose, a blending manifold was built to allow three pumps on both the primary sludge and WAS lines to feed a pipeline to the digesters or a pipeline bypassing the digesters. Used simultaneously or in selective combinations, three pumps would allow fine control over the proportions of both sludges going into the blend.

The bypass is needed, Wise adds, because sometimes there is too much WAS for the amount of primary sludge available. The undigested leftover WAS then can go directly to incineration, but only if mixed with digested sludge in proportions small enough to prevent the blend's dewatered cake from being less than 20 percent solids.

AUTOMATIC SAMPLING

To assess the sludges accurately, the plant staff proposed using automatic *ISOLOK* samplers built by Sentry Equipment Corp in Oconomowoc, Wis. — two on the lines coming out of the primary sludge and WAS holding tanks leading to the manifold, two on the digester inlet feed and bypass lines leaving the manifold, and one on the line from the digesters to the centrifuges, downstream from where any bypass material would join the digester outflow.

"With that setup, no matter what mix we put together or where we send it, we can accurately monitor solids content," Wise says. The samplers mount onto an access port in the side of a pipeline, tank or pressure vessel. The sampler body encloses a plunger positioned to extend through the port and into the process stream when activated by a pneumatic cylinder (see diagram above).

Near the plunger's tip is an annular ring (the sample spool), sized to capture a measured volume of material by positive displacement — in this application 8 cc per cycle. When the spool darts into the product stream, then withdraws, it brings out a sample of process material and drops it into a closed container beneath the sampler body.

Heavy elastomer seals around the plunger at both ends of the spool keep the port closed regardless of plunger position, and the

With closely controlled variations made possible by the blending manifold and sampling system, the plant was able to explore alternative technologies of thermophilic digestion and acid fermentation while testing a wide range of blend ratios. In the end, they found that the standard mesophilic digestion used previously — and widely used throughout the industry — would work best with the digesters if controlled properly.

"For our system, we now know we must keep the sludge solids content balanced by weight at 30 percent WAS to 70 percent primary sludge," Wise says. "Any more than 30 percent WAS makes the digesters start to get sick. Any less WAS lets the system fall off peak efficiency. Continual sampling and testing gives us the tools to keep the system tightly controlled."

CONFIRMING LOADOUTS

Automatic sampling also gave the plant an easy way to verify the amount of digested sludge trucked out. "We not only give it away free, but pay to have it hauled," Wise explains. "Charges are based not on liquid volume but on the pounds of liquid hauled. The most economical concentration was a liquid with 10 percent solids, which is the target concentration used by the contractor for delivering the desired organic application rates.

"By installing an *ISOLOK* sampler on the loadout line, using a flow-proportional control to pull a sample from every 3,000 gallons pumped out, we generate our own solids weight data to compare with the samples received from the contractor." **tpo**

ABOUT THE AUTHOR

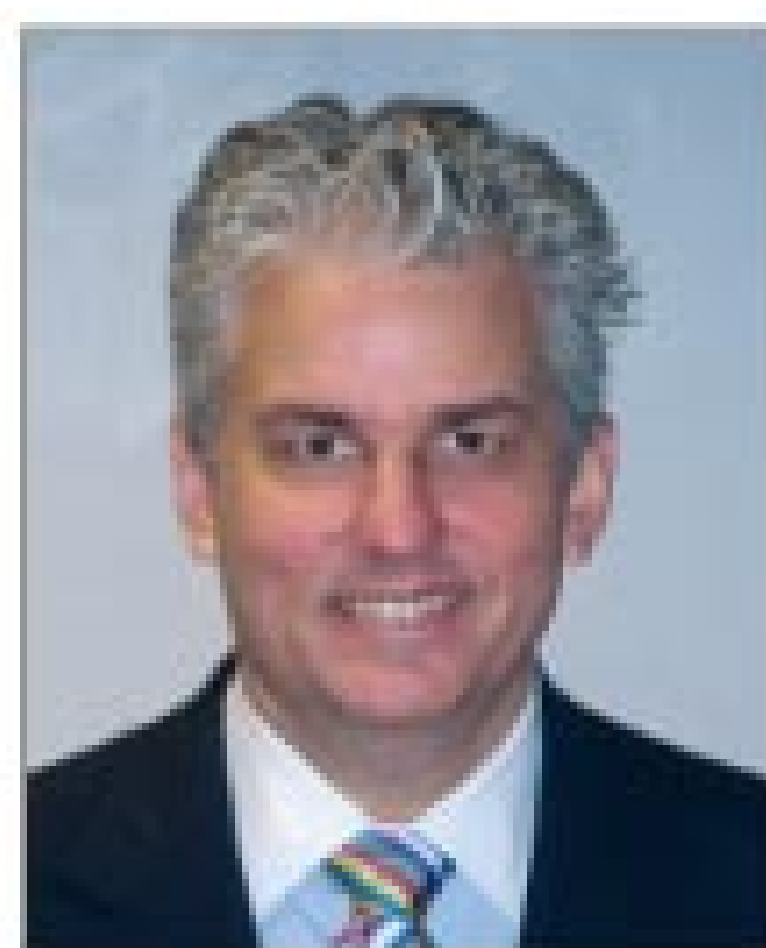
Bill Werra is a business unit manager with Sentry Equipment Corp, a manufacturer of sampling equipment based in Oconomowoc, Wis. This is edited from an article that previously appeared in Water & Wastewater Asia magazine.

more info:

Sentry Equipment Corp
262/567-7256
www.sentry-equip.com

Pump Solutions Names Douglas President

Dean E. Douglas has been named president of the Pump Solutions Group by Dover Fluid Management, a segment within Dover Corp. Douglas brings 20 years experience to his position. He has a Bachelor of Arts degree from Cal State University-Dominguez Hills and an MBA from Pepperdine University.



Dean E. Douglas

GLV Acquires Christ Water Technology

GLV has acquired Christ Water Technology AG, an Austrian-based municipal water treatment technology company.

AWWA Symposium Set for May 2-4

The American Water Works Association 2010 International Symposium on Waterborne Pathogens is scheduled for May 2-4 in Manhattan Beach, Calif. Topics include detection methods, emerging pathogens, risk assessment, treatment and disinfection, case studies and outbreaks and regulatory issues.

Industrial Scientific Names McElhattan President, CEO

Justin McElhattan, 37, has been elected president and chief executive officer by the Industrial Scientific Corp. Board of Directors. McElhattan has served as president and chief operating officer since February 2008 and has been a member of the board since 2006. He has a Bachelor of Science degree in environmental science from Penn State University and an MBA from Carnegie Mellon University's Tepper School of Business. McElhattan joined Industrial Scientific in 1998 as manager of commercial systems.

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Fluid Conservation Systems Launches Redesigned Web Site

Fluid Conservation Systems, a division of Halma Water Management, has redesigned its Web site, www.fluidconservation.com. Features include detailed product information, downloadable software updates and distributor contact information.



Dickson Publishes Print and Video Support Guides

Online support guides from Dickson are downloadable in PDF formats (www.dicksondata.com/product/model_VFC325.php) as well as videos on YouTube. The guides cover product applications and useful features, product specifications, software specifications, accessories, calibrations, troubleshooting, warranties and service.

Highland Tank Releases Latest Catalog

The latest engineering catalog from Highland Tank is available for download at www.highlandtank.com and features information on chemical storage tanks, wastewater treatment systems, ASME pressure vessels and grease removal systems.

MWH President Awarded Fellow Designation

Dr. Paul F. Boulos, president and chief operating officer for MWH Soft, has been made a Fellow of the American Society of Civil Engineers. Dr. Boulos received his doctorate, Master of Science and Bachelor of Science degrees in civil engineering from the University of Kentucky.

Pulsafeeder Appoints Regional Sales Managers

Pulsafeeder Inc. has named Travis Lee regional sales manager for the Western Region of the United States and Alex Gordon regional sales manager for the Midwest-Southwest Region. Lee has a degree in chemical engineering from the University of Wyoming and an MBA from the Kelly School of Business. Gordon holds a Bachelor of Science degree in biological sciences and a Master of Science degree in civil engineering from the University of Pittsburgh. **tpo**



Travis Lee



Alex Gordon

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THE CITY OF PORTLAND BIOSOLIDS MANAGEMENT PROGRAM COMBINES BENEFICIAL USE WITH SEQUESTRATION OF OLDER, CONTAMINATED MATERIAL

By Diane Gow McDilda

OVER HALF A CENTURY OLD, IT'S NO WONDER THAT THE COLUMBIA BOULEVARD WASTEWATER Treatment Plant in Portland, Ore., has been upgraded, expanded and modified. Even so, there are legacies and leftovers the operators must account for.

The prime legacy operation is Triangle Lake Lagoon, a 37-acre storage area that holds older biosolids and also serves in today's treatment train. The lagoon stores three types of biosolids: older material too contaminated to land-apply (generally the oldest of the lagoon solids); older material

suitable for land application; and new solids pumped from the plant.

"Some of the older solids in the lagoon have been around for decades," says Greg Charr, who recently took over as biosolids and residuals manager when Mark Ronayne partially retired. "Pollutant levels tend to be lower in the new solids, but newer solids are less stabilized than older lagoon solids."

And what's to be done with 20,000 tons of the oldest solids deemed unsuitable for land application because of elevated levels of lead, cadmium, and PCBs? They'll be encapsulated in a monofill next to the lagoon.

An overview of the Columbia treatment plant, showing the aeration basins. (Photography by Pamela Royal)



profile

**Columbia Boulevard
Wastewater Treatment Plant,
Portland, Ore.**

BUILT:	1952 (upgrades 1969, 1974, 1982, 1994, 1996, 2000)
FLOWS:	120-mgd design, 100-mgd average, 450 mgd (short-interval wet weather)
TREATMENT LEVEL:	Secondary
TREATMENT PROCESS:	Activated sludge
RECEIVING WATER:	Columbia River
BIOSOLIDS PROCESS:	Anaerobic digestion, belt filter press dewatering
BIOSOLIDS VOLUME:	16,000 dry tons/year
BIOSOLIDS USE:	Land application of Class B cake (~20 percent solids)
WEB SITE:	www.portlandonline.com/bes

"To accomplish this, one half of the lagoon will be drained while the other half remains in operation," says Charr. "The solids in the drained portion will be allowed to air dry, to about 40 percent solids, before being placed in the monofill." The cost of managing the material on site is half of what it would be to transport it to a landfill. And when the project is complete and the solids safely entombed, the monofill will be closed.

Other solids are treated using anaerobic digestion (newer solids) or lagoon stabilization (older solids and a portion of the newer solids). The two streams are mixed together before being dewatered and trucked

off to a farm for land application to produce a variety of crops, including canola, whose seeds are processed into biodiesel fuel.

TWISTS AND TURNS

The solids treatment train at Columbia Boulevard takes many twists and turns. It includes eight digesters (some not used exclusively for digestion), and processes that include thickening, dewatering, and blending.

Charr, with help from Ronayne, oversees the biosolids management team. Operations specialist Willy Park and five operators work with the

COLUMBIA BOULEVARD WASTEWATER TREATMENT PLANT PERMIT REQUIREMENTS

PARAMETER	PERMITTED AVG.
BOD ₅	45 mg/l weekly avg. 30 mg/l monthly avg.
TSS	45 mg/l weekly avg. 30 mg/l monthly avg.
Total residual chlorine	< 1 mg/l
<i>E. coli</i>	126/100 ml monthly log mean
pH	6.0 to 9.0



LEFT: Biosolids are dewatered on a belt press. ABOVE: A settling lagoon for biosolids.

“Some of the older solids in the lagoon have been around for decades.”

GREG CHARR

plant’s six mesophilic digesters and two solids blending tanks. Operations specialist Richard Brixey and six operators control solids thickening processes, which include gravity belt thickeners, belt filter presses, and lagoon dredging operations. Newer solids come from three sources:

- Primary sludge from the Columbia plant is processed through gravity thickeners (Eimco Water Technologies, 55305-1 and 55305-2).
- Waste activated sludge from Columbia is processed through a gravity belt thickener (Ashbrook Simon-Hartley Type 6093) to a solids content of 19.3 to 22.5 percent.
- Primary solids and thickened waste activated sludge from the city’s

Tyron Creek Wastewater Treatment Plant are trucked in 6,600-gallon tankers to the plant and pumped in just upstream of the anaerobic digesters.

As solids are brought into the system they are routed for treatment one of two ways: two-stage mesophilic digestion or lagoon stabilization. Primary sludge is never sent to the lagoon; it is treated solely in the three anaerobic digesters (concrete structures equipped with WEMCO Torque-Flow pumps from Weir Specialty Pumps).

Treatment takes place in the digesters and lagoon, and the material is ready to be combined in what the plant calls digester 3, which acts as a

SMOOTH TRANSITION

Mark Ronayne began working at the Columbia Boulevard Wastewater Treatment Plant in 1995. When he decided to retire in 2009, he didn’t have to look far for his replacement. Greg Charr, an operations specialist who has worked at the plant since 2002, was the logical choice.

Over the years, Ronayne and Charr worked together on several projects, traveled to meetings, and visited land application operations in Oregon and elsewhere. Charr has now stepped in as full-time biosolids and residuals manager. “I am enjoying the transition into retirement while taking pleasure in working with plant staff on a part-time basis,” says Ronayne.

To stay on top of operations, technology, and regulations, Ronayne, Charr, and plant staff exchange information with other professionals, including contacts with the Northwest Biosolids Management Association, the Oregon Association of Clean Water Agencies, and the Water Environment Federation. Some of these

activities are among those Ronayne will miss the most when he fully retires.

“I will miss working with an excellent crew of managers and operators at the treatment plants, with biosolids program managers from other regional agencies, with peers in associations, with land application and haul contractors, with soils and engineering consultants, and with state and federal regulators,” Ronayne says.

Because of his part-time status, no one really considers Ronayne retired just yet. The arrangement is a win-win: Ronayne gets time off, while the crew has access to his know-how. But there’s no saying how long the arrangement will last. “It’s an undefined schedule,” Ronayne says. “This opportunity might be here one or two months. It’s not cast in stone.”

Charr’s response? “We’d like to keep him here as long we as we can.”



Greg Charr, biosolids and residuals manager, oversees the biosolids management team and enjoys options presented by new technologies.

mixer. In addition to the blending lagoon and digested solids, polymer (ClariFloc WE-686 from SNF/Polydyne) is added in digester 3.

For every load of solids entering digester 3, about one-third is from the lagoon and the remaining two-thirds are from the mesophilic digesters. From digester 3, the mixture is sent to the belt filter press (Ashbrook Simon-Hartley Winklepress with a 4-foot extension).

WORKING THE LAGOON

Thickened waste activated sludge not treated in the digesters goes to the lagoon for stabilization. These solids are sometimes mixed with older solids, or given a place of their own.

"Most of the older solids in the lagoon are in the south cell," Charr says. "New solids can be pumped into either cell, but the majority of newer solids are pumped into the north cell. Dredge crews avoid the section of the lagoon with the heavily contaminated materials."

Dredging is a daily operation — two dredges work in the lagoon. The pumping of thickened waste activated sludge to the lagoon and removing more stabilized solids from the lagoon is



From left, Richard Reed, operator 2; Richard Brixey, operations specialist; Greg Charr, biosolids and residuals manager; and Fred Heiserman, operator 2, with the plant's Ashbrook Simon-Hartley gravity belt thickener.

"I like to interact with different people in different roles: the engineers, the public, private contractors. And the wastewater industry is so dynamic. I'm curious to see where biosolids goes from here. It's exciting that new technologies can present new biosolids management options."

GREG CHARR

an organized operation. Surveys over the years have mapped the location, quality, and quantity of solids in the lagoon. The information was last updated in fall 2009.

While it may be a relic in some respects, the lagoon still serves a function: solids from the lagoon are pumped back into the plant, to digester 3, and blended with solids from the second-stage anaerobic digesters to provide additional solids stabilization. "If not for the lagoon solids, our cake density would be in the 16 to 17 percent range, as opposed to the 21 percent we see now," Charr says.

The lagoon also serves an alternate purpose: filtrate disposal and weather-related emergency storage.

"Filtrate solids from our belt presses and gravity belts are periodically pumped out to the lagoon," says Charr. "Cleanings from any of our digesters can be pumped out to the lagoon as well. The lagoon also serves as emergency storage. When winter road conditions are too hazardous for trucks, all of our digested solids can be discharged to the lagoon."

A LONG HAUL

From the belt filter press, the mixture of stabilized lagoon and anaerobically digested biosolids are stored on site in two 100-wet-ton cylinder silos. Trucks pull in below the silos onto platform scales and are filled from above without assistance from plant staff. Gresham Transfer Inc., a private hauler,

"Filtrate solids from our belt presses and gravity belts are periodically pumped out to the lagoon. Cleanings from any of our digesters can be pumped out to the lagoon as well. The lagoon also serves as emergency storage. When winter road conditions are too hazardous for trucks, all of our digested solids can be discharged to the lagoon."

GREG CHARR

collects triplicate tickets with tare, gross, and net weights. The firm transports the solids 200 miles to Madison Farms, keeping a ticket for its own use and giving the others to personnel at the farm and to the city. Trucks make morning and evening trips to the farm six to seven times a day.

Each truck carries 35 wet tons of biosolids for application to perennial dryland pasture, canola, alfalfa, corn, snap peas, potatoes, rye grass, and wheat. It's typical for 20 to 30 acres to receive biosolids every day. At an application rate of 9.7 dry tons per hour, a week's worth of biosolids can be land-applied in about 26 hours, given level terrain.

Even with the long haul, 400 miles round trip, Madison Farms has a number of advantages as the city's land application site. One is the climate: It is in a semi-arid region that receives only 7 to 9 inches of rainfall a year, and the depth to groundwater is more than 300 feet. That means land application can take place year-round, helpful for a plant that generates 16,000 dry tons per year.

Another is that Madison Farms is designated as Exclusive Farm Use property, meaning it is dedicated farmland. The designation never expires, and it offers tax incentives to the owner as long as the land is farmed.

The benefits of land application are evident at Madison Farms. Since land application began, forage production per acre has increased, and so has the cattle-stocking rate (the number of cattle per acre). Along with that, cattle on the farm weigh more than they used to.

Madison Farms also grows crops that benefit from land application, specifically canola. The farm owns a biodiesel production facility that crushes the canola seeds. The final step in conversion to biodiesel can be completed at the farm or by an off-site processor. Either way, the city offsets carbon emissions by using the biodiesel-to-fuel fleet vehicles.

LOOKING AT OPTIONS

Charr cites a study performed by the University of Iowa in partnership with Madison Farms showing that even when accounting for the drive from the treatment plant to the farm and the fuel needed to spread the biosolids,



Terry O'Brien, wastewater operator II, in the polymer room.

"Land where biosolids are applied sequesters more than eight times the carbon dioxide released during solids transport and land application."

But no option goes without continued evaluation. Charr and his group review biosolids management alternatives. After a recent request for proposals the city shifted handle of 25,500 wet tons of biosolids per year — about one-third of what is taken to Madison Farms — to a contract with another hauler.

"We will partner with K&S Madison to land-apply biosolids to dryland small grains in the Sherman and Wasco county areas of Oregon," Charr says. "The truck haul is about half as far as Madison Farms. This will result in an annual savings of about \$280,000."

Charr enjoys almost everything involved in managing biosolids. "I like to interact with different people in different roles: the engineers, the public, private contractors," he says. "And the wastewater industry is so dynamic. I'm curious to see where biosolids goes from here. It's exciting that new technologies can present new biosolids management options."

The Clean Water Act requires the EPA to review biosolids regulations every two years. Charr believes that opens the door to changes, and will require identification and study of additional pollutants, including pharmaceuticals and endocrine disruptors. All this, he feels will lead to additional research to assess the safety of and possibly change current biosolids land application practices.

It's an ever-changing field, just the way Charr likes it. **tpo**

more info:

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www.as-h.com

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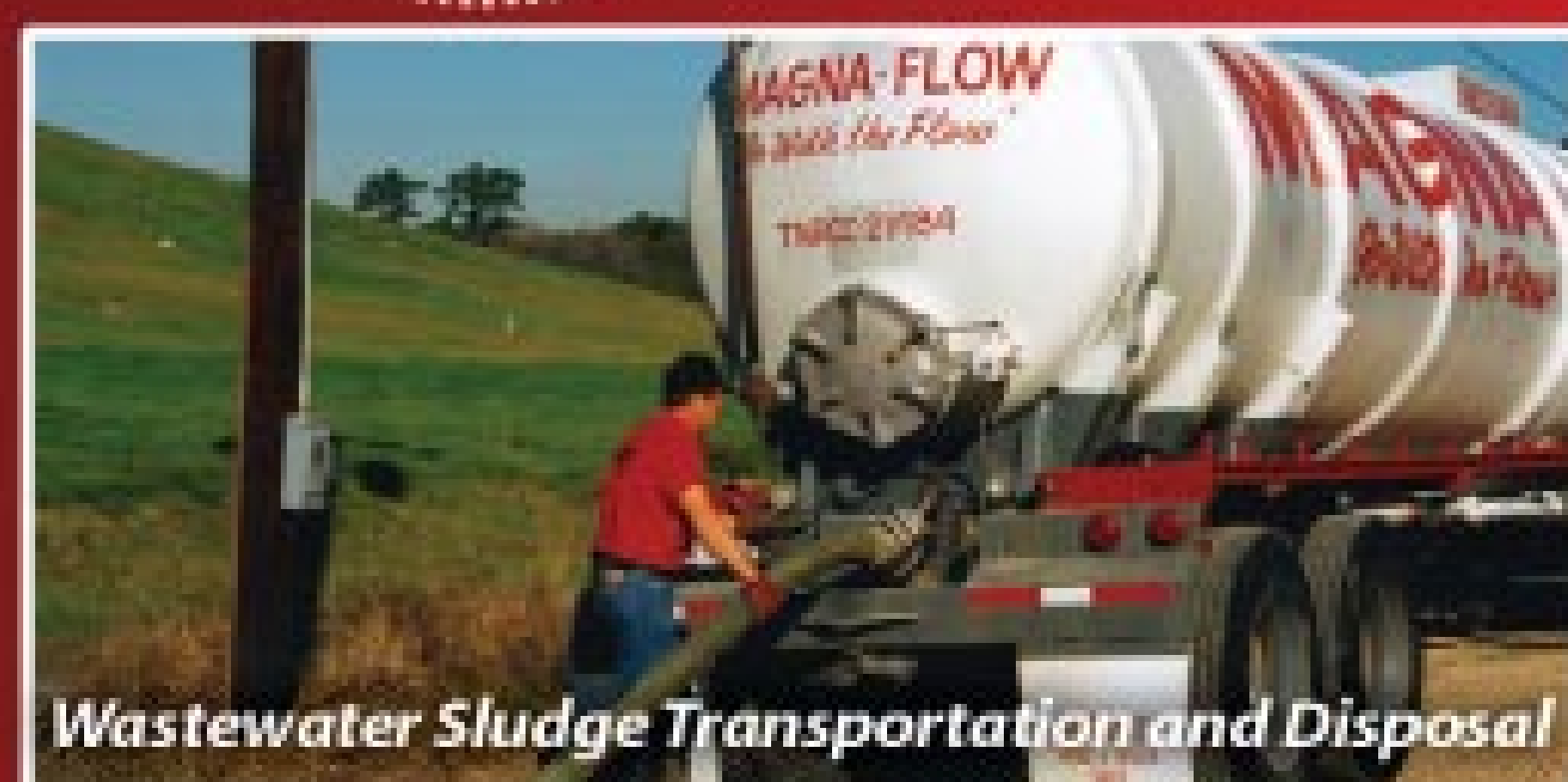
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LUDECA  See ad page 6										
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MILTON ROY 		YES			YES			YES		YES
 See ad page 64		YES								
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 See ad page 45		YES						YES		YES
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 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 68	YES	YES		YES	YES	YES	YES	YES		YES
 Vaughan Company, Inc. 364 Monte-Elma Road Montesano, WA 98563 888-249-2467 360-249-4042 Fax: 360-249-6155 info@chopperpumps.com www.chopperpumps.com See ad page 13	YES		YES			YES				
 Verder GPM 110 Gateway Drive Macon, GA 31210 877-783-7337 Fax: 478-476-9867 info@verder.com www.gpmpump.com									YES	
 Weir Specialty Pumps / WEMCO 440 West 800 South Salt Lake City, UT 84101 801-359-8731 Fax: 801-530-7828 info@weirsp.com www.weirsp.com	YES		YES	YES		YES		YES		
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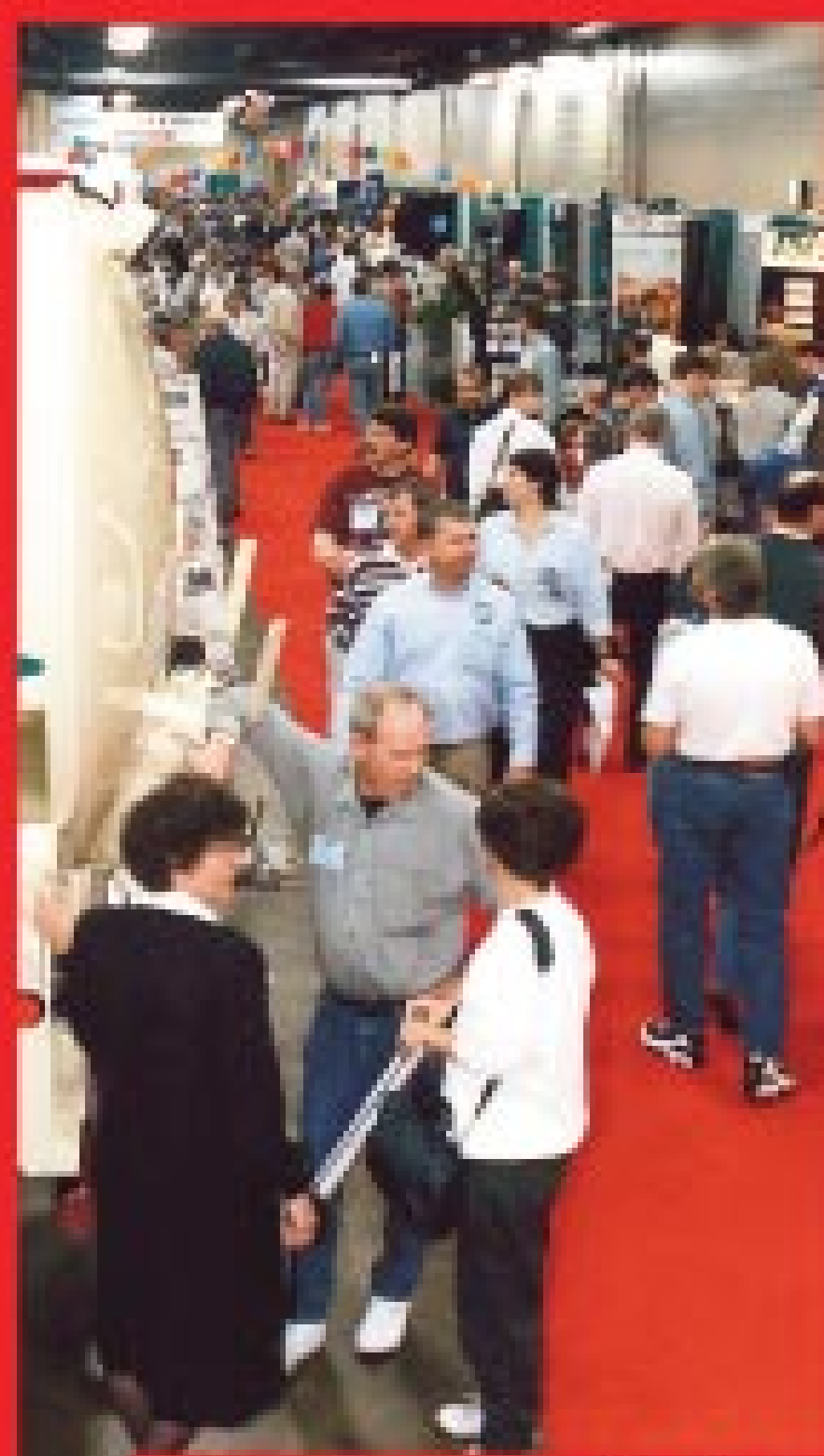
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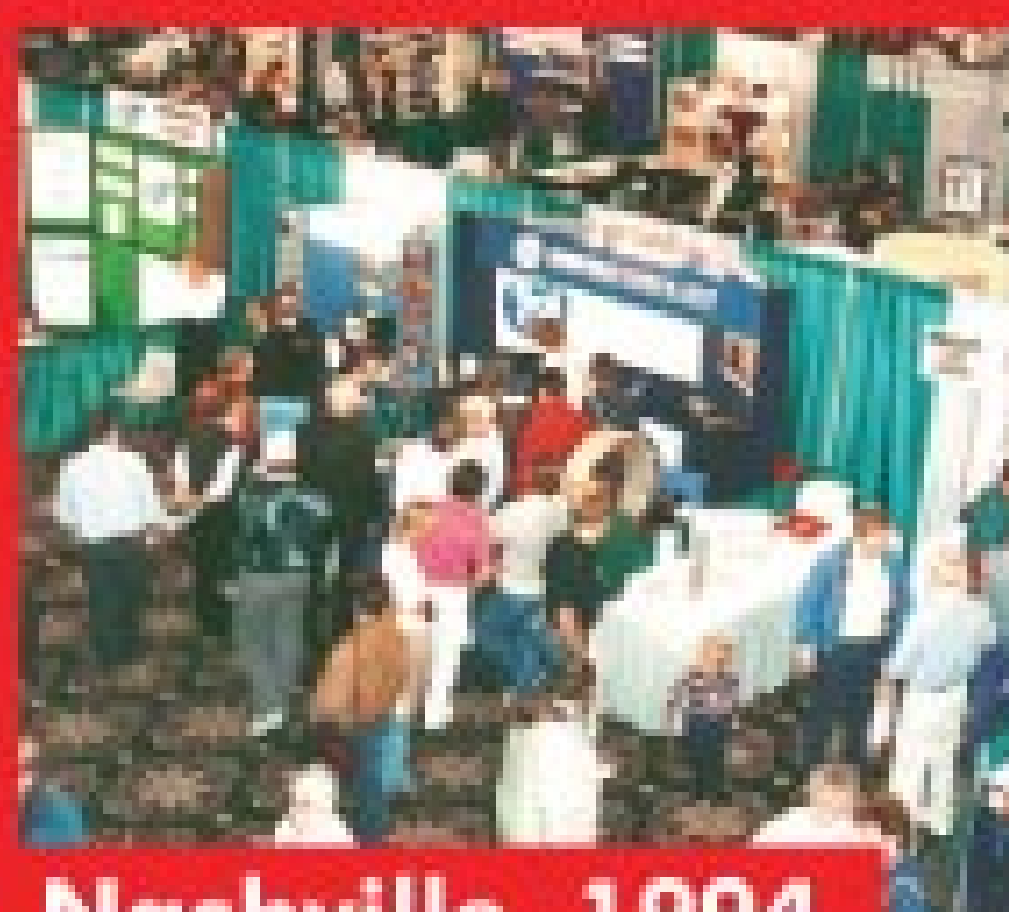
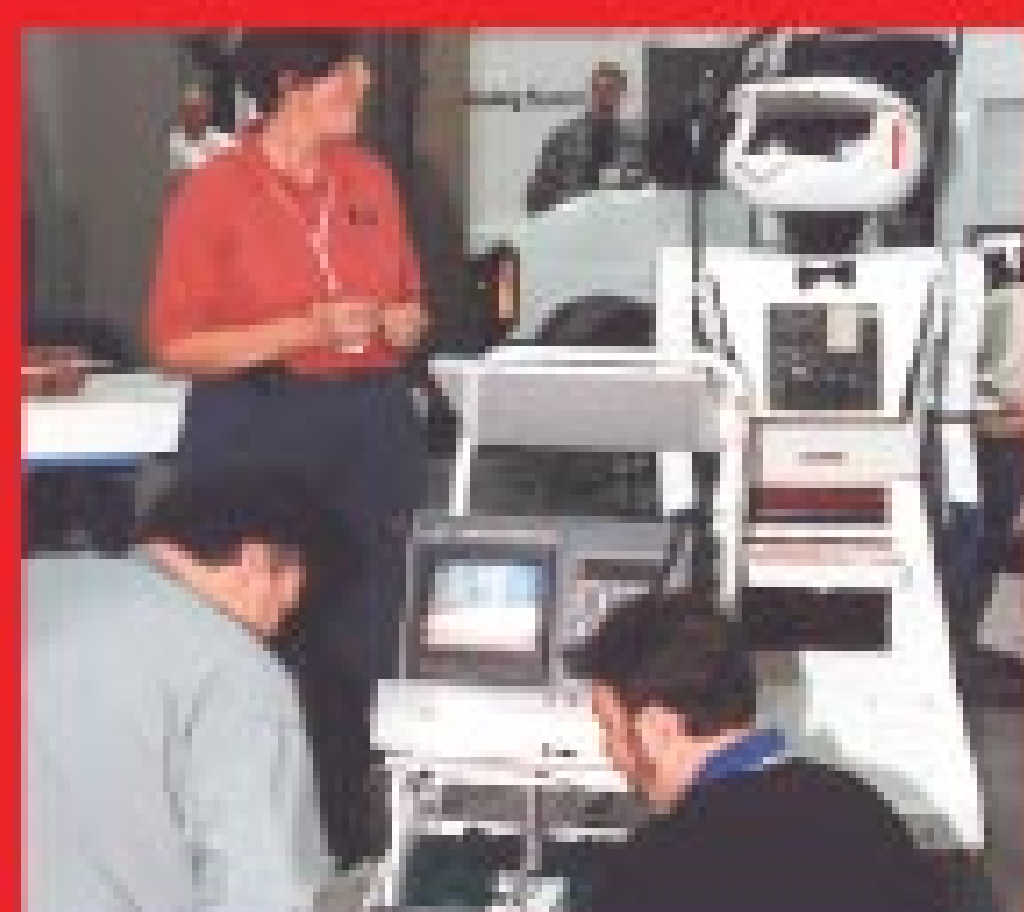


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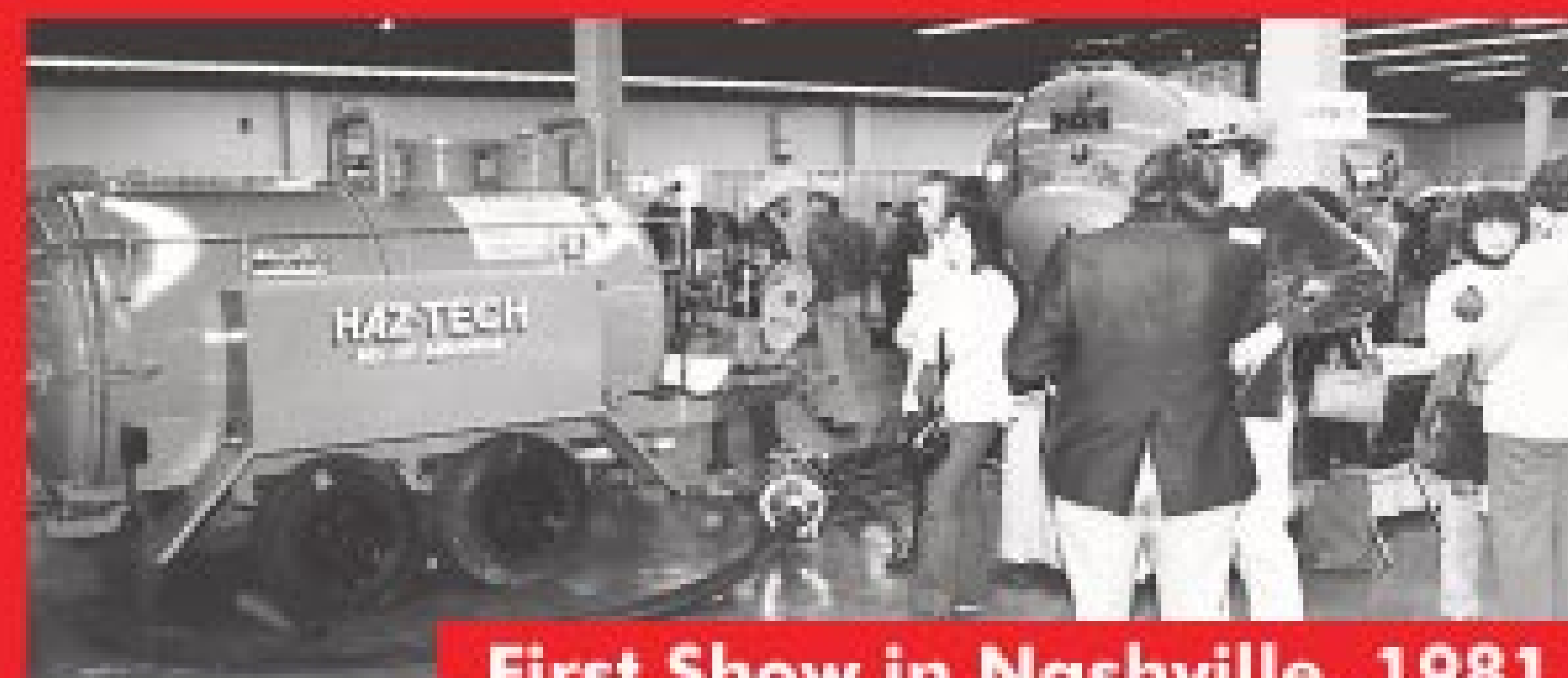
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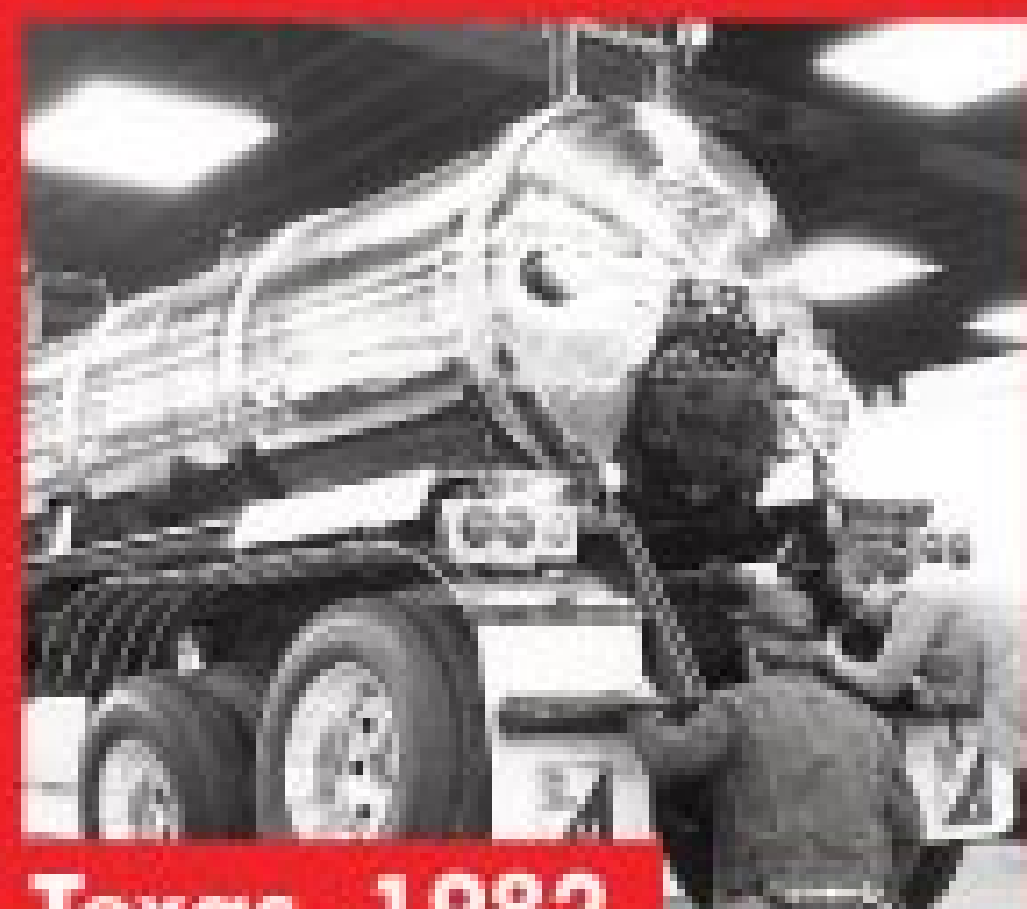
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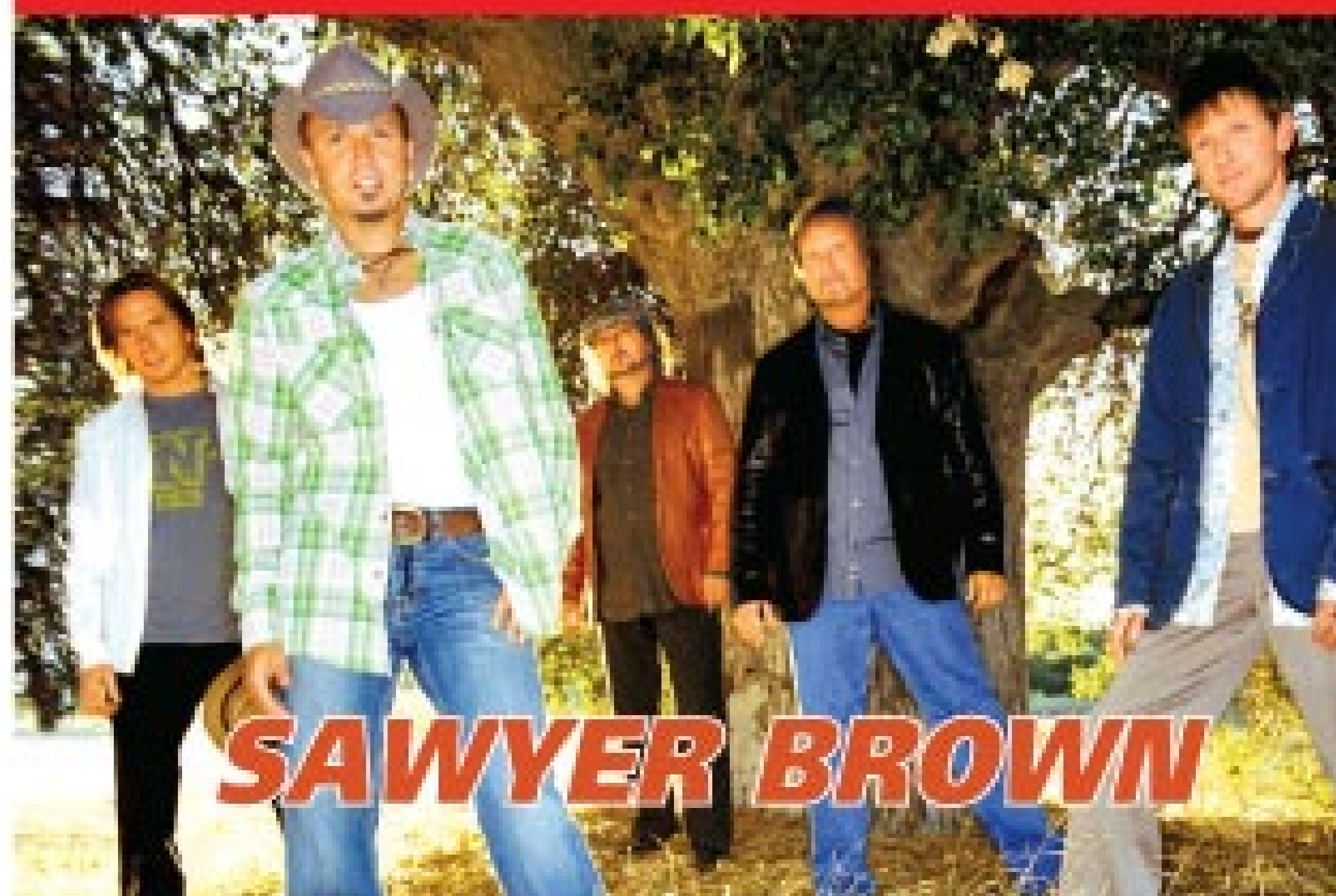
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THURSDAY

February 25, 2010

- Certified Onsite Installer Course
- Educational Seminars: 8 a.m. - 12 noon
- Exhibits Open: 9 a.m. - 5 p.m.
- Women in the Industry Seminar: 9 a.m. - 12 noon
- Women's Wine & Cheese: 2 - 4 p.m.
- Industry Appreciation & Networking Party: 5 p.m. - 25¢ Tap Beer and Other Refreshments

FRIDAY

February 26, 2010

- Educational Seminars: 8 a.m. - 12 noon
- Exhibits Open: 9 a.m. - 5 p.m.

SATURDAY

February 27, 2010

- Exhibits Open: 9 a.m. - 3 p.m.
- Saturday Evening Jam: 5 p.m. - Phil Vassar & Sawyer Brown

► Exhibits open at 9 a.m. on Thursday!

A HOME RUN CAREER

TIM WOODWARD'S DREAM OF PLAYING MAJOR LEAGUE BASEBALL NEVER CAME TRUE, BUT HE TURNED HIS PASSION TO WASTEWATER TREATMENT, WITH ALL-STAR RESULTS

By Jim Force

IF TIM WOODWARD WEREN'T SUCH A HARD-CHARGER, HE MIGHT NOT be superintendent of the award-winning Turkey Creek (Ind.) Regional Sewer District Wastewater Treatment Plant.

His first love was baseball, but when he barreled into second base on a steal attempt in college and broke his ankle, his dream of playing in the major leagues ended with three steel pins inserted to keep the bones together.

So he turned to wastewater treatment, an industry he had known since he mowed grass at the local utility as a 14-year-old worker on the old CETA federal-government-sponsored temporary employment program. Today, he couldn't be happier.

"All I really wanted was a job I liked," says Woodward. "When baseball didn't happen, it was wastewater. I'm really happy with what we're doing here."

His staff shares his enthusiasm. "Tim sets a good example," says chief operator Ryan Curtis. "He's straightforward — no rigmarole."

Laboratory manager Jane Bauer agrees: "Tim has the right attitude and keeps everybody in the plant on board. That makes our jobs easier."

CRITICAL RESOURCE

Woodward became a full-time member of the wastewater profession in 1987 as a staffer at the treatment plant in his hometown of Roann, Ind. Eventually, he moved on to the Town of Cromwell as plant manager and earned his water and wastewater certification.

Then, in 1990, when the Turkey Creek regional authority was formed and built a new plant to treat wastewater from the homes and businesses around



Tim Woodward, superintendent of the Turkey Creek (Ind.) Regional Sewer District Wastewater Treatment Plant. (Photography by Joe Kois)

popular Lake Wawasee, he joined that new staff as laboratory manager. After eight years, he was promoted to assistant superintendent. In 2007, he became superintendent of wastewater treatment and water treatment, as well as wastewater collections.

"This is a big district," he says proudly. "We have more than 32 miles of sewers, and the 1,890 connections around the lake occupy some of the most expensive real estate in the state."

The plant is a Class 2 activated sludge facility with a pair of oxidation ditches (Lakeside Equipment Corporation). Average flow is 250,000 gpd in winter and 400,000 to 600,000 gpd in summer and on holiday weekends.

Septic systems around the lake receive raw sewage. Septic tank effluent enters the district's collection system and flows by gravity or through force mains to the treatment plant. The loop of 4- and 12-inch pipes, installed in 1990, surrounds the lake, a 3,000-acre natural body of water and the major recreational site in Kosciusko County, northwest of Fort Wayne.

The plant's role in protecting water quality is critical: Lake Wawasee is one of the most popular recreational lakes in the Midwest. Vacationers from Chicago and Indianapolis visit to enjoy boating, swimming, and sightseeing. The Eli Lilly pharmaceuticals family residence is a landmark. Numerous marinas and sailing clubs occupy the shoreline.

The lake is a glacial and spring-fed with 3,060 acres of surface area, and depths to 77 feet. The largest lake in Indiana, its watershed encompasses more than 23,000 acres. Water clarity is exceptional, partly through the vigilance of the local community and the Wawasee Area Conservancy Foundation, a nonprofit group concerned about the region's water quality.

profile

Tim Woodward, Turkey Creek (Ind.) Regional Sewer District Wastewater Treatment Plant

EXPERIENCE: 23 years

POSITION: Superintendent

CERTIFICATIONS: Class 2 wastewater, Class 3 collections systems, Class 3 water, Class A industrial waste

EDUCATION: Studies toward a degree in environmental science from Indiana University-Purdue University Fort Wayne

GOALS: Oversee plant expansion and extension of service to new areas; complete the I&I compliance schedule



From left, Ryan Curtis, Jason Garber, Roger Miller and Tim Woodward with the Turkey Creek District's Vactor truck.



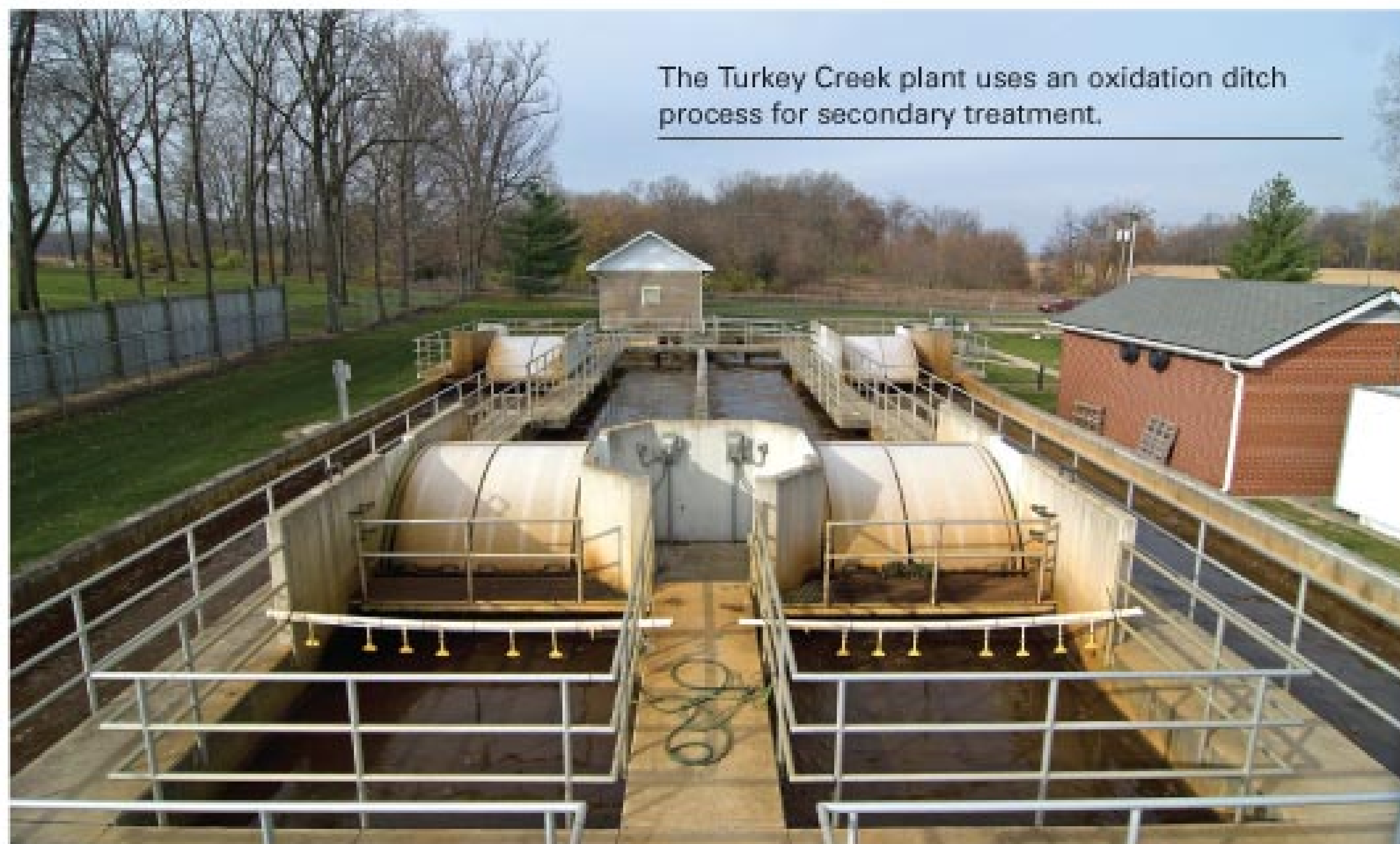
LET'S DO LUNCH

Even with a small staff, communication and shared information are critical to successful operations. Tim Woodward, superintendent of the Turkey Creek Regional Sewer District Wastewater Treatment Plant, makes sure that happens by having lunch with his team every month after the local district board meeting.

Laboratory manager Jane Bauer is a big fan of the practice. "Every month, we order out for pizza or sandwiches, and we sit down in the board room — all six of us — and discuss the plant and our activities," she says. "Sometimes there are problems, but we have great camaraderie here. We celebrate each other's success. Everybody likes everybody."

That's an attitude that creates a good appetite, as well as a good atmosphere.

The Turkey Creek plant uses an oxidation ditch process for secondary treatment.



Clockwise from top left: The entry sign at the Turkey Creek treatment plant; a UV disinfection system from Trojan Technologies; the Turkey Creek SCADA system (Scadata Scientific LLC), and equipment from Hach Company for phosphorous testing.



EFFECTIVE N REMOVAL

The secondary treatment system at Turkey Creek does its job effectively. A coarse bar screen and sewage grinder in the influent structure take care of large solids. Three submersible pumps transport the sewage to a centrifugal grit chamber. The material removed is deposited in a decant dumpster and hauled to a landfill.

In the secondary phase, the oxidation ditches reduce the organic loading and remove ammonia nitrogen. Two rotary aerators in each basin mix and aerate the wastewater. A tandem of circular clarifiers follow the ditches, equipped with rotating sludge collectors that move the solids to the center of the tank floor.

The design of the system (HNTB) provides adequate aeration and sludge return capacity, enabling the plant to operate successfully as a nitrification process. Turkey Creek cuts ammonia nitrogen significantly, achieving better than 99 percent removal (see performance table).



ever we need to get done, he gets it done.” Bauer feels “honored to work in the laboratory and really glad to be part of the Turkey Creek operation.” Her background as a bank teller helped prepare her for the numbers and detail that come with sampling and analysis, and her childhood years on a farm make her appreciate the agricultural reuse of Turkey Creek biosolids. “I wasn’t intimidated by the spreading; in fact, I was fascinated by it,” she says.

“Tim took me under his wing and taught me more in that time than I learned in all the years before. Tim says, ‘It’s not what you know, it’s what you know how to do,’ and that’s dead-on.”

JASON GARBER

A UV system (Trojan Technologies) disinfects the effluent, which is discharged to a cascading re-aeration process before entering Cromwell Ditch, which flows to Solomon Creek. Waste activated sludge is pumped to an aerobic digester and then to drying beds. The biosolids cake is spread on area farm fields.

TEAM OF WINNERS

Making it all work is a winning team that has earned a steady stream of awards over the years, including several state honors for excellence in annual reports and laboratory practices, and an annual maintenance award from Lakeside. Recently, Woodward was placed on the Indiana Department of Environmental Management (IDEM) biosolids committee. He also serves on the Indiana regional sewer district board.

Much like a player-coach, he leads by example. “I don’t ask my staff to do anything I haven’t done,” says Woodward. “If a pump needs pulling, I’ll jump in there and do it. We’re here to get things done.” His willingness to help and his zest for the job (fully evident as he describes the operation in an enthusiastic tumble of words) is catching.

Chief operator Curtis joined the Turkey Creek team after a hitch in the U.S. Army. “I’ve been here 12 years,” he says. “I like this place and have no plans to leave. Tim sets a good example. Everyone seems to know what to do.”

Woodward responds, “Ryan is loyal and shows up ready to work. What-

She also credits Woodward’s leadership style for the success of the operation. “Tim engenders teamwork and excitement for what we do here,” she says. “He facilitates progress.” An example is a recent improvement in the turn-around time for ammonia nitrogen testing. “These results used to take several hours, but now we’re using a new salicylate method from Hach, and it has reduced that time to about 15 minutes,” says Bauer. “I think we’re only the second municipality in the state to use it.”

TURKEY CREEK REGIONAL SEWER DISTRICT WASTEWATER TREATMENT PLANT PLANT PERFORMANCE (MONTHLY AVERAGES)				
	INFLUENT	PERMIT	EFFLUENT	% REMOVAL
CBOD	183 mg/l	25 mg/l	5.4 mg/l	97
TSS	89 mg/l	30 mg/l	7.1 mg/l	92
Ammonia	27 mg/l	2.5 mg/l summer 3.4 mg/l winter	0.22 mg/l	99
Total Phosphorus	6.06 mg/l	1 mg/l	0.45 mg/l	92.5

REFRESHING ENVIRONMENT

Roger Miller, in charge of the collections system and the district's Vactor truck, joined Turkey Creek about three years ago after working with a septic system company. He's also a farmer, raising corn and soybeans. He likes his job, which takes him around the lake checking lift stations and cleaning and maintaining the lines. He also enjoys his boss: "Tim is great to work for. He listens, and we're always able to work through things."

That mentality motivates the newest member of the Turkey Creek team — Jason Garber, responsible for maintenance. "I've been here a year and a half, about a year full-time," he says. "Tim took me under his wing and taught me more in that time than I learned in all the years before. Tim says, 'It's not what you know, it's what you know how to do,' and that's dead-on."

"Tim engenders teamwork and excitement for what we do here. He facilitates progress."

JANE BAUER

Garber feels good about his job and accomplishments. "I grew up about two miles from the plant, lived here all my life," he says. "Now, I've learned how to take care of our water and protect my friends and family. I love this job."

Office manager Pam Johns likes the work environment too. "I worked 30 years in manufacturing accounting before I came here, and it was a real change," she says. "But it's a very refreshing environment. The key word here is 'team.'"

STAYING AROUND

Gordon Evans, project manager with HNTB, has worked with Woodward and his Turkey Creek operation for more than a decade and is impressed with Woodward's leadership style. "Tim is one of the most conscientious wastewater treatment operators we've ever encountered," says Evans. "He maintains good relations with the regulators and his customers. He always wants to do the right thing. He deals with his employees fairly and in an organized manner."

These good relations are reflected in an informal compliance program Woodward entered into with the state to address previous infiltration and inflow issues in the Turkey Creek system. "I've never seen a compliance program quite like this," says Evans. "Usually, compliance is specified in a formal, signed agreement with the regulatory agency."

Instead, Woodward and his team proactively make improvements — cleaning and televising sewers, replacing equipment — on a monthly basis and file quarterly reports that HNTB certifies. "I think the informality of the compliance agreement is a credit to Tim's conscientious manner in operating the plant," says Evans.

If his staff members like the environment at Turkey Creek and have no plans to leave, neither does Woodward. He cites an upcoming plant expansion plan and a sewer extension to 300 more homes as upcoming challenges. He likes working with his board.

"I'm a wastewater guy," he says. "This place is really who I am. It's like I sleep with a settlometer at my head." **tpo**

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In Control

AUTOMATION OF A PLANT AERATION SYSTEM IN CAPE CORAL, FLA., BRINGS SUBSTANTIAL ENERGY SAVINGS AND A MORE CONSISTENT TREATMENT PROCESS

By Doug Day

With about 1,200 new residents a month, Cape Coral, Fla., is one of the nation's fastest-growing cities. Only 30 years old, it grew by 8 percent (11,400 people) in 2005-06. Its current 165,000 population is expected to double in the next 30 years.

Both the city's wastewater treatment plants have been expanding to keep pace. When planning began for another expansion at the older Everest plant in 2006, acting plant superintendent Brian Fenske knew it was the last shot to get everything right. "There is no room to make the facility larger," he says.

That work included improvements that dramatically increase energy efficiency. In particular, automated control of the aeration system drives down power consumption, while making the treatment process more consistent and helping to reduce chemical consumption.

ON THE GROW

Everest was first expanded in the late 1980s when the 4-mgd conventional activated sludge plant saw flows of about 6 mgd. The expansion to 8.5 mgd included conversion to a four-stage biological nutrient removal system. That worked well, but by 2006, the plant was running out of capacity again.

After \$10 million in various improvements, the final \$62 million upgrade, engineered by MWH Global, converted Everest from four-stage nutrient removal to a five-stage system (adding an anaerobic zone) and upgraded its capacity to 13.4 mgd. The real prize, to Fenske, was getting more out of the plant while doing less.

"We were looking for automation to optimize the plant and reduce electrical consumption and chemical use," he says. That's exactly what he got when two new aeration basins came online in June 2008 with a new control system. The following

June, while two existing basins were being refurbished to operate with the new control system, Fenske had a chance to see the old working alongside the new.

"The new system is much more efficient," he says. A single-stage 300-hp blower (Turblex Inc., a Siemens company) replaced the old multi-stage blower and immediately met expectations in controlling

"We ran the two systems side by side and found the Turblex blower ran with about 40 percent lower electrical consumption than the multi-stage."

BRIAN FENSKE

PHOTOS COURTESY OF CAPE CORAL WASTEWATER TREATMENT PLANT SUPERINTENDENT BRIAN FENSKE



The Everest plant's automated aeration system includes redundant dissolved oxygen probes (thin PVC poles at left) with a motor-operated air control valve. The stainless steel pipes feed air to two aeration zones. The metal box left of probes houses the dissolved oxygen meters from Hach Company.

dissolved oxygen levels. "The single-stage blower's efficiency comes from its design and a Turblex proprietary algorithm," says Fenske. "It keeps the motor running more efficiently at lower amps throughout its electrical turndown."

According to Turblex, the blower uses variable diffuser vanes on the discharge side of the impeller to vary air volume from 100 percent to 45 percent of capacity. The PLC controls variable inlet guide vanes to optimize inlet air-flow by reacting to three variables that affect efficiency: ambient temperature, differential pressure, and machine capacity.

The old blower had an annual electricity cost of about \$96,500, versus an expected \$69,700 for the single-stage blower — a savings of \$26,800 a year, or 27.8 percent.

Actual savings could be much greater if real-life to date experience holds true. "We ran the two systems side by side and found the Turblex blower ran with about 40 percent lower electrical consumption than the multi-stage," says Fenske. The old blower consumed 5,089.3 kWh in 24 hours, while the new blower used just 2,928.6 kWh. That means annual savings of about \$100,000 (though based on only a single day of operation).

CONTROL IS THE KEY

To operate the new automated aeration system, operators simply enter the desired dissolved oxygen levels into the SCADA. A proprietary programmable logic controller from Turblex serves as the brain, providing an automated connection between the blower and the

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.



EVEREST EXPANSION HELPS IN WASTEWATER RECLAMATION

Like many Florida cities, Cape Coral reclaims wastewater for irrigation to keep water in the aquifer and out of the ocean, where it would be lost to the saltwater environment. In the fiscal year ending in September 2009, the city reused all of its wastewater discharge.

"That is unusual for a city as large as Cape Coral," notes Brian Fenske, acting plant superintendent for the city's Everest treatment plant. Yet even that is not enough to meet the irrigation demand: effluent is supplemented with water from freshwater canals. The city has plenty of those: 295 miles among a total of 400 miles of canals.

"It's pretty interesting to come in at three o'clock in the morning," Fenske says. "We'll have all the pumps running at both treatment plants and our five freshwater canal stations to meet the demand of the irrigation system."

A SCADA system maintains the proper pressure to make sure there is enough capacity for the overnight irrigation hours. "We have 25 million gallons in five storage tanks between the two wastewater treatment plants," Fenske says. "On watering days, we have no problem filling them up and emptying them out in a matter of eight hours."

field instrumentation, mostly from Hach and Endress+Hauser, and motor-operated valves from Rotork Controls Inc. that maintain the airflow with input from the PLC.

"With the previous system, we had to go out and manually inspect the dissolved oxygen levels, and our only adjustment was with a manual valve," says Fenske. "Every two hours, operators adjusted the valve by hand to increase or decrease the airflow to each zone of the aeration basin. Or they adjusted a butterfly valve by loosening or tightening a wing nut to increase or decrease the output at the blower directly."

With little information about dissolved oxygen levels, operators had to run the airflow higher to maintain the proper margins. "We had to shoot for 3 ppm because we could have a significant drop in the two hours between adjustments that would affect the treatment," Fenske says. "Now, we can run right at 2 ppm. That saves a lot of energy."

TRENDING INFORMATION

Luminescent dissolved oxygen probes from Hach give a continuous reading in each zone. They replaced membrane probes that had to be constantly cleaned and replaced. "The process is only as reliable as the field instruments, and these are rock solid," says Fenske.

A motor-operated air valve (Rotork) and hand valve serve Zone 1 of an aeration basin. The motor-operated valve is controlled by a Turblex master control panel to regulate air delivery based upon dissolved oxygen levels in tank.



"You take them out every few weeks and wipe them down."

Redundant probes and automatic diagnostics ensure constant and accurate readings. In addition, operators check the probe accuracy with a portable dissolved oxygen meter six times a day.

What is now automatic used to depend on the experience of operators. Essentially, they used their eyes and ears to keep dissolved oxygen at the proper levels. "There was some instrumentation, but it was done mainly by looking at the tank to see how the flow increased or decreased and listening to hear the hiss through the valves," says Fenske. "That was the best fine-tuning we could do."

With reliable probes and the PLC, operators now have trend information on dissolved oxygen. They have found very consistent results. "Dissolved oxygen will stay within half a part per million for hours and sometimes days, so we have very little change," he says. "That optimizes the plant and makes it run more efficiently."

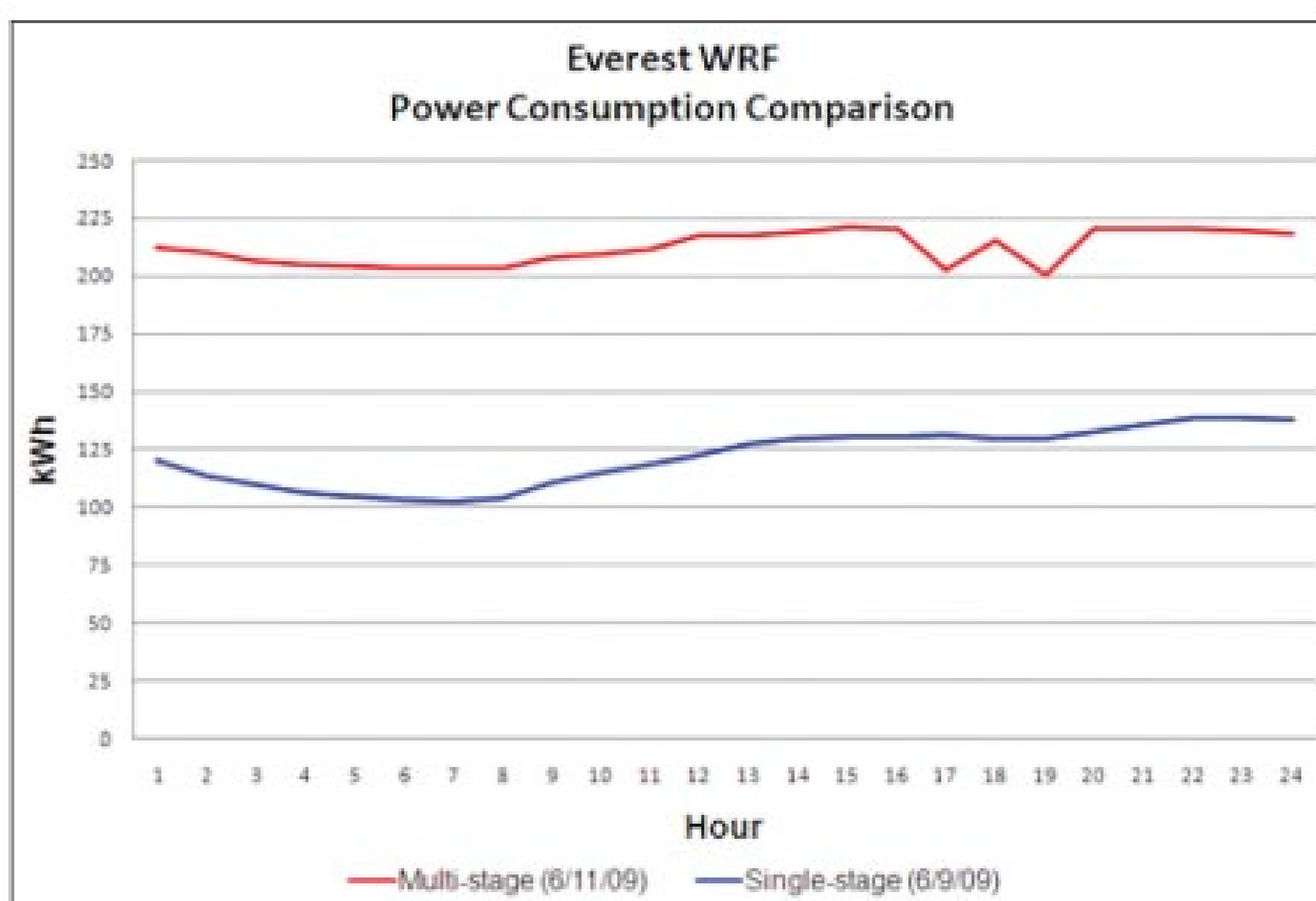
The PLC also monitors the temperature on different mechanical parts of the blower, helping to detect abnormal conditions so the staff can make repairs before failure occurs. The Turblex PLC was also designed as a hybrid system: it can also operate the old blower, which remains as an emergency backup.

"Dissolved oxygen will stay within half a part per million for hours and sometimes days, so we have very little change."

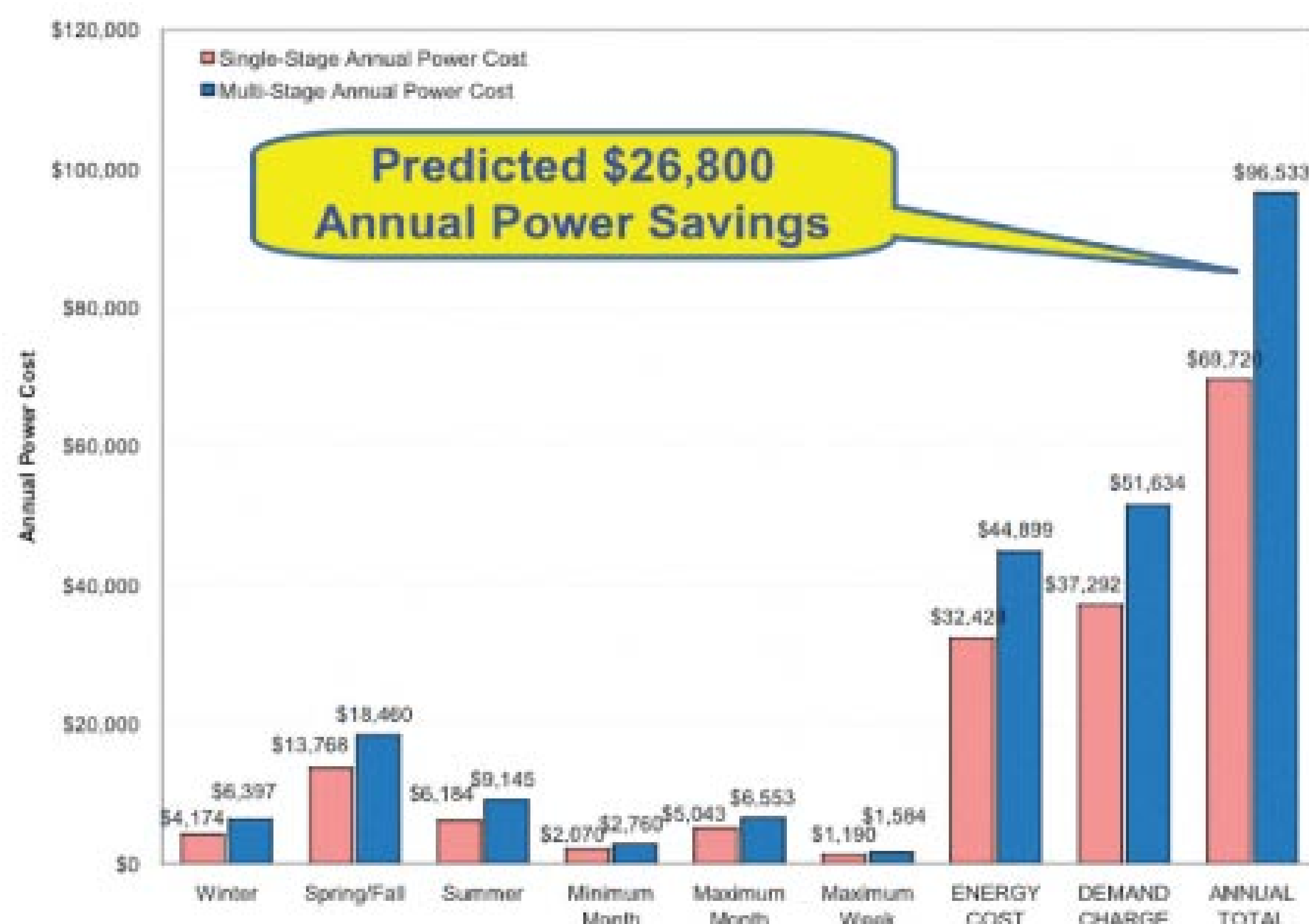
BRIAN FENSKE

CONSISTENT OPERATION

Because of the more consistent treatment performance (and the addition of the fifth-stage anaerobic zone), the plant has been able to



Old multi-stage and new single-stage blowers operated at the same time during June 2008 while the plant was being upgraded. This chart shows significantly lower power consumption for the new blower with automated control.



A projection of annual operating cost savings with the new single-stage blowers versus the old multi-stage blowers. The actual operating cost savings could be even greater than projected.

reduce chemical usage substantially. Consumption of alum, used to keep phosphorous below the permit limit of 0.5 mg/l, has been reduced from 400 to 450 gallons a day to about 200 gallons.

A free chlorine analyzer (Emerson Process Management, Rosemount Analytical) has helped cut the use of a 12.5 percent bleach solution for final disinfection. "The analyzer in the chlorination chamber tells if we need to increase or decrease the output of the bleach pump,"

One of the two new single-stage Turblex blowers. The units have modulating inlet and outlet vanes and are far more energy efficient than the old multi-stage blowers.



Fenske says. "We just put that online recently, and we have already significantly reduced our bleach usage. In the long run, I think we're going to save tens of thousands of dollars per year."

The plant expansion was a large investment, but well worth it considering how precious freshwater is in Florida. "We're extremely happy with it," says Fenske. "We're more than glad to show people how well it works." **tpo**

more info:

Emerson Process Management, Rosemount Analytical
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www.railiquid.com

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www.us.endress.com/environmental

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What the Heck Is SVI?

SLUDGE VOLUME INDEX IS A VALUABLE MEASURE OF SLUDGE SETTLEABILITY CHARACTERISTICS AND CAN BE MONITORED TO HELP PREVENT PROCESS PROBLEMS

By Ron Trygar, CET

Sludge Volume Index (SVI) is an extremely useful parameter to measure in a wastewater treatment process.

In simple terms, SVI is the result of a mathematical calculation. It takes into account the 30-minute settleability test result and the activated sludge mixed liquor suspended solids (MLSS) test result to come up with a number (or index) that describes the ability of the sludge to settle and compact. SVI gives a more accurate picture of the sludge settling characteristics than settleability or MLSS alone.

SVI can indicate changes occurring in the activated sludge treatment process. By trending SVI data over a period of time, operators are able to prevent problems. Many textbooks give guideline SVI numbers, but since every plant operates differently, the best SVI for each plant will be different. The SVI should be determined when the facility is running at optimum, and should be used as a benchmark.

TESTING FOR SVI

The standard SVI test requires a 1-liter graduated cylinder for the MLSS settling test. A separate aliquot of mixed liquor is used for a total suspended solids (TSS) test. A fresh sample of mixed liquor should be used for

the tests and is normally collected from the effluent end of the aeration system, just upstream of the secondary clarifier. The formula for SVI is written:

$$\text{SVI (mL/g)} = \frac{\text{30-minute settleability test result (mL/L)} \times 1,000}{\text{MLSS (g/L)}}$$

It is important to allow the sludge to settle in a quiet area where it won't get bumped or disturbed. The sample should also be kept out of direct sunlight.

There are various containers on the market for performing the settleability test (Figure 1). In the description of the test noted above, a 1-liter (1,000 mL/L) graduated cylinder is used. Other settling containers may be used in daily plant operation. These include the 1.4-liter polycarbonate settlometers, the Mallory settlometer, and 1,000- or 2,000-mL beakers. The Mallory settlometer can hold 2 liters but it is marked with graduations up to 1,000, and the results are read as mL/L (Figure 2).

Refrain from using tall graduated cylinders for the settling test, as the friction created by the close walls can slow the settling, change settling velocities and give false readings. Wide-mouth containers that hold at least 1 liter are acceptable, but 2-liter containers are preferred.

Operators of sequencing batch reactor (SBR) facilities may take the final settleability reading in correlation to the settle time of the SBR. For example, an SBR has a settle time of 50 minutes; the operator takes the final settleability reading at 50 minutes instead of 30 minutes. The SVI is then calculated using the settle time of the SBR. This is common, but should be noted on process control bench sheets for each SBR.

USING RESULTS

Here are some general guidelines for SVI:

SVI = 80 mL/g or less. This usually indicates a sludge that is dense and has rapid settling characteristics. This is most often attributed to an old, over-oxidized sludge typically seen in an extended aeration facility. The floc particles would be dense and granular in appearance (like a BB). As this type of sludge settles, it may leave a cloudy appearance in the supernate above the settled sludge blanket. This turbidity is called pinpoint floc (pin-floc). The sludge usually begins settling quickly after the start of the sludge settleability test, and it does not form larger particles before settling. Effluent BOD results may be below requirements, but TSS levels can still be high.

SVI = 100 to 200 mL/g. Most activated sludge plants seem to produce a clear, good-quality effluent with an SVI in this range. The



FIGURE 1. Various settling containers. From left: 1.4-liter settlometer, 2-liter settlometer, 1,000 ml beaker.

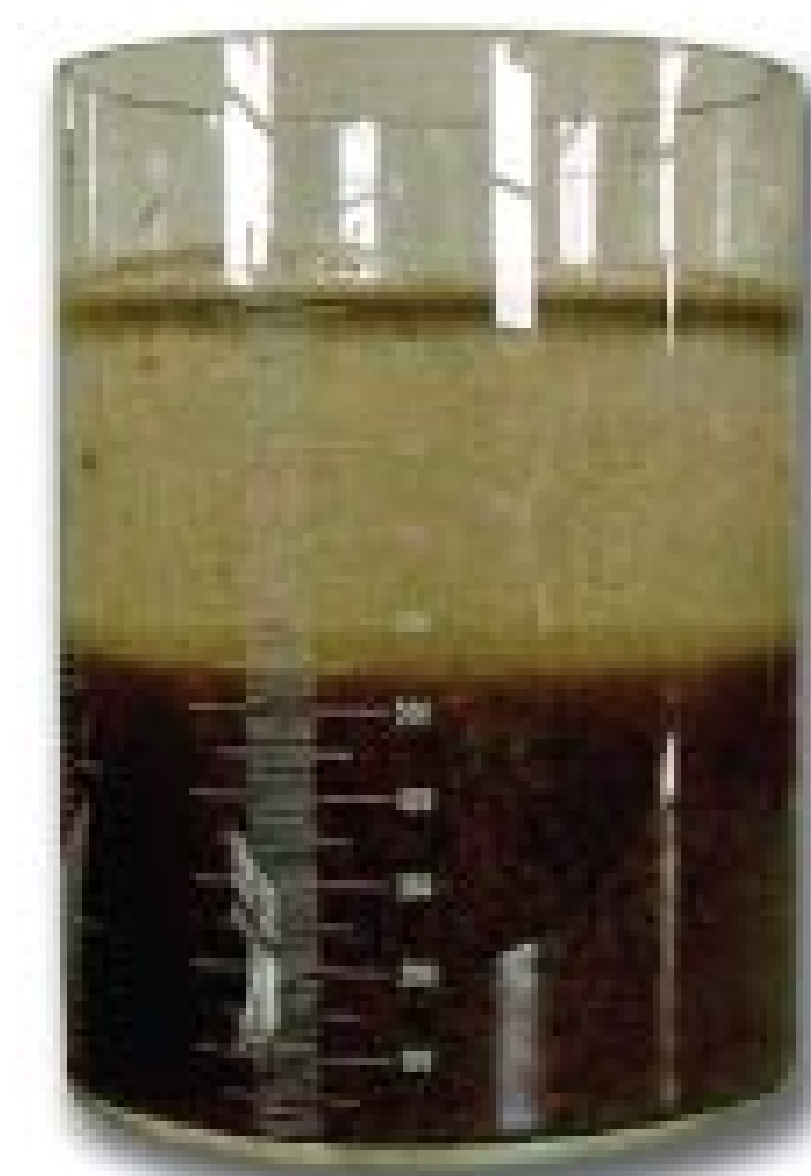


FIGURE 2. 2-liter settlometer, showing mixed liquor suspended solids settling.

sludge typically settles more slowly and traps more particulate matter as it forms a uniform blanket before settling. Microscopic examination of this MLSS would show an irregularly shaped floc particle with some filaments forming a backbone for floc-forming bacteria to attach and colonize.

In the settleability test, the sludge first forms a blanket and seems to flocculate together *before* starting to settle. This usually happens in the first five minutes of the test. As the particles come together, they form larger particles that have a specific gravity greater than water. As the sludge settles, you will notice channels through the sludge that are formed by the liquid being squeezed out of the sludge as it compacts.

By knowing the SVI for a given condition at the treatment plant and plotting the data on a trend chart, an operator can make process control adjustments before problems get out of hand.

SVI = 250 mL/g or higher. At this elevated SVI, the sludge settles very slowly and compacts poorly in the settleability test. The MLSS looks light and fluffy, not very dense. There are several reasons the SVI may be high.

If the treatment plant is new and undergoing startup, the sludge age is considered young and the floc particles are just forming. The MLSS result is usually low (less than 1,000 mg/L), and the supernatant above the sludge blanket will be cloudy, sometimes grayish/green. This type of sludge usually leaves behind straggler floc particles that either settle slowly or not at all. Effluent BOD and TSS may still be above regulatory requirements. The term Classic Sludge Bulking has been used to describe this young sludge condition.

A high SVI may also indicate filamentous sludge bulking. In this case, a microscopic exam is recommended and might show light floc particles that contain long filaments extending out of the particle and touching filaments from other particles. Or, the filaments may be contained within the floc, causing a dispersed, open floc structure. In these cases, the liquid above the sludge blanket is usually very clear. The sludge can sit in the settleability test container for long periods and settle very little, or not at all.

When choosing a method of filamentous control (chlorination or other oxidizer), SVI should be calculated and used in trend charts to show the effectiveness of control.

TEST EXAMPLES

The following examples show various MLSS and settleability test results and how they can affect the SVI result.

Example 1. The settleability test is 875 in 30 minutes and the MLSS is 3,000 mg/L. The SVI calculates to 292. If the supernatant is very clear, then filamentous sludge bulking may be the cause of the high SVI. In the actual clarifier, the sludge blanket might be seen below the surface.

Example 2. The settleability test is 700 after 30 minutes and the MLSS is 1,200 mg/L. The SVI is over 580. The supernatant in the settleability test and in the clarifier looks very cloudy, with a green/gray appearance. Look for a young sludge condition, the result of toxic influent loading, or a clarifier solids washout event.

Example 3. The settleability test result is 255 in 30 minutes and the MLSS test result is 4,200 mg/L. This SVI is 61 and indicates a rapid-settling sludge condition. The clarifier may be somewhat cloudy, and pinpoint floc particles might be seen in the settleability test container. An old, over-oxidized MLSS may be the cause.

Example 4. The settleability test result is 400 and the MLSS is 3,000 mg/L. The SVI is 133. This might be a good SVI for a plant providing a good-settling sludge that first forms a blanket, and then traps fine particles as it slowly settles and compacts.

Calculating the SVI for each MLSS sample and settleability test gives the operator of an activated sludge plant a valuable tool that can help prevent problems before they begin. By knowing the SVI for a given condition at the treatment plant and plotting the data on a trend chart, an operator can make process control adjustments before problems get out of hand. **tpo**

ABOUT THE AUTHOR

Ron Trygar, Certified Environmental Trainer, is a senior training specialist, water and wastewater programs, at the University of Florida TREEO Center in Gainesville, Fla. He can be reached at 352/392-9570 or rtrygar@treeo.ufl.edu.

References

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- Clifton, J. (1988). *Wastewater Treatment Plant Operation*, 2nd Edition. Univ. of Florida DCE: Kendall Hunt Publishing.

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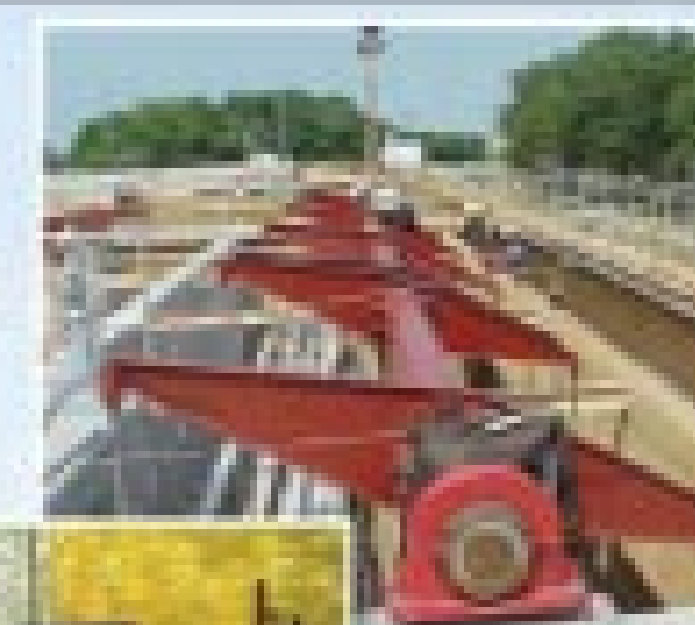


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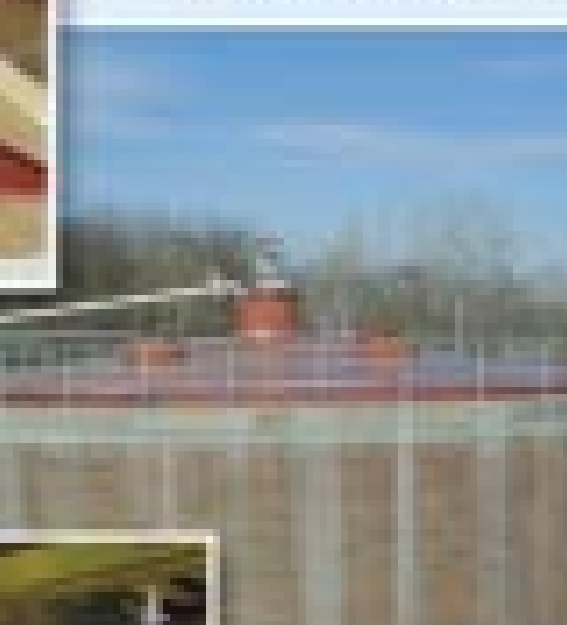
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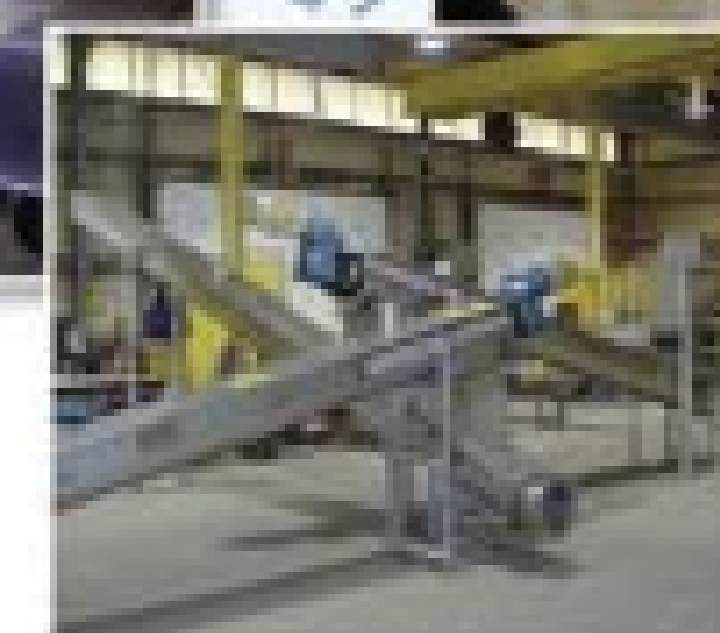
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people/awards

The Alabama Water Environment Association named its 2009 award winners:

- **Cherokee Nitrogen** (Cherokee), Plant Excellence in Industrial Wastewater Treatment Award (Category I: Physical Treatment)
- **International Paper** (Prattville), Plant Excellence in Industrial Wastewater Treatment Award (Category III: Biological Treatment)
- **American Protein** (Cullman County) and **Tyson Foods-Blountsville** (Blount County), Plant Excellence in Industrial Wastewater Treatment Award (Category IV: Biological and Physical Treatment)
- **Lucy Branch Wastewater Treatment Plant** (Limestone County Water & Sewer Authority), Plant Excellence in Municipal Wastewater Treatment Award (<1 MGD WWTP)
- **Trussville Wastewater Treatment Plant** (Jefferson County), Plant Excellence in Municipal Wastewater Treatment Award (1-10 MGD WWTP)
- **Turkey Creek Wastewater Treatment Plant** (Jefferson County), Plant Excellence in Municipal Wastewater Treatment Award (<10 MGD WWTP)
- **Village Creek Wastewater Treatment Plant** (Jefferson County) and **C.C. Williams Wastewater Treatment Plant** (Mobile), Plant Excellence in Municipal Wastewater Treatment Award (>10 MGD WWTP)
- **Mark Huber** (Huntsville), Golden Manhole Award
- **Mark Lowery** (Mobile), William D. Hatfield Award
- **Tim Patton** (Volkert and Associates Inc.), Arthur Sidney Bedell Award

The Pacific Northwest Clean Water Association named its 2009 award winners:

- **Jon Hays**, Lakehaven Utility District, Washington Treatment Plant Operator of the Year
- **Paul Schuler**, GE Water, Arthur Sidney Bedell Award
- **Linda Kelly**, WEF, Individual Distinguished Achievement Award
- **Kim Ashmore**, City of Centralia, Lyman Ketcum Award
- **Kristi Nelson**, HDR Engineering, Young Professional of the Year Award
- **Tony Samartino**, City of Boise, Idaho Operator of the Year
- **Brett VanBrunt**, City of Pocatello, Idaho Collections Operator of the Year
- **Chris Miccolis**, City of Redmond, Oregon Operator of the Year
- **Bill Appleby**, City of Chehalis, Washington Collections Operator of the Year
- **Bill Strait**, City of Redmond, Oregon Collections Operator of the Year
- **Carlo Spani**, Clean Water Services, President's Award
- The University of Colorado-Boulder (team comprised of **Leanne Miller**, **Sean Aronson**, **Rishabh Iyer**, **John Craven**, **Bradley Short**, **Jayson Ellis** and their faculty advisor, **Dr. Angela Bielefeldt**), received a 2009 Student Design Competition Award in the Wastewater Design Category from the Water Environment Federation.

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

education

American Water Works Association

AWWA published the second edition of *The Water Dictionary*, a desk reference providing definitions for more than 15,000 water- and wastewater-related words and phrases. Visit www.awwa.org/bookstore.

Kansas Water

Environment Association

The KWEA has these courses:

- March 4-5 – Ethics, Phillipsburg
- March 10 – Small Systems Wastewater Operations, WaKeeney
- March 11-12 – Applied Math for Wastewater Operators, Hays
- March 16 – Membranes Treatment, Garden City
- March 18-19 – Natural Systems for Wastewater Treatment, Medicine Lodge
- March 24-25 – Activated Sludge Process Evaluation and Control, Garnett
- March 26 – Small Wastewater Systems, Kinsley
- March 30 – Membranes Treatment, Garden City
- March 30-31 – Plant Optimization, El Dorado
- March 31-April 1 – Biological Nutrient Removal, Lawrence
- April 1-2 – Wastewater Certification Preparation, Dodge City
- April 6 – Ethics, Ulysses
- April 7-8 – Wastewater Stabilization, Chanute
- April 8-9 – Wastewater Certification Preparation, Phillipsburg
- April 13 – Safety, Kinsley
- April 16 – Small Wastewater Systems, Syracuse
- April 21-22 – Utilities Management, Fort Scott
- April 22-23 – Wastewater Stabilization, Medicine Lodge
- April 27 – Wastewater Stabilization, Manhattan

Visit www.kwea.net.

Rocky Mountain Water Environment Association

The RMWEA is offering a March 25 Industrial Wastewater Treatment seminar, location to be announced. Visit www.rmwea.org.

Texas Water Utilities Association

The TWUA has these courses in Waco:

- March 2 – Basic Wastewater, Carrollton
- March 30 – Wastewater Collection, Waco

Visit www.twua.org.

University of Wisconsin

The University of Wisconsin Department of Engineering-Professional Development is offering a course in Designing Wastewater Pumping Systems and Lift Stations in Madison April 21-23. Visit <http://epdweb.engr.wisc.edu>.

Virginia Water Environment Association

The VWEA has a Wastewater Seminar in Charlottesville March 1. Visit www.vwea.org.

Wisconsin Department of Natural Resources

The Wisconsin DNR has these courses:

- March 2-3 – Wastewater Ponds-Intro and Advanced, Rhinelander
- March 9 – Spring Wastewater/Biosolids Symposium, Stevens Point
- March 9-11 – Wastewater Lab Intro, Madison
- March 17-18 – Wastewater Disinfection-Intro & Advanced, Chippewa Falls
- March 29-31 – General Wastewater Treatment, Madison
- April 5-6 – Activated Sludge-Intro (Wastewater), Green Bay
- April 7-8 – Activated Sludge-Intro (Wastewater), Green Bay
- April 13-14 – Anaerobic Digestion-Intro (Wastewater), Chippewa Falls
- April 15 – Anaerobic Digestion-Advanced (Wastewater), Chippewa Falls
- April 19-20 – Mechanical Sludge Handling-Intro and Advanced (Wastewater), Madison
- April 20-21 – Lab-Advanced (Wastewater), Oconomowoc
- April 27-29 – Phosphorus Removal-Intro and Advanced (Wastewater), Stevens Point

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

CALENDAR OF EVENTS

March 1-3

Illinois Water Environment Association Annual Conference & Expo, Embassy Suites, East Peoria, Ill. Call 309/694-0200 or visit www.iweasite.org.

March 7-10

Cities of the Future 2010, Boston Marriott Cambridge, Boston, Mass. Call 703/684-2441 or visit www.wef.org.

March 15-17

Hawaii Water Environment Association Conference, Neal S. Blaisdell Center, Honolulu, Hawaii. Visit www.hwea.org.

March 16-17

2010 Industrial Conference & Expo, Callaway Gardens Convention Center, Pine Mountain, Ga. Call 770/618-8690 or visit www.gawp.org.

March 24-26

Globe 2010, at Vancouver Convention Centre, Vancouver, Canada. Call 604/695-5001 or visit www.globe2010.com.

March 28-30

IWA/WEF Wastewater Treatment Modeling Seminar, Chateau Mont-Sainte-Anne, Quebec, Canada. Visit www.wef.org.

April 11-14

Kentucky Water and Wastewater Operators Association Annual Conference, Galt House Hotel and Suites, Louisville, Ky. Visit www.kwwoa.org.

April 13-14

2010 Spring Conference & Expo, Columbus Convention & Trade Center, Columbus, Ga. Visit www.gawp.org.

April 13-15

Nevada Water Environment Association Conference, J.A. Nugget Hotel & Casino, Sparks, Nev. Visit <http://nvwea.org>.

April 18-20

North Carolina AWWA-WEA Spring Conference, New Bern Riverfront Convention Center, New Bern, N.C. Call 919/784-9030 or visit www.ncsafewater.org.

April 18-20

Water Environment Association of Ontario Annual Conference, London Convention Centre, London, Ontario. Call 416/410-6933 or visit www.weao.org.

April 18-21

Alabama Water Environment Association, at Perdido Beach Resort, Orange Beach, Ala. Call 205/349-0067 or visit www.awea-al.com.

April 25-28

Maritime Provinces Water and Wastewater Association Annual Seminar, Delta Brunswick, Saint John, New Brunswick. Call 888/890-3222 or visit www.mpwwa.ca.

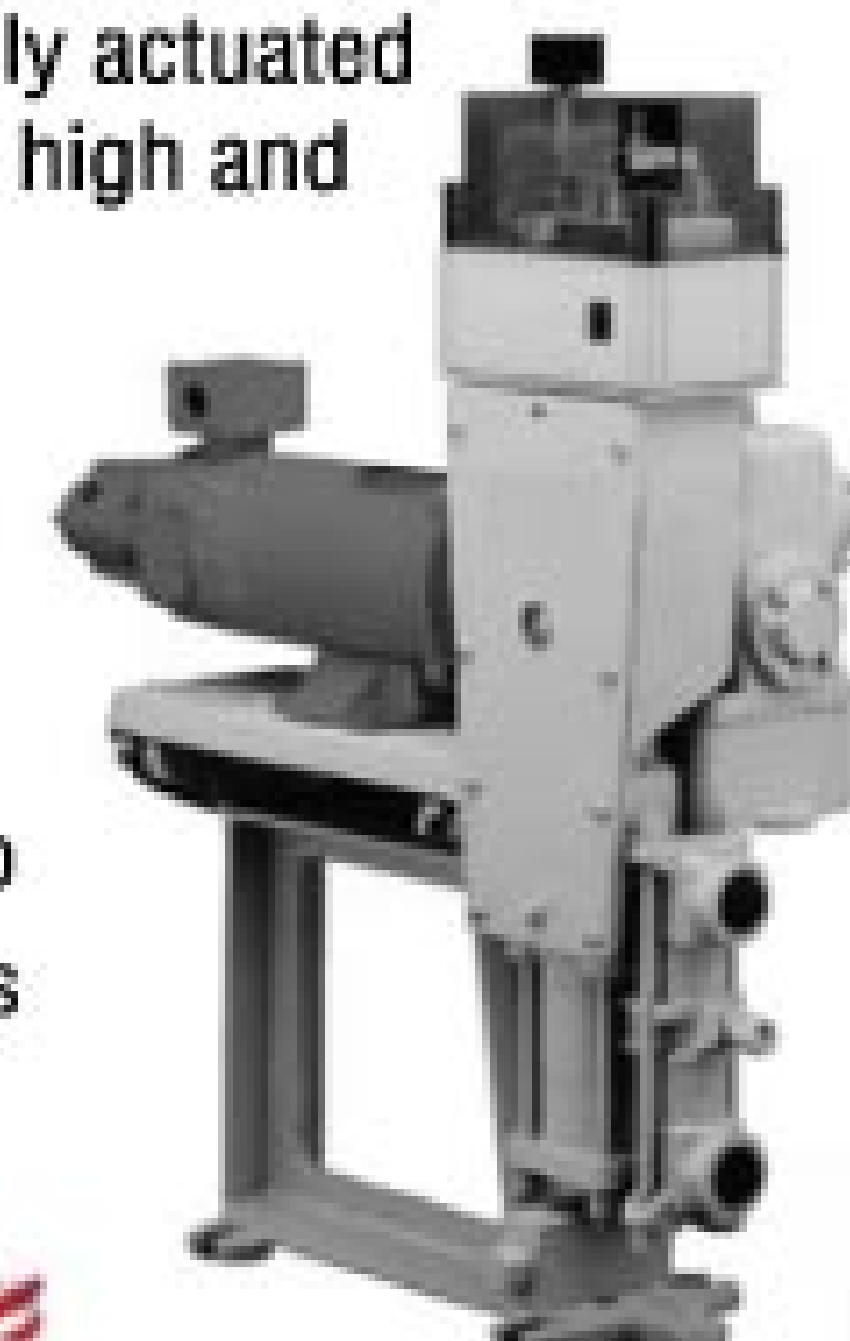


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Latest Innovations in Pumps

By Scottie Dayton



Anamix horizontal submersible mixers from KSB Inc.



Self-priming pumps from Griffin Pump and Equipment Inc.

SUBMERSIBLE MIXERS

Anamix horizontal submersible mixers from KSB Inc. mix, homogenize, and thicken wastewater and sludge. Units have an 8- to 24-inch self-cleaning propeller with up to 13.4-hp/1,750-rpm motor and 2,359-gpm capacity. A tandem mechanical sealing arrangement seals the shaft, while a leak-proof cable entry prevents water from wicking inside the motor. The pumps have a close-coupled design, gear drive, and cable plug that plugs and unplugs without an electrician. **804/565-8343; www.ksbusa.com.**

HIGH-VOLUME PUMPING

Electric- or diesel-driven **self-priming pumps from Griffin Pump and Equipment Inc.** have non-clog impellers that handle stringy materials and solids up to 4.5 inches. An ample clean-out port enables operators to clear debris beyond 4.5 inches without removing the suction pipe or hose. The pumps deliver flows to 17,000 gpm and head capacities of 240 feet or more. They are available in vacuum-assist, diaphragm prime, or compressor prime. **866/770-8100; www.griffinpump.com.**

MICROPROCESSOR MANAGEMENT

The **Chem-Tech XPV Series pump from Pulsafeeder Inc., a unit of IDEX Corp.** combines variable-speed peristaltic pump technology with control

electronics. Duplex models have two pump heads that deliver twice the flow of two different chemicals simultaneously. The microprocessor handles various input signal types and onboard timer programs to customize the pump to any application.

The electronic management system matches the variable-speed motor to the real-time dosing requirements as directed by a 4-20 mA signal, Hall Effect or Dry Contact pulse input, External Stop or manual operation in Fixed Speed mode. The pump also has a cycle timer and daily timer. **585/292-8000; www.pulsafeeder.com.**

HYDRAULIC METERING

Series 500 hydraulic metering pumps from Neptune Chemical Pump Co. are adjustable while running through 100 percent of range. They have capabilities to 80-gph simplex and 160-gph duplex with pressures up to 3,000 psi. The 1/3-hp single-phase motor includes a built-in automatic thermal overload.

The pump valve cartridge removes for cleaning without disturbing piping. A variable oil bypass stroke adjustment improves valve

performance. Options include an internal relief valve viewing line and electronic and pneumatic stroke control that changes stroke length, not speed. **888/637-8863; www.neptune1.com.**

REVERSIBLE GRINDER

The 2-hp **Model 6840 Shark grinder pump from Zoeller Engineered Products** has a reversible stainless steel star cutter and plate hardened to Rockwell C 55-60. The bidirectional design eliminates cutter jams. The pump's discharge configuration is 1.25-inch NPT vertical. The standard or explosion-proof three-phase motor runs at 3,450 rpm. Its cool-run technology effectively disperses heat, promoting long service life. **800/928-7867; www.zoeller.com.**

BLOWER PACKAGE

The **Qube blower package from Tuthill Vacuum & Blower Systems** has a low noise (<75 dBA attenuation), high-efficiency Qx rotary positive displacement blower. It provides 18 psi or 17-inches-Hg dry vacuum, 3,400 cfm, and 4,800 rpm. A powder-coated steel enclosure reduces noise to 24 dBA. The unit has a compact footprint, integral check valve, discharge from the back, and discharge flexible connector. **800/825-6937; www.tuthill.com.**



Chem-Tech XPV Series pump from Pulsafeeder Inc.



Series 500 hydraulic metering pump from Neptune Chemical Pump Co.



Model 6840 Shark grinder pump from Zoeller Engineered Products



Qube blower package from Tuthill Vacuum & Blower Systems



Custom-designed pump control applications from Revere Control Systems



4JSCM Enviroprime automatic priming centrifugal pump from Thompson Pump



Water reuse systems from Metropolitan Industries

CUSTOM-DESIGNED PACKAGES

Custom-designed pump control applications from **Revere Control Systems** include duplex, triplex, and high-horsepower application. One control package serves duplex 200-hp pumps supplying a golf course sprinkler system with effluent from the Fort Walton (Fla.) Wastewater Treatment Plant. The variable frequency drive system includes an outdoor enclosure with insulation, air conditioning, and bypass contactors. **205/271-9732; www.reverecontrol.com.**

ENVIROPRIME PUMP

The **4JSCM Enviroprime**, a 4-inch automatic priming centrifugal pump from **Thompson Pump**, provides flows up to 1,450 gpm and heads up to 130 feet. It handles solids up to 3 inches. The priming system prevents product blow-by, making it environmentally friendly. **800/767-7310; www.thompsonpump.com.**

SINGLE COMPRESSIONS CYCLE

The self-priming, seal-free **MiniPump** from **Eccentric Pumps LLC** has flow rates from 1 gph to 2 gpm. A single hose compression per cycle extends hose life, produces more flow per revolution, and creates high vacuum for suction lift

applications. The reversible dry-running pumps run slower and 8 to 10 degrees F cooler than sliding shoe pumps. **404/816-4760; www.eccentricpumps.com.**

SUCTION SOLVER

The **1700 Series**, a heavy-duty, hydraulically actuated tubular diaphragm pump from **Lutz-Jesco America Corp.** handles inconsistent suction conditions, providing suction lift capabilities to 16 feet total dynamic head and 1,640 gph. It has a manual micrometer stroke length control, an internal hydraulic relief valve, easy-maintenance cartridge-type check valves, an internal back pressure valve, automatic stroke length control, diaphragm leak detection, and AC or DC speed control. **800/554-2762; www.jescoamerica.com.**

AIR-OPERATED PUMPS

Pumps 2000 America air-operated double diaphragm pumps from **Megator Corp.** come in 1-, 1.5-, and 2-inch designs that pass 1.5-inch solids. The stall-free air motor runs without lubrication and uses half the industry standard for air consumption. Explosion-proof conductive plastic construction resists deterioration even in low-pH locations and is lightweight. The 2-inch model weighs 41 pounds. The maintenance-free high-suction lift (27 feet wet or dry) comes from double-

hinged diaphragms, long stroke, and self-cleaning slurry valves. **800/245-6211; www.megator.com.**

PACKAGED WATER SYSTEMS

Factory-prefabricated, protected **water reuse systems** from **Metropolitan Industries** reclaim effluent from the final disinfection chamber. They come complete with controls, tanks, and pumps that meet flow and pressure applications such as split case and close-coupled, multi-stage, and flex-coupled end suction. **800/323-1665; www.metropolitanind.com.**

METERING PUMPS

Available in four models with flow rates from 1 gph to 2 gpm and pressures up to 300 psi, **ProCam Smart pumps** from **Bran+Luebbe**, an **SPX Process Equipment** operation, meter pH control, flocculation, and fluoridation using standard components. The hermetically closed pumps have a mechanically operated polytetrafluoroethylene double-diaphragm arrangement that operators can monitor. **800/252-5200; www.branluebbe.com.**

(continued)



MiniPump from Eccentric Pumps



1700 Series diaphragm pump from Lutz-Jesco America Corp.



Pumps 2000 America diaphragm pumps from Megator Corp.



ProCam Smart pumps from Bran+Luebbe



Abaque series peristaltic hose pumps from Blackmer

PERISTALTIC HOSE PUMPS

Constructed of ductile iron and steel, **Abaque series peristaltic hose pumps from Blackmer, a company within the Dover Corporation Pump Solutions Group**, have discharge pressures to 217.5 psi. A seal-free design eliminates leaks, contamination, and product loss, while reducing maintenance and repairs.

Hoses come in natural rubber, Buna or NBR, and EPDM. Available in nine sizes with flow rates from 0.07 to 237 gpm, the reversible pumps are self-priming to 29.5 feet manometric lift, can run dry continuously without detrimental effects, and handle a high concentration of solids. **616/248-9252; www.blackmer.com.**

HIGH-FLOW MOLDED PUMP

Series HF horizontal pumps from Serfilco Ltd. have flows to 400 gpm or 170 feet total dynamic head, come in high-temperature polypropylene or chlorinated polyvinyl chloride construction, and are ANSI dimensional with the optional ANSI 150-pound flange connection. An enclosed impeller, molded to close tolerances, allows the pumps to operate at peak horsepower (up to 30 hp) efficiency for many flow and head requirements, including dry-run capability. All have an external Type 21 mechanical seal with silicon carbide seal faces. Models with double mechanical seals require water lubrication for solutions containing abrasives. **800/323-5431; www.serfilco.com.**



Series HF horizontal pumps from Serfilco Ltd.



SPX pumps from Watson-Marlow Bredel Pumps



Tube-mounted screw pumps from Schreiber LLC

TUBE MOUNTED

Tube-mounted screw pumps from Schreiber LLC use a variation of the Archimedes screw pump inserted in a steel stationary pipe, simplifying structure design and eliminating grouting. The self-contained units provide variable capacity at constant speed, and come factory-assembled. They can be set at a fixed angle or the lower end supported by a hoist to vary the pump angle and for maintenance access.

The lower bearing design is based on an oil-lubricated, single-row spherical roller, combination radial-and-thrust bearing with true self-aligning capability. An elevated oil reservoir with feed hose lubricates the bearing. Oil is not continuously consumed but changed periodically. A simple pillow block bearing supports the pumps at the upper shaft. **205/655-7466; www.schreiberwater.com.**

HEAVY-DUTY HOSE PUMPS

With operating pressures to 232 psi and flow rates to 350 gpm, heavy-duty **SPX pumps from Watson-Marlow Bredel Pumps** handle abrasive sludge with no affect on pump life. Peristaltic hose pumps work by alternately compressing and relaxing a machined hose element between the pump housing and compressing shoes.

The fluid ahead of the shoe is pushed toward the discharge, while the rebounding hose behind the shoe draws in more fluid. With 100 percent com-



The H2O Works multipurpose vertical turbine (MPVT) pump from Patterson Pump Co.

pression at all times, the pumps do not slip, providing metering accuracy and pressure performance. With no pump seals, seats, or valves, abrasive slurries are no problem. With its self-loading design, hose replacement is quick and easy. **800/282-8823; www.watson-marlow.com.**

VERTICAL TURBINE PUMP

The **H2O Works multipurpose vertical turbine (MPVT) pump from Patterson Pump Co.** has an internal vane that prevents stringy solids from wrapping around the shaft. Cast-iron bronze-fitted bowls from 12 to 40 inches deliver 1,500 to 20,000 gpm. Units have a cast-iron discharge head, fabricated steel column, stainless steel head and bowl shaft, and alloy steel line shaft. Open line shaft construction is standard.

Pumping sections can be staged to meet desired pressure requirements. The low-vibration, quiet pump has a small footprint and operates in low NPSHA (net positive suction head available) applications. The discharge, motor, and controller are above ground for easy maintenance. **706/886-2101; www.pattersonpumps.com.**

SUBMERSIBLE SHREDDER

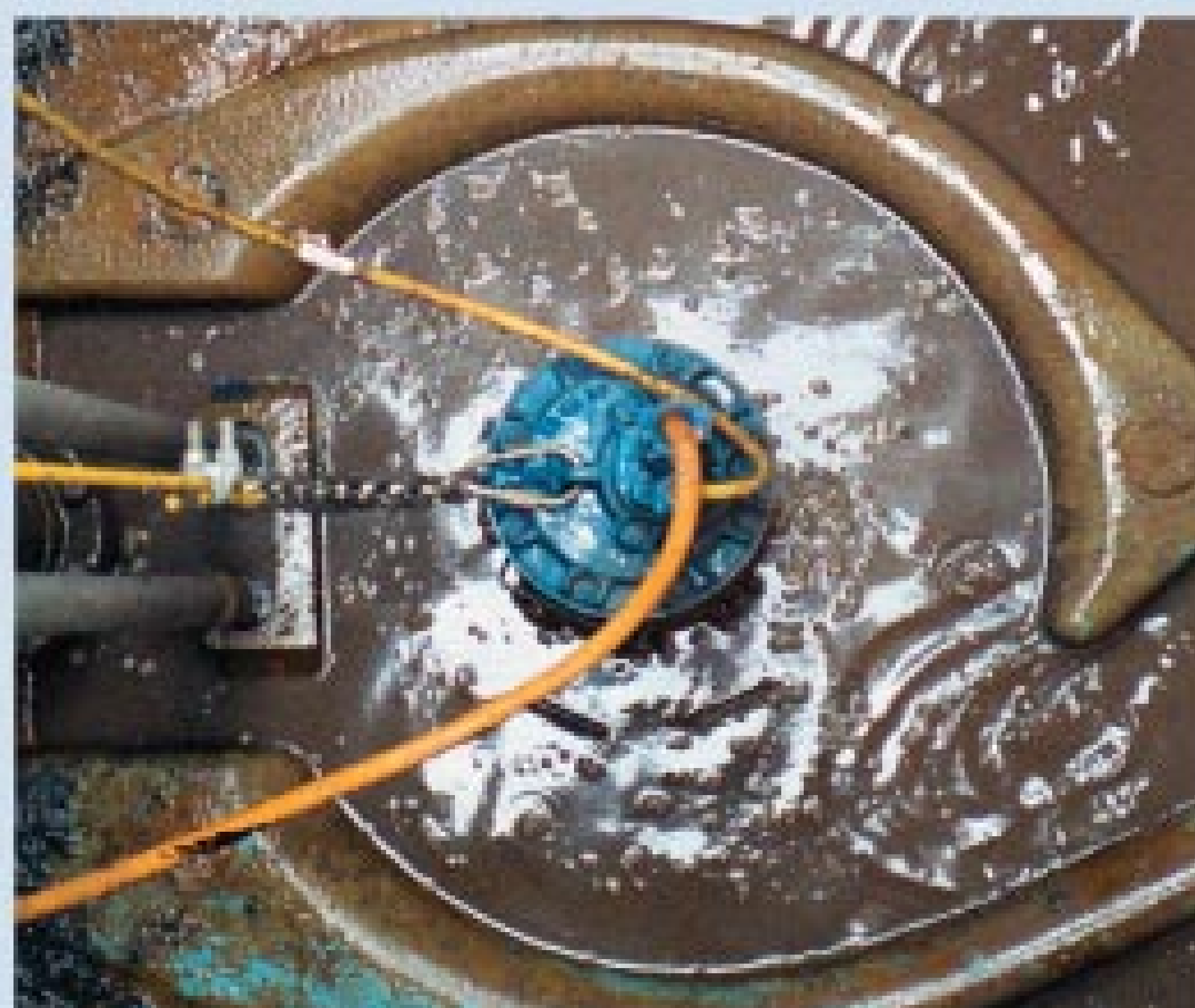
The **S4SHR 4-inch hydraulic submersible shredder pump from Hydra-Tech Pumps** has an open-vane shredder impeller with tungsten carbide cutting tip that continuously rips and shears solids



S4SHR submersible shredder pump from Hydra-Tech Pumps



ShaftAlign pump shaft alignment tool from Ludeca Inc.



WEMCO-Hidrostal centrifugal pump
from Weir Specialty Pumps

up to 3.5 inches with a 360-degree shredding action. The variable-speed hydraulic drive pump operates with flows of 10 to 15 gpm and maximum pressure of 2,600 psi. A guiderail assembly is available for stationary applications. **570/645-3779; <http://hydra-tech.com>.**

THREE IN ONE

The **WEMCO-Hidrostal submersible/immersion screw centrifugal pump from Weir Specialty Pumps** combines the clog-free features of a vortex pump with the gentle action of a screw pump and the high efficiency (up to 80 percent) of a centrifugal pump, while handling large and stringy solids. It also comes in a prerotation system that automatically adjusts pumping volume to varying inflow rates using a constant-speed motor and pump. The pumps are made of cast iron with optional high-chrome iron impeller and suction liner. **801/359-8731; www.weirsp.com.**

SHAFT ALIGNMENT

ShaftAlign pump shaft alignment tool from Ludeca Inc. is high-precision, easy-to-use, and incorporates error-proof functions. Its intuitive auto-flow functionality guides operators through three easy steps to determine the machinery alignment condition: dimensions, measure, and results.

The active clock measurement mode automatically collects the laser coordinates for the corresponding shaft position. Only three readings over a rotation angle of less than 70 degrees achieve precision alignment. All relevant alignment results, including the alignment status



2000 HS system from Moyno Inc.



Dri-Prime backup systems (DBS) from
Godwin Pumps of America Inc.

evaluation, are displayed on the high-resolution color backlit thin-film transistor screen through Smiley and LEDs. Alignment results are archived or print to PDF with included software. **305/591-8935; www.ludeca.com.**

SLUDGE PUMP

The **2000 HS system from Moyno Inc.** has an integral hopper with twin-screw auger feeder and G4 PC pump that handles semi-dry, high-solids, dewatered biosolids to more than 50 percent solids. The system pumps filter cake long distances with high-volumetric efficiency. Its twin-screw feeder supplies a constant, pressurized feed rate to the pump for a 100 percent pump cavity fill. The design of the Ultra-Feed pump rotor head contributes to the volumetric efficiency, while the non-pulsing flow reduces operating pressures. **877/486-6966; www.moyno.com.**

MAINTAINS INTEGRITY

Dri-Prime backup systems (DBS) from Godwin Pumps of America Inc. provide independent power in one package for emergencies including

primary power, switchgear, and sewage pump failures or repairs, and for primary pumping during routine maintenance. Systems are available in sizes 3 to 16 inches with flows to 10,000 gpm, heads to 600 feet, and solids handling to 5-inch diameter. Units start by themselves, pump the required flow, and shut off when the wet well is lowered or the primary system regains control. The PrimeGuard digital pump controller interfaces with existing control systems, allowing electronic remote monitoring. **856/467-3636; www.godwinpumps.com.**

RECIRCULATOR PUMP

The submersible recirculator **Chopper pump from Vaughan Co. Inc.** has a guiderail system and an adjustable recirculator nozzle assembly that mixes and pumps solids-laden waste pits. The chopper design eliminates plugging and the need for a comminutor or screens. Units have heat-treated alloy steel and ductile iron components and an oil bath seal-and-bearing system for reliable operation. **360/249-4042; www.chopperpumps.com. tpo**



Chopper pump from
Vaughan Co. Inc.

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OK – Your Turn!

A LONG-TIME OPERATOR HAS VISIONS OF A BOARD GAME THAT WOULD MAKE LEARNING ABOUT WASTEWATER TREATMENT FUN FOR TRAINEES AND HELP ENGAGE PUBLIC INTEREST

By Ted J. Rulseh

Frank Eggleston grew up as a lover of board games, from Candyland, Sorry! and Chutes & Ladders to Monopoly, Scrabble and Life. Today, his tastes run toward more cerebral games like chess, Taboo, Scruples and Balderdash.

His dream is to create a board game for wastewater treatment operators — one in which players work their way around a game board by answering questions that pertain to a variety of scenarios and situations they might encounter at a typical treatment plant.

Eggleston has worked in the profession for 29 years, all at the Ithaca (N.Y.) Area Wastewater Treatment Facility, where he is now assistant chief operator. He is in the early stages of developing the game and is looking for ideas from his peers in the profession. He talked about the project in an interview with *Treatment Plant Operator*.

tpo: Tell us about your background in the wastewater treatment profession.

Eggleston: After I got out of the Navy in 1980, I was looking for a job, and my experience as a machinist mate gave me the qualifications for the position of operator trainee here in Ithaca. I started in 1981 at the old treatment plant. I stayed until the new plant was completed in 1987, and that's when things start to get interesting.



Frank Eggleston

"I'm going to retire in three years, and I thought it would be nice to leave the industry with something, to leave a legacy by giving back something to help the industry. It seemed natural to try and create a board game."

FRANK EGGLESTON

I took training to become certified as a higher-level operator. I ran our belt filter press for eight years and got a letter of commendation from the chief operator for having high throughput, good-quality cake and good efficiency. Then I worked in the lab for about eight years. In between, I served as an operator out in the plant. I became assistant chief operator three years ago.

We have a conventional activated sludge plant, and on our tail end we recently added a tertiary system called Actiflo (Veolia Water Solutions & Technologies) for phosphorus removal. We're staffed by about 15 people. Our daily flow is about 6 mgd. It's seasonal because

we have Cornell University here. During the school year, we're busier, and we have a higher BOD loading then.

tpo: How did you get the idea for a game about wastewater treatment?

Eggleston: I've always been kind of creative, and I've always had an interest in board games. I'm going to retire in three years, and I thought it would be nice to leave the industry with something, to leave a legacy by giving back something to help the industry. It seemed natural to try and create a board game.

I've had ideas for games to develop on a commercial level in my personal life, but this is something I think of as being just for the industry. I can't imagine the average person going out and buying it. I don't see someone like Hasbro taking this on as something to sell, but as a tool for the industry, I think it could be fantastic.

tpo: Have you seen anything at all similar to this in the industry?

Eggleston: In New York, the Department of Environmental Conservation teaches a troubleshooting class at Old Forge, and as part of it they play Sludge Jeopardy. It's played along the same lines as the actual Jeopardy game on TV.

In the class, you'll be sitting in groups of four or five around tables, and each group has a little buzzer. They present the answers on a screen in PowerPoint. You hit the buzzer and answer with a question.

There are various topics, like primary treatment, sedimentation and solids handling. All the questions are related to things you learned at some point during the week-long course. They play the game on the Friday when you're about to leave. At the end, the winners get a Golden Plunger award. It makes the course more fun. You're not just learning and taking a test. You get some enjoyment out of it.

tpo: What needs would you see a board game fulfilling for the industry?

Eggleston: I could see it serving a couple of purposes. You'd be able to use it in the industry for people coming out of technical schools, or for operators at the end of certification classes. They would take a basic operations class, and at end of the course they would play this board game.

I think it would also have value for public relations purposes. It could be played by members of tour groups who come to treatment

plants. Or if a school was trying to promote environmental studies, this would give them a fun way to learn about wastewater treatment, by going around the board and seeing the process.

You would have to adapt the game to suit the players. For wastewater operators, you'd have more technical questions. For kids, you'd have easier questions. A lot of games are set up that way, with harder questions based on your age or your knowledge.

tpo: How do you envision the game being structured?

Eggleston: The game board would be designed and illustrated to show the basic systems and processes found at a conventional activated sludge plant: preliminary treatment, primary and secondary sedimentation, aeration, tertiary treatment, disinfection, anaerobic digestion, and solids removal.

You'd have a circular spinner like in the game of Life, but it would be shaped like a sludge rake. Players would proceed through each stage of the plant, starting with preliminary treatment. To pass through one stage and proceed to the next, they would have to become "certified" in order by answering multiple-choice questions about that treatment process.

Other players would be allowed to comment on their answers to be sure they were not just guessing. If by consensus the players determined that an answer was a wild guess, the player guessing would forfeit his turn and proceed to the laboratory, in the center of the board.

In the same way, if someone challenged an answer but turned out to be wrong, that person would go to the lab. The lab would be like the jail in Monopoly. On their next turn, they would have to answer an analytical question to go back to the beginning of the last process they were in.

There would also be Upset squares. Players landing on one of those would be presented with a scenario of a problematic situation that, if left unchanged, could lead to a violation of the plant permit. They would be given four choices of short-term solutions. Only the best answer would enable them to spin the rake again and move on.

tpo: Where would you get the information to create these scenarios?

Eggleston: It would be nice to get actual stories from regulatory agencies in different states, where they went into a plant and did troubleshooting. The agencies would surely have those cases on record. And individual plants have their experiences, too. Almost any plant has had strange things happen that at first they couldn't figure out.

tpo: What are you doing to get input from your peers in the industry to help you develop this game?

Eggleston: I've been sending requests to industry groups like

WEF and the New York Water Environment Federation. I sent a blurb to an online operator forum at www.waterandwastewater.com. I would love to be able to get a list of e-mails of wastewater treatment operators and send a message to them. In my free time, I'm searching for different avenues for getting the word out.

tpo: What about funding? How would you expect to pay for the production of this game once you have it designed?

Eggleston: I can come up with the basic design and layout for the board. After that, I know there must be companies out there that

"You would have to adapt the game to suit the players. For wastewater operators, you'd have more technical questions. For kids, you'd have easier questions. A lot of games are set up that way, with harder questions based on your age or your knowledge."

FRANK EGGLESTON

would see an idea like this and want to contribute in some way. There might be a way for those who did contribute to be recognized on the game board.

tpo: What's your timetable for bringing this project to completion?

Eggleston: I'm starting a rough draft of the board and taking ideas from other people as they come in. My chief operator, Dan Ramer, has given me the OK to do this in my spare time. He's a progressive thinker and has a fun attitude. He thought this was a good idea. It could take a year. It could take longer. Hopefully I finish it before I retire — that's the goal. **tpo**

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DuraFlex couplings from TB Wood's utilize a polyurethane material formulated for superior weathering, chemical resistance and dynamic properties. The two-piece, split-element design eliminates the need to remove hubs during element replacement. The coupling requires no maintenance or lubrication. www.altramotion.com.

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The Gas Chlorinator from Regal uses 100 percent chlorine to disinfect and purify wastewater. The device provides consistent chlorine residual and features an all-vacuum system, limiting the possibility of gas leaks. 772/288-4854; www.regalchlorinators.com.

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The wireless manhole monitoring system from Weidmuller is designed to monitor underground sewer levels to prevent sewage overflow. Installed in the manhole, the system sends signals through the ground and steel manhole covers to receivers located in control cabinets. Signals can be transmitted via wireless or wired connection to a programmable logic controller or SCADA system. The portable unit is powered by six AA-sized batteries and features a small external antenna.

It can send both analog and discrete signals, enabling both water levels and high-low set point to be monitored. Components include a wireless transmitter and battery pack. Downloadable software permits transmission signal mapping and control of the transmit schedules. 800/849-9343; www.weidmuller.com.

3. FPZ OFFERS K10-TD BLOWER

The SCL K10-TD blower from FPZ Inc. uses regenerative, side-channel technology to deliver 570-scfm/13.2-inches-Hg vacuum with 7.5 psig. The double-rotor, double-stage blower, in 15-, 20-, or 25-hp, has an integral, direct-drive, oil-less TEFC motor (no belts/transmissions). The 384-pound unit runs at less than 88 dBA. 262/268-0180; www.fpz.com.

4. ROTEX OFFERS APEX DRY SEPARATION SCREENER

The Apex dry separation screener from Rotex Global LLC is a self-contained production system, featuring gyratory-reciprocating motion with positive screen cleaning. Its ergonomic design enables one person to maintain, inspect and clean the unit. 800/453-2321; www.rotex.com.

WIKA OFFERS SANITARY GAUGE ASSEMBLY

The all-welded M93X.3A sanitary gauge assembly from Wika Tronic meets 3A third-party standards and biopharmaceutical industry standards. All external stainless steel surfaces are electro-polished. Wetted components have full material identification and traceability. 888/945-2872; www.wika.com.

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Square D brand Pumptrol 9013 pressure switches from Schneider Electric feature Restriction of Hazardous Substances-compliant Chromate 3 plating, reducing the potential for corrosion and rust in a more environmentally friendly way. The plating covers all metal parts, protecting the switches' key mechanical components. The diaphragm also is manufactured to U.S. Food & Drug Administration specification CFR 177.2600. **www.pumptrol.com.**

MWH SOFT RELEASES VERSION 10.5 OF INFOWORKS

Version 10.5 of InfoWorks, InfoNet and FloodWorks is available from MWH Soft. InfoWorks CS enables engineers and planners to produce hydraulic modeling of a complete urban collection system network, including trunk sewers and complex pipe connections and ancillary structures, while InfoWorks SD enables users to model stormwater flows through a complex environment with a diversity of underground and overland structures. InfoNet is a purpose-built asset and data management system for water distribution, wastewater collection and stormwater networks. FloodWorks focuses on real-time simulation and forecasting of future hydrological and hydraulic conditions in stormwater and drainage systems. **626/568-6868; www.mwhsoft.com.**

6. BILCO OFFERS ALUMINUM ACCESS DOORS

J-AL aluminum access doors from Bilco feature stainless steel hardware for corrosion resistance and are available in single- or double-leaf design. **203/934-6363; www.bilco.com.**

7. MSA OFFERS TRIGARD MONITORING SYSTEM

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8. SEL INTRODUCES REAL-TIME AUTOMATION CONTROLLER

The SEL-3530 real-time automation controller from Schweitzer Engineering Laboratories Inc. features an IEC 61131 logic processor, secure communications, advanced data concentration, local and remote I/O and protocol conversion capabilities. **509/332-1890; www.selinc.com.**

9. HEMCO INTRODUCES UNIFLOW CE LABORATORY FUME HOODS

UniFlow CE laboratory fume hoods from HEMCO Corporation are available in 30-, 36- and 48-inch widths. The hoods are constructed of a composite resin for chemical resistance and can be supplied with or without an exhaust blower in standard or explosion-proof models. **816/796-5983; www.hemcocorp.com.**

SPX INTRODUCES CLEAN EDGE IMPELLER

The Clean Edge impeller from SPX Process Equipment's Lightning Operation is designed to eliminate rag buildup in municipal treatment plants. **585/527-1749; www.lightninmixers.com.**

(continued)

product spotlight

Heating Blankets Provide Cold-Weather Protection

By Ed Wodalski

FreezeSentry heating blankets from Rain for Rent are designed to maintain a constant temperature, preventing liquids from freezing and protecting equipment. Resembling a giant electric blanket, the wrap is available in various configurations to cover pipe, manifolds, well-heads, pump volutes and priming chambers, barrels, totes, frac tanks, upright tanks, filtration units, and more.

The wrap uses a technology in which resistive electrical elements are attached to a carbon-based material that works as a heat sink, spreading the heat evenly throughout the blanket, says Kevin Day, specialty products manager.

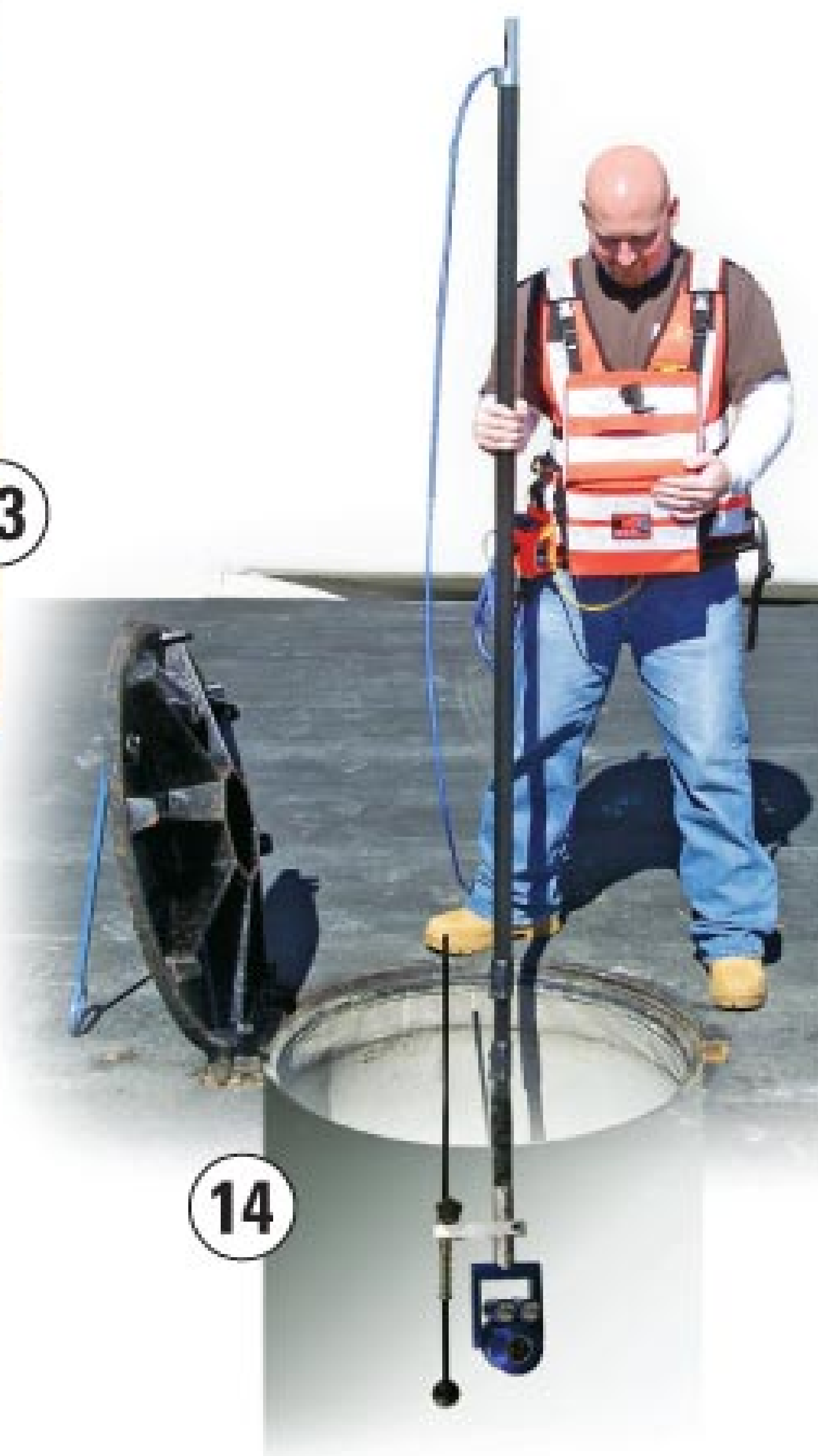
"The temperature throughout the blanket is uniform and consistent," he says. The wrap delivers with more than 90 percent of the heat to the targeted material. The outer shell is made of a rip-resistant vinyl, cold rated to -65 degrees F.

"Generally speaking, the product is used for freeze protection," says Day. "It's not designed to heat large tanks." The wrap temperature can exceed 180 degrees, if needed. The product can be rented. "You need it for four months out of the year, you rent it from us. And at the end of the four months you hand it back to us and we'll hang onto it until you need it next year," Day says.

Using a 20-amp 120-volt outlet, the blankets have a built-in thermostat and strain-resistant cord. Manifold and pipe wraps are available in 5-, 6-, 8- and 10-foot sizes and up to 25 feet in length. Wraps also are available for 4,900- and 6,900-gallon poly tanks, 400-barrel upright steel tanks, and 500-barrel rectangular and bi-level tanks. Custom sizes are available. **800/742-7246; www.rainforrent.com.**

FreezeSentry heating blankets from Rain for Rent





10. ASAHI INTRODUCES SERIES 92 ELECTRIC ACTUATORS

Series 92 electric actuators from Asahi/America Inc. feature a die-cast aluminum alloy enclosure, bolted together in two sections by eight hex-head cap screws and fitted with an O-ring between the two halves for environmental purposes. Access to the enclosure is by M20 conduit openings in the base. The ATEX-certified actuators are designed for use in potentially explosive atmospheres. **877/242-7244; www.asahi-america.com.**

11. ELECTRO-CHEMICAL OFFERS HYDRA AMMONIUM ANALYZER

The Hydra ammonium analyzer from Electro-Chemical Devices Inc. can be used to monitor the ammonium nutrient load directly in the aeration basin of a wastewater treatment plant. It automatically compensates for the pH-dependant concentration equilibrium and potassium ion interference on the electrode and measures ammonium and potassium in concentrations from 0.1 to 1,000 ppm, pH from 0 to 14 and temperature from 32 to 212 degrees F. **800/729-1333; www.ecdi.com.**

12. SAUEREISEN OFFERS SEWERGARD 210 LININGS

The SewerGard 210 family of protective polymer linings from Sauereisen Inc. is formulated for low permeability to enhance corrosion resistance and extend the longevity of infrastructure, such as manholes and lift stations. Available in several variations to accommodate desired thickness and methods of application, the liner can be spincast, trowled, rolled or applied by airless spray. **412/963-0303; www.sauereisen.com.**

13. TECHNOLOGIES OFFERS FLOWTEX DISC FILTER

The FlowTex disc filter from Entex Technologies Inc. is suitable for both small and large flow applications and can remove suspended solids as small as 10 microns. Each separately monitored disc has two independently operated segments that can be replaced without taking the filter offline. **919/933-2770; www.entexinc.com.**

14. CUES OFFERS QZ2 VIDEO INSPECTION SYSTEM

The QZ2 portable, pole-mounted video inspection system from CUES Inc. can be operated by one person to perform inspections, surveys of pipelines, wet wells, manholes, sewer treatment plants, steam generators, tanks, vessels and other difficult-to-reach areas without confined-space entry. The camera system is mounted on a carbon fiber, adjustable telescopic pole that can extend up to 24 feet. An optional 34-foot pole is available. The system features a 420:1 (35-optical/12-digital) zoom with automatic focus and self-contained, waterproof lighting for enhanced detailed viewing of cracks, breaks, pipe separations, scale and various defects from hundreds of feet away. It also can be used to locate lateral services or identify a blockage at a manhole, access port or other entry point. The unit includes two high-density discharge lights and VIS (video image stabilization) module for sharp and stable images. **800/327-7791; www.cuesinc.com. tpo**

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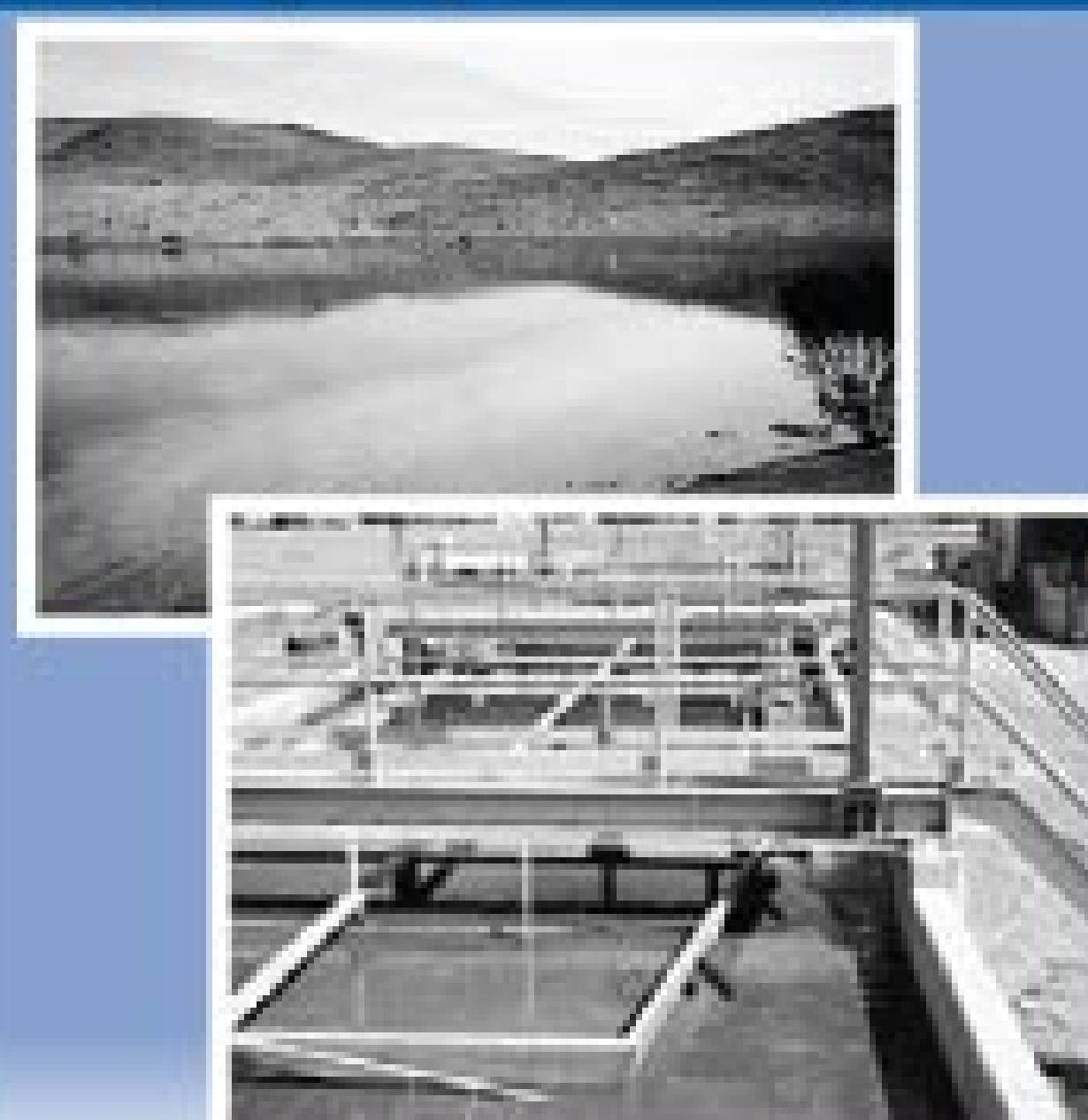
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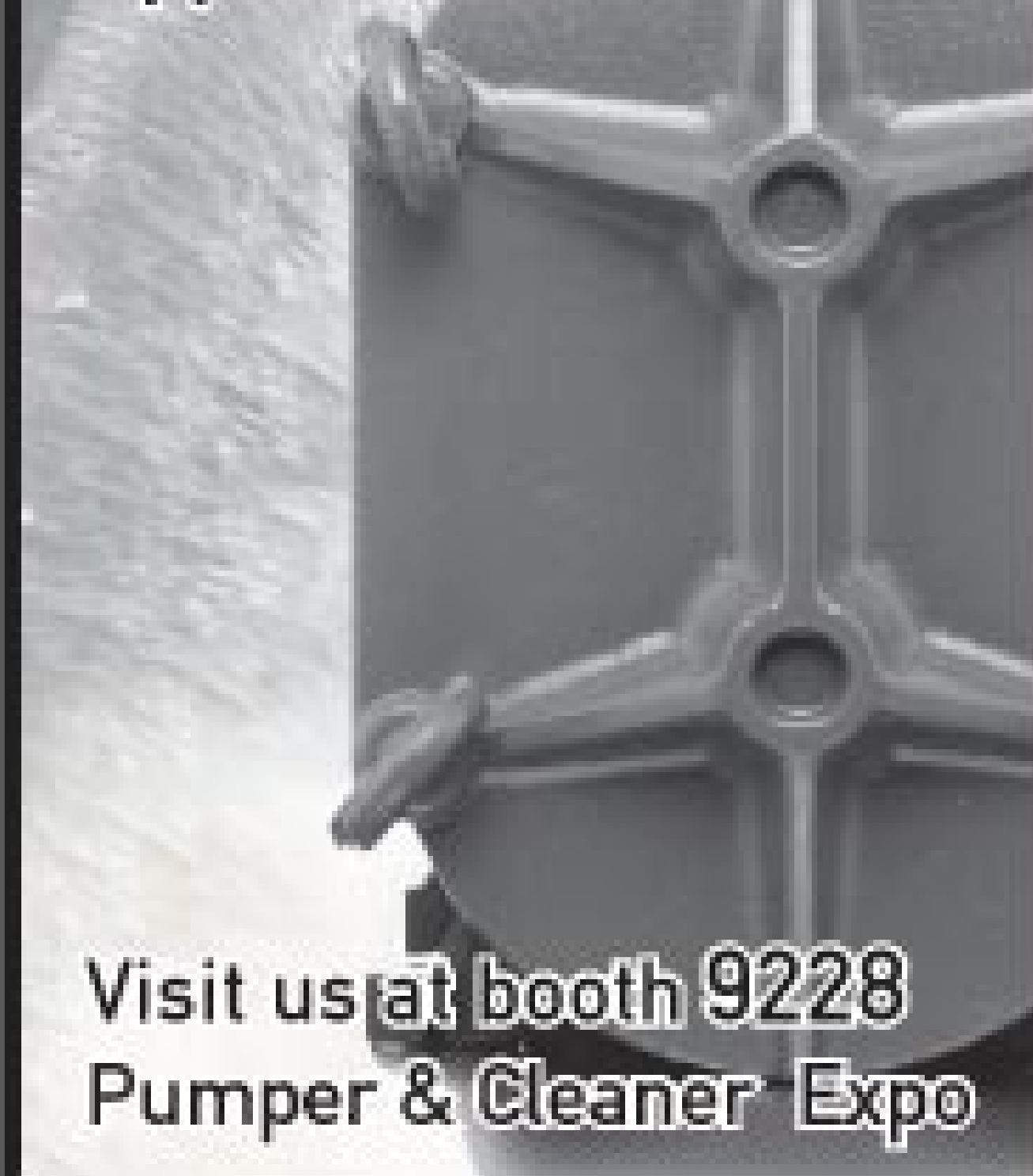
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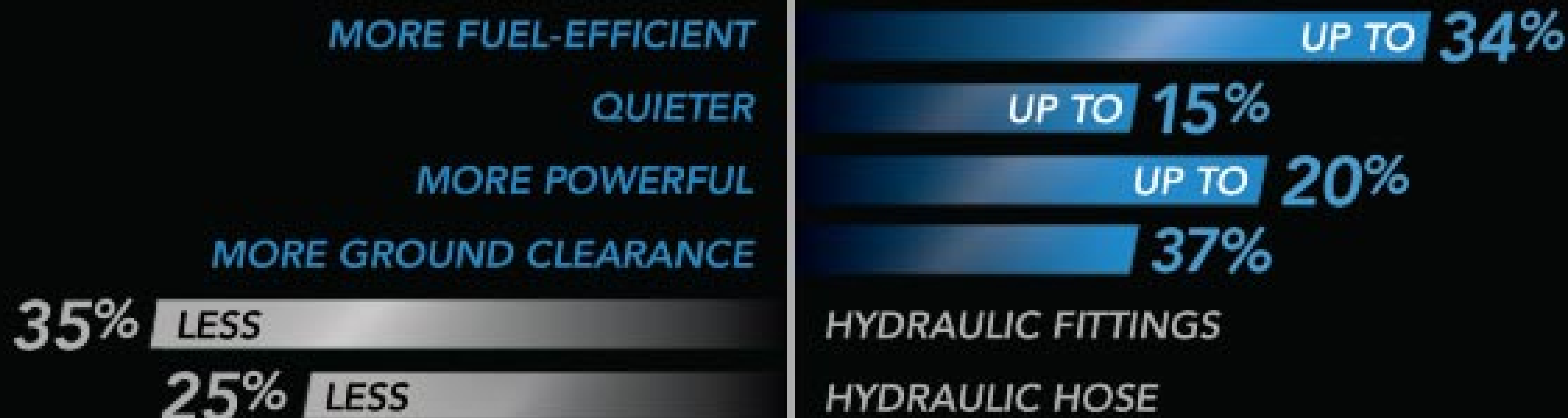


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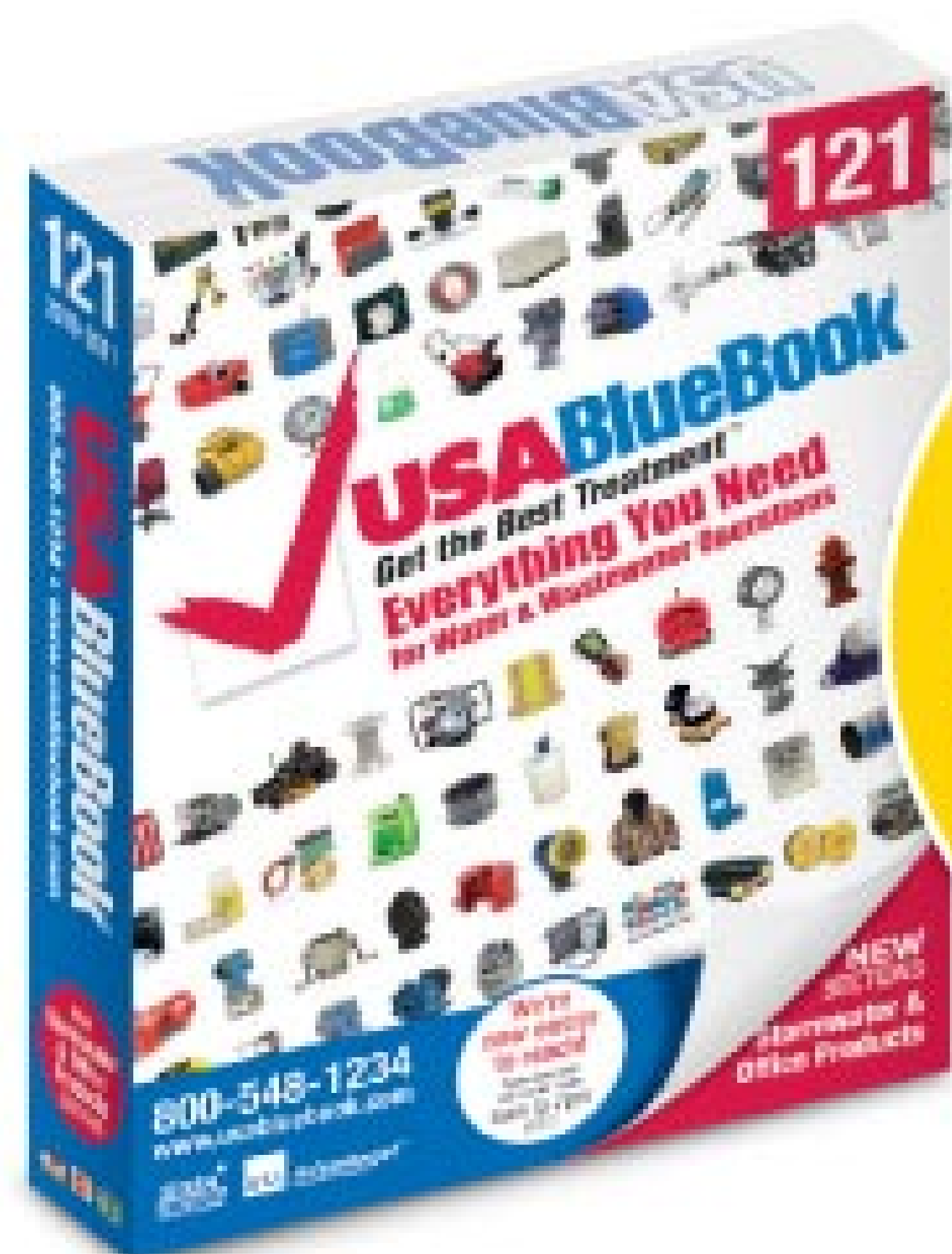
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