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JUNE 2010

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Total Project Costs... the **BIG** picture

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Location	Flow (MGD)	Project Cost	\$/Gallon
AZ	0.10	\$ 2,570,000	\$ 25.70
WA	0.15	\$ 4,500,000	\$ 30.00
NC	0.20	\$ 5,800,000	\$ 29.00
MI	0.32	\$ 3,200,000	\$ 10.00
OR	0.40	\$ 5,600,000	\$ 14.00
MO	0.40	\$ 4,200,000	\$ 10.50
WA	0.48	\$ 14,900,000	\$ 31.04
NM	0.50	\$ 6,100,000	\$ 12.20
Averages	1.36 MGD	\$18.77/gal	
SC	0.67	\$ 7,000,000	\$ 10.45
VA	0.70	\$ 20,000,000	\$ 28.57
CA	1.00	\$ 26,000,000	\$ 26.00
WA	1.50	\$ 34,000,000	\$ 22.67
CA	1.80	\$ 42,500,000	\$ 23.61
CA	2.00	\$ 30,000,000	\$ 15.00
CA	2.80	\$ 40,000,000	\$ 14.29
FL	4.00	\$ 58,000,000	\$ 14.50
MI	4.00	\$ 48,000,000	\$ 12.00
CA	5.00	\$ 58,000,000	\$ 11.60

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Location	Flow (MGD)	Project Cost	\$/Gallon
WA	0.10	\$ 1,700,000	\$ 17.00
OR	0.13	\$ 1,100,000	\$ 8.80
CA	0.20	\$ 2,500,000	\$ 12.50
OR	0.20	\$ 3,000,000	\$ 15.00
WA	0.30	\$ 2,900,000	\$ 7.67
WA	0.36	\$ 6,200,000	\$ 17.22
UT	0.38	\$ 2,138,000	\$ 5.70
AZ	0.50	\$ 3,650,000	\$ 7.30
Averages	1.15 MGD	\$9.56/gal	
GA	1.00	\$ 10,700,000	\$ 10.70
MI	1.00	\$ 8,000,000	\$ 8.00
GA	1.00	\$ 11,600,000	\$ 11.60
GA	1.00	\$ 8,000,000	\$ 8.00
CA	1.25	\$ 16,200,000	\$ 12.96
NM	1.80	\$ 16,200,000	\$ 9.00
GA	2.00	\$ 14,500,000	\$ 7.25
WA	2.00	\$ 12,000,000	\$ 6.00
GA	2.00	\$ 16,200,000	\$ 8.10
OH	6.00	\$ 31,800,000	\$ 5.30

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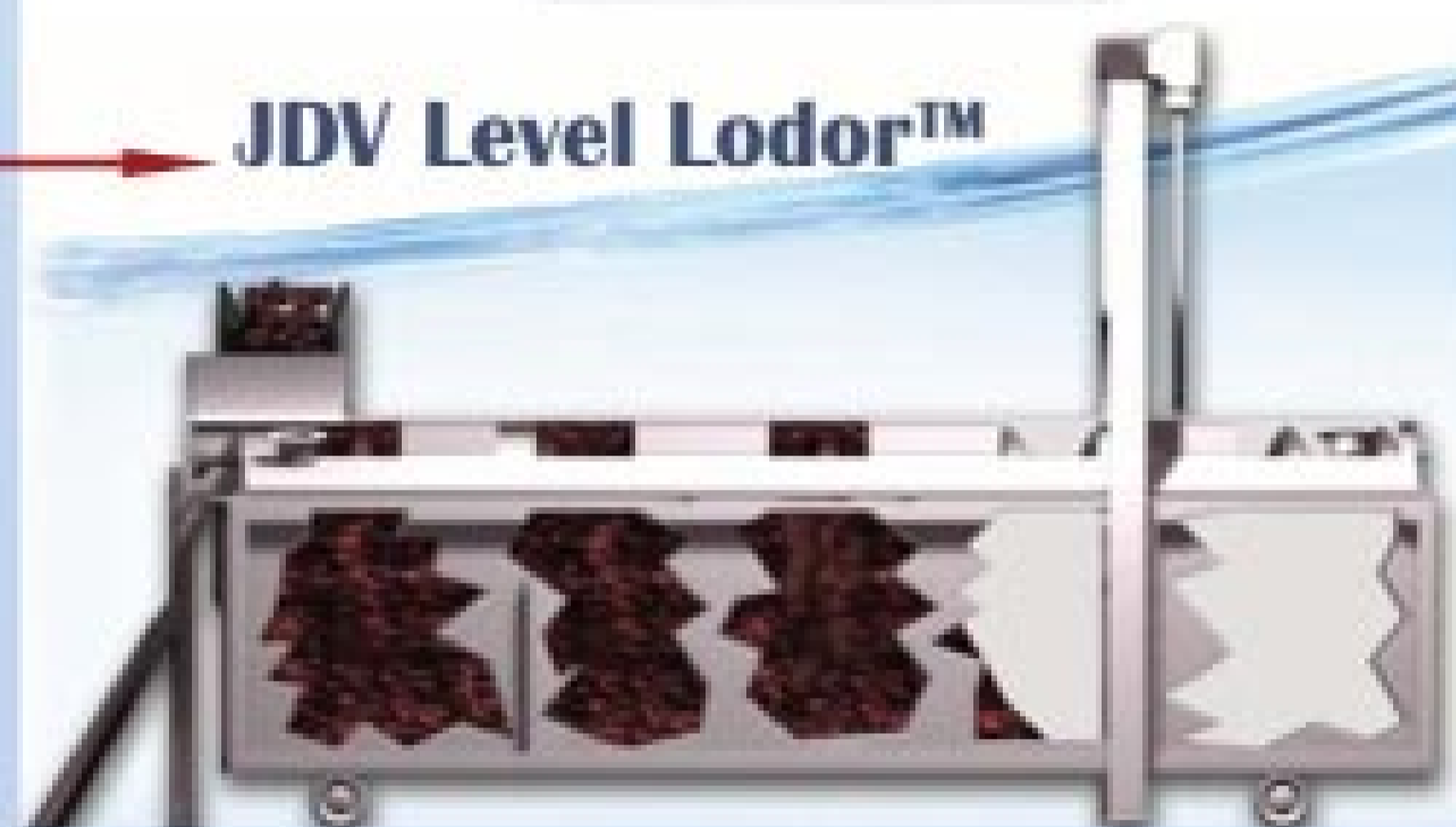
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letters

Article Hit Home

Your article, "What Exactly Do You Do?" (*TPQ* March 2010) really struck a nerve with me. When I worked at a local prison, I used to tell people I was a correctional officer, and they had all kinds of interest and questions for me.

When I became a wastewater treatment operator and told people my profession, mostly I got was kind of an "eeeewww" reaction. I honestly had never even thought of saying that I make clean water.

The longer I work in this field, the more I realize the importance of what we do, and the more proud I become of my occupation. I have started answering the "What do you do?" questions with: "I make clean water."

This gives a great opportunity to provide a little education about the importance of our jobs. I am not OK with operators who belittle what they do. We are professionals, and it is past time that our actions and attitudes reflect that.

The way I look at it, if you ever ate a wild-caught fish or swam in a natural body of water ... you're welcome! Keep up the great work on the magazine. I look forward to getting it every month.

Larry Littrell
Wastewater Operator Group IV
Lake Stevens Sewer District
Lake Stevens, Wash.

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DEDICATED TO MUNICIPAL
WASTEWATER PROFESSIONALS

Published monthly by:

COLE publishing

1720 Maple Lake Dam Rd., PO Box 220
Three Lakes WI 54562

www.tpomag.com

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In U.S. or Canada call
toll free 800-257-7222

Elsewhere call 715-546-3346

E-mail: info@tpomag.com

Web site: www.tpomag.com

Fax: 715-546-3786

Office hours Mon.-Fri.,
7:30 a.m.-5 p.m. CST

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ADDRESS CHANGES: Submit to *TPO*, P.O. Box 220, Three Lakes, WI, 54562; call 800-257-7222 (715-546-3346); fax to 715-546-3786; or e-mail nicole@colepublishing.com. Include both old and new addresses.

ADVERTISING RATES: Call 800-994-7990 and ask for Phil or Kim. Publisher reserves the right to reject advertising which in its opinion is misleading, unfair or incompatible with the character of the publication.

EDITORIAL CORRESPONDENCE: Address all editorial correspondence to Editor, *TPO*, P.O. Box 220, Three Lakes, WI, 54562 or e-mail editor@tpomag.com.

REPRINTS AND BACK ISSUES: Visit www.tpomag.com for options and pricing. To order, call Jeff Lane at 800-257-7222 (715-546-3346) or e-mail jeffl@colepublishing.com.

CIRCULATION: Circulation is controlled at 73,000 copies per month.

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on the cover

The Michigan cities of Wyoming and Grand Rapids have formed the Grand Valley Regional Biosolids Authority (GVRBA) to manage biosolids more cost-effectively. Kim Hackbardt leads the effort as project manager. (Photography by Dan Watts)





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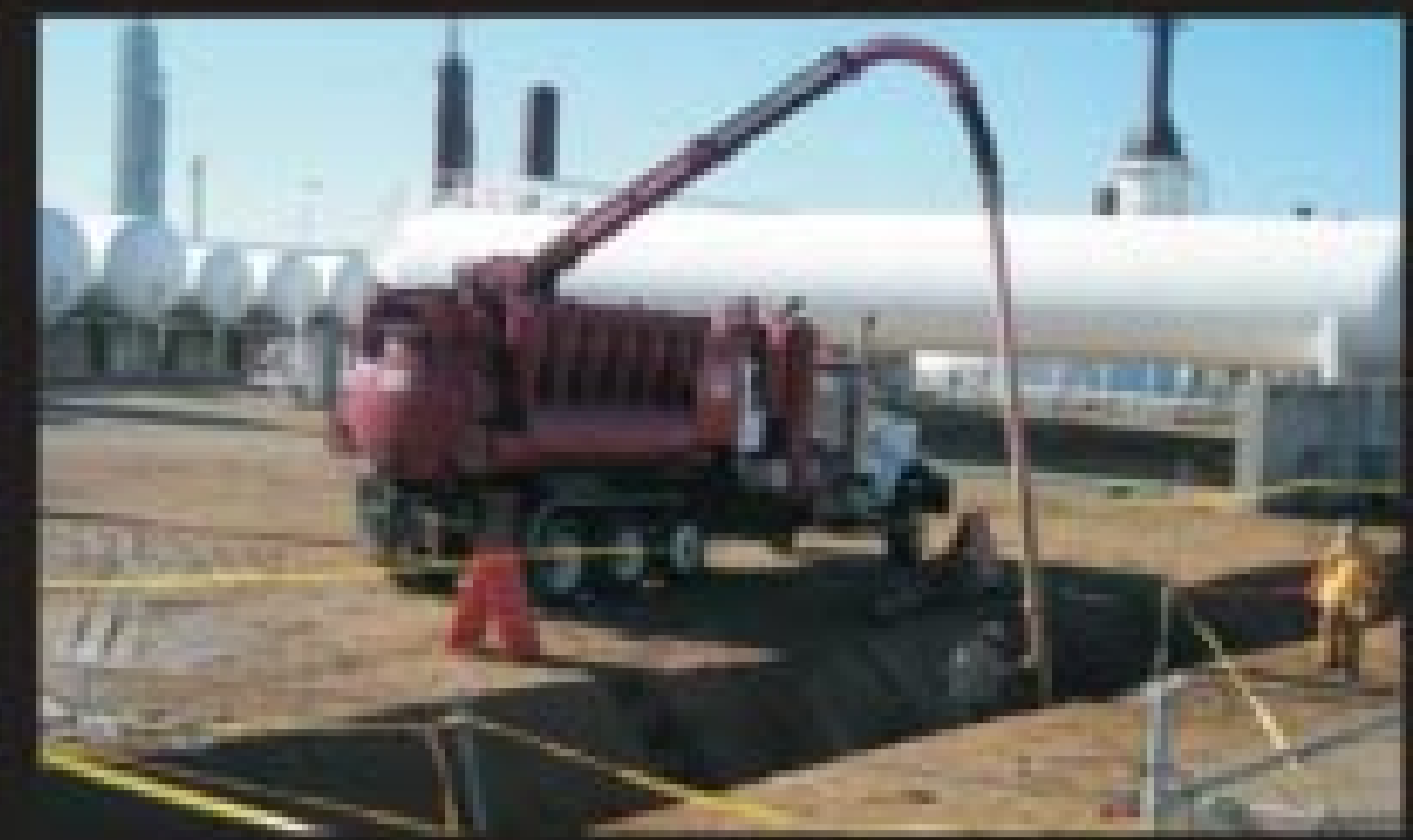
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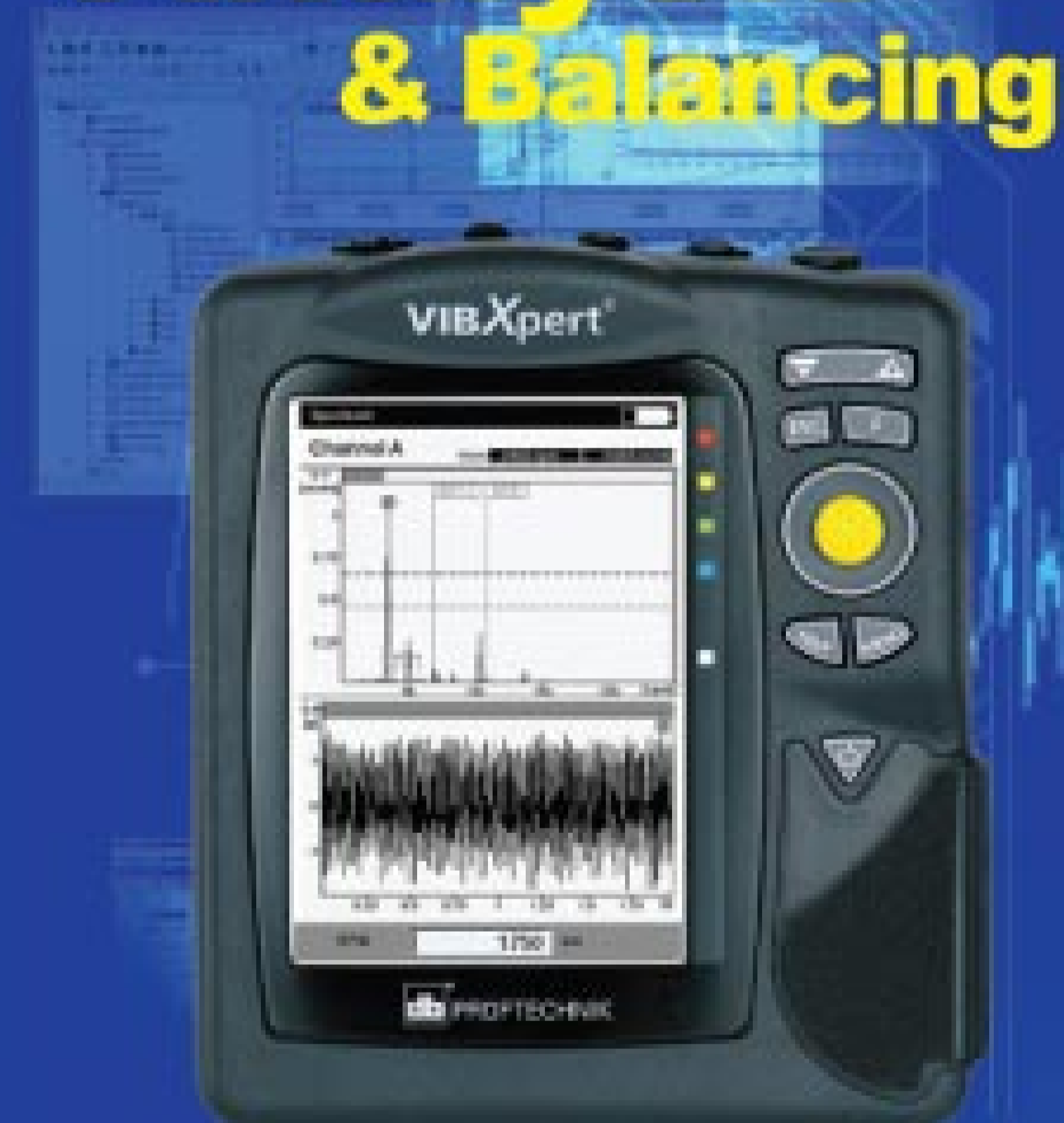
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let's be clear

Who's Watching Your Water?

WORLD WATER MONITORING DAY LOOKS LIKE A GREAT OPPORTUNITY TO GET PEOPLE IN YOUR COMMUNITY INTERESTED AND INVOLVED IN WATER QUALITY

By Ted J. Rulseh, Editor

While in college I studied field biology, and one field trip took our class onto Lake Michigan aboard a university research vessel.

We sampled for dissolved oxygen, towed for plankton (which we later examined in the lab), measured clarity with a secchi disc, and pulled a grab sample up from the bottom. It was the most memorable day of my career as a student. That may say a thing or two about my interests, or it may speak to the pure power and allure of water.



Now, here's something that looks like a great way to get people in your community excited about clean water and involved in your mission of protecting it. It's called World Water Monitoring Day, and it's held every year on Sept. 18. Maybe you already know about it. But do you take part?

GROWTH TREND

Sponsored by the International Water Association (IWA) and the Water Environment Federation (WEF), this international education and outreach program builds awareness and involvement in protecting water resources around the world.

"World Water Monitoring Day engages citizens to conduct basic monitoring of their local waterbodies," says a notice from IWA and WEF. "Although some participants act as individuals, many take part with schools, universities, and civic, environmental and faith-based groups."

How big is this event? Last year nearly 123,000 people worldwide visited local streams, rivers and lakes to perform basic monitoring tests. That's 67 percent more volunteers than in 2008.

Most participants test for dissolved oxygen, pH, temperature and turbidity, but some also monitor for macroinvertebrates like dragonflies, mayflies and scuds. They take samples

in various settings — agricultural, commercial, residential and industrial.

In 2009, people and groups from 81 countries reported data — 11 more than in the previous year. In the United States alone, participants monitored 4,155 sites.

Do you see a growth trend here? Or, more to the point, do you see an opportunity? Here's a chance for your clean-water agency to make a strong and lasting connection with your community.

World Water Monitoring Day engages citizens to conduct basic monitoring of their local waterbodies.

Although some participants act as individuals, many take part with schools, universities, and civic, environmental and faith-based groups.

NOT DIFFICULT

The beauty of World Water Monitoring Day is that it's not hard to get involved and engage your community. It's not as if someone has to develop a curriculum, create a bunch of materials or plan an elaborate event.

Getting started might be as simple as contacting your local high school biology teacher. The activities don't need to interrupt classes. Kids can do the monitoring tests just about anytime — not necessarily on Sept. 18.

While that's the official day of observance, volunteers can monitor and report data to the World Water Monitoring Day database anytime from March 22 (World Water Day) until Dec. 31. To get involved, you just have to follow four steps:

Register. Choose any lake, stream or other waterbody where you can safely monitor. Then go to the Web site (<http://www.worldwatermonitoringday.org>) and register yourself and the site you've chosen.

Prepare. You can use your own gear or buy an easy-to-use test kit (from the Web site) with instructions and enough reagents to repeat up to 50 tests.

Monitor. Invite your volunteers — whether a high school class or some other group — to help with the testing.

Report. Submit your data on the Web site.

HAVE YOU DONE THIS?

If you have taken part in World Water Monitoring Day, TPO would like to hear about your experiences. What exactly did you do? With whom did you partner? What good things came out of it. Tell about it by sending me a note to www.tpomag.com. We'll include a report in a future issue.

If you haven't been a part of this initiative, consider trying it this year. There's plenty of time to get organized, even if you want to hold your event on the Sept. 18 date.

There's an old saying about education: "Tell me, I'll forget. Show me, I may remember. Involve me, and I will understand." Here's a great way to help people in your community understand what you do and understand the importance of clean water and the treatment plants that help protect it.

Editor's note: WEF and IWA receive financial and in-kind support for World Water Monitoring Day from sponsors including the U.S. Geological Survey, the U.S. EPA, PerkinElmer, ITT Corporation, Sinclair Knight Merz and Smithfield Foods. tpo

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A Week in the Life

A WEEKLONG CLASS ON WASTEWATER SCIENCE HELPS ACQUAINT HIGH SCHOOL STUDENTS WITH THE WASTEWATER PROCESS FROM START TO FINISH

By Diane Gow McDilda

One of Maya Slocum's favorite student testimonials is: "Now I know there are people at the other end of the toilet." Slocum, pollution prevention specialist for the South Bayside System Authority (SBSA) in Redwood City, Calif., says the Sewer Science course she teaches is "definitely an eye-opening experience" for students.

Sewer Science is a weeklong, hands-on program that takes simulated wastewater processes into the classroom. Students learn what goes on in the collection and treatment processes by making their own "wastewater" samples and then cleaning the water using specially designed tanks. They perform analytical tests and are responsible for meeting quality standards.

It's like experiencing a week in the life of a wastewater treatment operator.

THE LITTLE THINGS

Sewer Science was developed in nearby Palo Alto by staff at the Regional Water Quality Control Plant. Slocum, who was a science teacher, brought it into her classroom in 1997. Over the years, the program has blossomed and is now taught in a number of schools. And after 17 years of teaching, Slocum now works full-time with SBSA.

Schools pick up the class largely because it meets science curriculum standards, but also because SBSA staff provides technical support for teachers as well as equipment and workbooks, free of charge. The program fits well with any high school class, but Slocum and her crew prefer freshman science classes. Sometimes they're asked to run it for an environmental studies class, usually for seniors.

The seven-day program includes one final day of wrap up and review. The day before SBSA educators arrive in the classroom, the teacher gets students prepared. "They have a brainstorming session," says Slocum. "The teachers ask them to think of everything that goes down the drain. Some students are modest; some go a little further and mention mucus and blood."

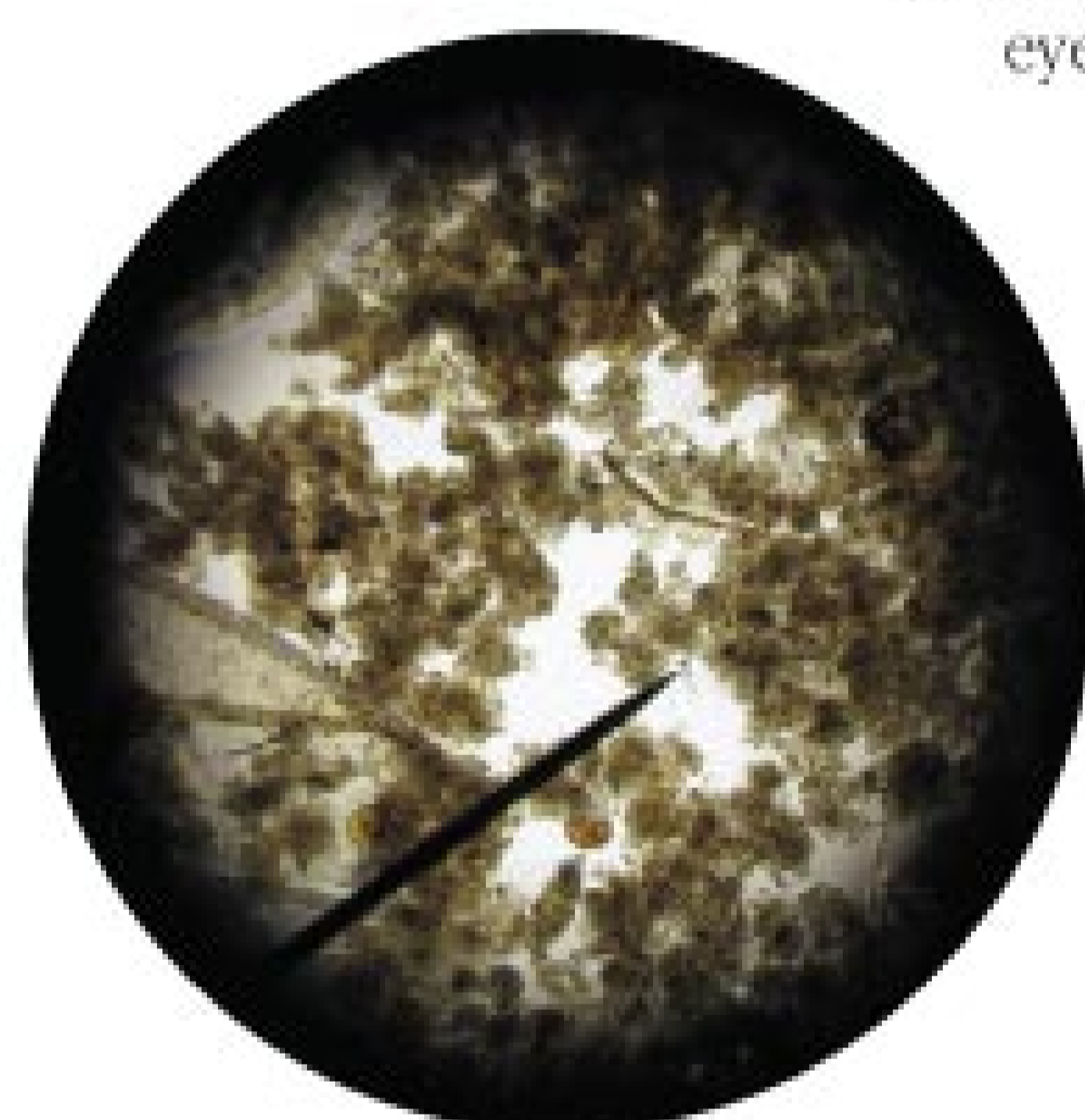
With workbooks open, the students begin their education in wastewater treatment. They start with an introduction to treatment

plants and processes, then learn about ammonia, pH, turbidity and chemical oxygen demand (COD) and how to measure them.

By day three, they are stirring up a brew of "wastewater," mixing dried coffee grounds, broken up breakfast cereal and pet food, cut up pieces of plastic, baking soda, torn up toilet paper, ammonia and vegetable oil in 1-liter beakers.

Then they run their concoctions through simulators. Throughout the program, they are asked to hypothesize outcomes. If the mixture rests for 20 minutes, what will float and what will sink? Are the pH and other parameters affected if floaters and sinkers are removed?

To Slocum, looking for water bears in a sample of activated sludge from the aeration basin is a high point in the program. "Water bears are Tardigrada," says Slocum. "They look like little teddy bears, but they have eight little legs instead of four. They have claws and can hold onto stuff and suck things out. They're omnivorous hunters."



In search of water bears, scientific name Tardigrada.



PHOTOS COURTESY OF SBSA

Science teacher Johnny DeSollar at Redwood High School in Redwood City leads a Sewer Science class.

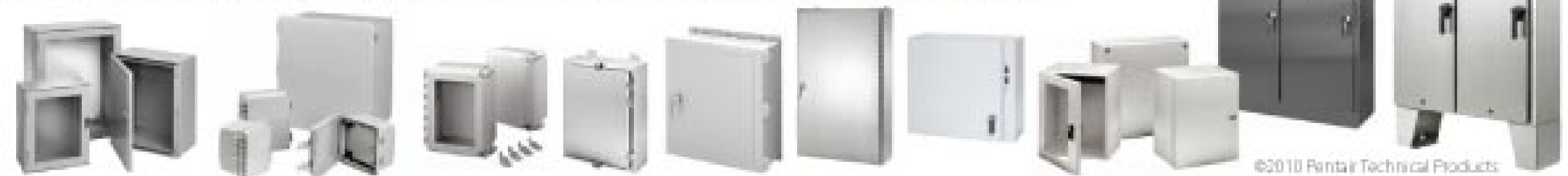
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A specially designed tank mimics secondary treatment in a wastewater treatment plant for the benefit of the students.

Slocum's enthusiasm overflows, and as a result students put extra effort into searching for water bears under the microscope. This is one of the reasons sludge is brought over from the Palo Alto plant. The SBSA plant isn't required to remove nitrogen, and as a result the sludge doesn't contain nitrifying bacteria or their companions, water bears.

"They have a brainstorming session. The teachers ask them to think of everything that goes down the drain. Some students are modest; some go a little further and mention mucus and blood."

MAYA SLOCUM

A HARDWORKING BUNCH

Slocum is the only pollution prevention specialist at SBSA, but Sewer Science is taught by every member of the SBSA source control department, which includes two pretreatment inspectors and one fats, oils and grease (FOG) inspector.

Treatment plant operators have taken an interest and have offered to teach, but that's on hold until construction projects at the plant are complete. And it's no wonder operators want to get involved: Ultimately it will make their jobs easier. **tpo**

"Effluent" from the different treatment processes.

Utility plant operator Linwood Dabbs pulls a sample from the chlorine contact tank at the Richmond treatment plant to test for chlorine saturation. The plant is undergoing a five-phase, \$130 million upgrade, mainly for nutrient removal. (Photography by Joe Mahoney)



Managing for Success

INITIATIVES IN ENVIRONMENTAL MANAGEMENT, STAFF TRAINING AND STAFF RETENTION PAY DIVIDENDS IN MORALE AND PERFORMANCE IN RICHMOND, VA.

By Trude Witham

MEETING NEW NUTRIENT REMOVAL REQUIREMENTS IS A TOP PRIORITY FOR the Richmond (Va.) Wastewater Treatment Plant. So is the facility's Environmental Management System (EMS), and so is attracting and retaining quality operators with a plant-wide training initiative and an innovative pay-scale structure.

The plant has made progress on all these fronts, to the mutual benefit of employees, the city and the 200,000 people the plant serves.

MEETING THE PERMIT

Located on the south bank of the James River, the 70 mgd Richmond treatment plant serves the City of Richmond and parts of Chesterfield, Henrico and Goochland counties. This advanced secondary treatment plant with tertiary sand filters is the largest of its kind in Virginia. As a combined sewer operation, the plant takes in flows from 1,500 miles of sanitary sewers, 38 miles of interceptor sewers and the Shockoe Retention Basin, a 50-million-gallon stormwater reservoir used during heavy rains.

During rain events, the plant increases its flow to 75-80 mgd. When the Shockoe Retention Basin and Hampton McCloy tunnel and sewer system are filled to capacity, the excess flow is relieved at combined sewer overflow (CSO) outfalls.

At the treatment plant, wastewater passes through screening and grit chambers, then to primary sedimentation tanks, aeration tanks, final clarifiers and chlorine contact tanks. From there, it is sent to effluent sand filters and then to the James River. The biosolids are sent to primary sludge degritters, gravity thickeners and digesters, then to the dewatering building, and finally to biosolids holding tanks. The treated biosolids are then land-applied.

The plant is undergoing a five-phase, \$130 million upgrade to remove nitrogen and phosphorus to meet more stringent permit requirements that go into effect in January 2011, and to update and improve plant systems and equipment (see sidebar). The more stringent limits are designed to protect the Chesapeake Bay, to which the river flows.

At present, the plant uses tertiary treatment with sand filters

profile



Richmond (Va.) Wastewater Treatment Plant

BUILT: 1958

AREA SERVED: City of Richmond, parts of three surrounding counties

EMPLOYEES: 122

FLOWS: 45 mgd dry weather, 75+ mgd wet weather

TREATMENT LEVEL: Tertiary

TREATMENT PROCESS: Activated sludge, sand media filtration

RECEIVING WATER: James River

BIOSOLIDS: Anaerobic digestion, dewatered to 25 percent solids Class B cake, land-applied

WEB SITE: www.ci.richmond.va.us/PublicUtilities/index.aspx

City of Richmond treatment plant superintendent of plant operations Clair Watson (left) and superintendent of operations Eric Whitehurst stand at a control panel for the primary sedimentation tanks.



Subcontractors are working on the plant's methanol storage building, next to the existing sand filtering tanks.

STAYING WITH THE TIMES

Built in 1958, the Richmond Wastewater Treatment Plant has been upgraded four times. In 1973, secondary treatment (step aeration) was added. In 1990, tertiary treatment was added in the form of sand filters (Tetra Tech). Management information systems (Invensys Operations Management - Foxboro) were added for the liquid train in 1997 and for the solids train in 2001.

The first phase of a five-phase, \$130 million upgrade now in progress will be completed at the end of 2010. It includes rehabilitation of the filtration building pumps, valves, back-wash pumps and blowers; an upgrade of the Foxboro management information system to help with denitrification at the effluent filtration building; construction of a methanol feed building; and rehabilitation of the ferric chloride feed system for phosphorous control. It also includes phosphorous, nitrogen, dissolved oxygen, pH and mixed liquor suspended solids (MLSS) instrumentation (Hach Company).

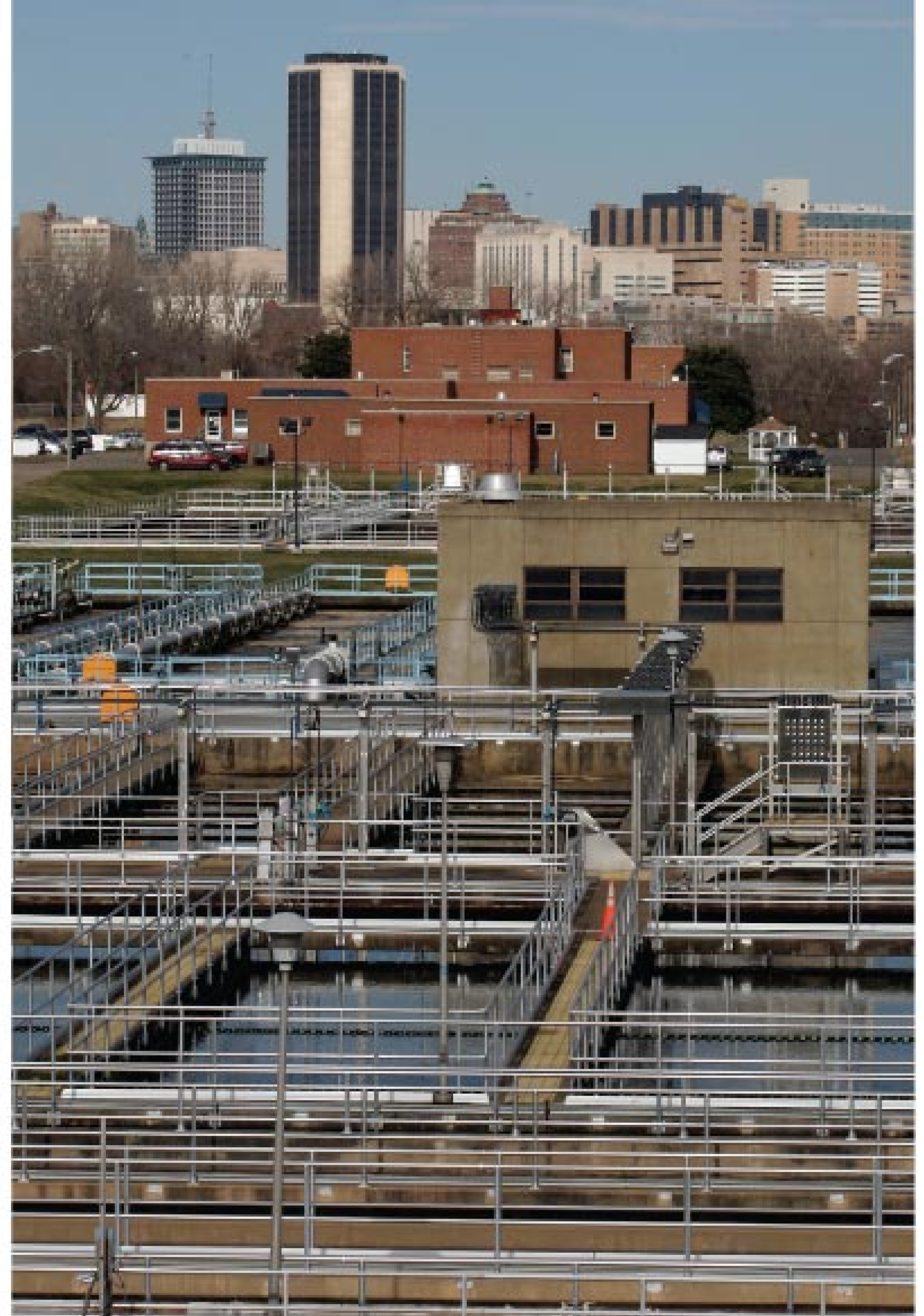
Phase 2 involves installing a UV disinfection system (Trojan Technologies), dual main electrical switchgear and new electrical feed. Phase 3 will add a scum collection system on four primary and eight secondary tanks, as well as a scum concentrator and building.

Phase 4 will replace and rehabilitate a four-tank aeration system to include nine new return activated sludge pumps, three new waste activated sludge pumps, and upgraded fine-bubble diffusers and all associated valves and adjustable frequency drives.

Phase 5 will add two final sedimentation tanks and all pumps, valves and piping.

The plant will then have eight secondary tanks.

New filter influent pumps await installation in the Effluent Filtration Building, which houses the plant's tertiary sand filters.



The City of Richmond skyline looms over the treatment plant along the James River.

(Tetra Tech) to meet limits on TSS (10 mg/l) and CBOD (8 mg/l). Phase 1 of the upgrade will be completed at the end of 2010 and will enable the plant to meet new limits on nitrogen (8.0 mg/l) and phosphorous (0.5 mg/l).

AMBITIOUS TRAINING

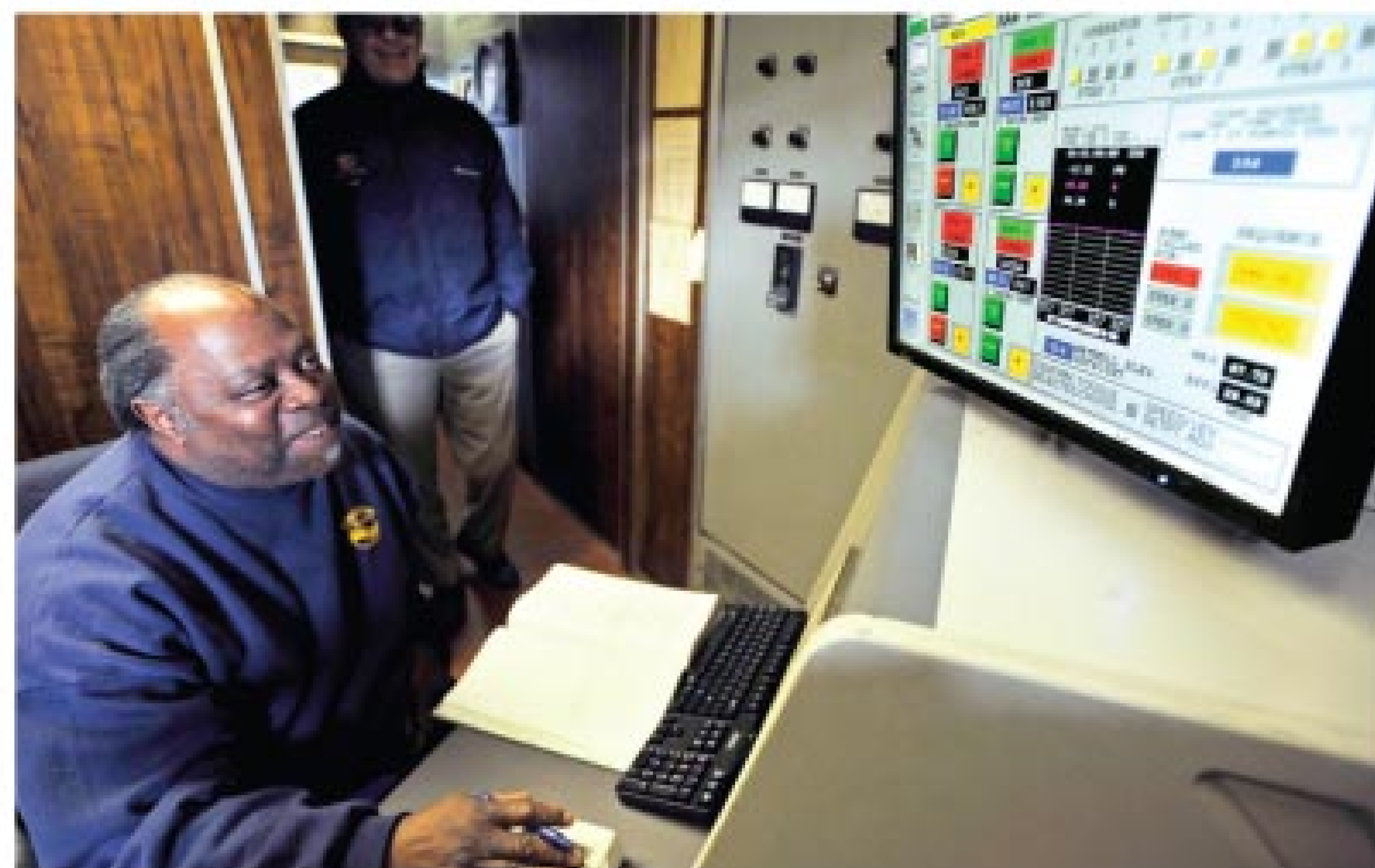
The Richmond plant has embarked on an extensive training program that involves rewriting and updating all standard operating procedures (SOPs) and writing a new operation and maintenance manual for all current and future equipment, including combined sewer operations.

"Our SOPs are 30 years old, and with all the equipment upgrades we've had and are going to have, it was clear that we needed to update all these documents," says Clair Watson, superintendent of plant operations. "We're also going to train our entire staff of 122 people, from maintenance people all the way through the plant, on our existing and new equipment."

This mammoth task is expected to take three years. It will involve bringing in a modular training building stocked with computers and overhead projectors. Consulting engineering firm Greeley and Hansen, which is involved with the five-phase upgrade, will help conduct the training.

The plant has 37 operations staff, including those assigned to the Shockoe Retention Basin; 41 maintenance staff, including mechanics, electricians and instrumentation people; 8 lab employees; and 36 sewer maintenance workers. Plans call for transitioning the maintenance and retention basin employees to the operations staff.

Operators are further categorized into biosolids operators and general



ABOVE: Bernard Evans, operator/maintenance technician, checks the raw sewage pump control station at the front end of the treatment plant. The plant's management information system (Invensys Operations Management - Foxboro) appears onscreen. LEFT: Clair Watson looks at an in-progress installation of a Hach nutrient analyzer in the aeration tank section of the plant.

plant equipment operators. Operations and maintenance staff work 12-hour shifts, with four people on each shift. Before the training started, there were 12 on a shift. "We have lost people through retirement and other issues over the past 20 years," says Watson. "We also moved four operators off shift to the biosolids operation. So, we've had to do more with less. When you're running a plant 24/7, it's hard to pull people out for training."

To help mitigate the effects of downsizing, the plant installed a \$5 million Foxboro (Invensys Operations Management) management information system (MIS) that allows staff to observe plant operations from numerous computer stations, including three off-site lift stations and the Hampton McCloy CSO tunnel.

"Our training program has benefited the operators immensely," says Eric Whitehurst, who supervises seven direct reports and 34 indirect reports as superintendent of operations. "We have a lot of seasoned operators, some of whom have been here 30 years, and now they are starting to learn about new technology and to understand the whole process from beginning to end."

BIOSOLIDS REDUCTION

The plant's EMS program began in 2006 as part of a commitment to reducing biosolids to save on land application costs. It soon evolved into a plant-wide initiative.

On the biosolids side, the staff implemented an EMS program certified by the National Biosolids Partnership (NBP). Barbara Jackson, who has been with the plant for 31 years, was promoted to biosolids supervisor and traveled to Seattle, Wash., for NBP training. She was given four operations staff members to run the biosolids operation. An environmental consultant from CH2M Hill came to the plant and worked with employees for several months, helping them to understand the EMS process.

"The EMS has made a huge impact on the plant," says Jackson. "We now have dedicated employees who feel a part of something and who have a better understanding of the process. Before, we had employees rotating in and out of the biosolids operation every 12 hours, and it was just a job. Now, employees refer to the facility as 'my building,' and that shows ownership."

The Virginia Department of Environmental Quality (DEQ) has an excellence program that encourages superior performance through EMS and pol-

lution prevention. "There are four levels in the DEQ program, and hopefully we will find out soon if we won at the third level, E3 (Exemplary Environmental Enterprise)," Watson says.

Working in the EMS process has helped the plant improve biosolids management. "We updated our centrifuge control panels, which helped improve the operation and resulted in a drier biosolids cake," says Watson. "We improved

"Our training program has benefited the operators immensely. We have a lot of seasoned operators, some of whom have been here 30 years, and now they are starting to learn about new technology and to understand the whole process from beginning to end."

ERIC WHITEHURST

our cake from 16 to 18 percent solids on average to 25 to 26 percent solids, saving \$350,000 in annual land application costs and \$40,000 on chemicals. Basically, having new equipment, new staff, new procedures and new thinking makes a better product. The EMS program helped us achieve that."

"Now that we have a dedicated group of biosolids employees who take pride in what they're doing, we have less wear and tear on the equipment, as they take better care of it," says Whitehurst. "Even the biosolids building is cleaner now."

The EMS has been so successful that it is being extended to all plant processes. Watson and three other employees attended an EMS training program at Virginia Tech University. They have also taken training in the ISO 14001 international environmental management standard and have incorporated that standard into plant operations.

"EMS is a culture, and we would like to have everyone involved," says Watson. "We're sending other people to training, including our maintenance superintendent and our instrument technicians. We even had our finance person involved." In the future, they hope to put a pollution prevention program in place that would allow the plant to produce higher-quality biosolids. "The biosolids are land-applied now, but we hope to produce a Class A product that could be reused as fuel or fertilizer," says Watson.

PAY INCENTIVES

Besides improving processes, plant leaders are taking steps to improve staff commitment and morale, in part, with pay incentives. Until recently,

employees had no economic incentive to continue their education and earn higher-level licenses. The plant was also losing people to other municipalities that paid better.

The solution was a pay system called broadbanding, implemented in 2004. It provides rewards in the form of higher salaries to people who reach the next level of licensing or who earn a degree.

The concept of broadbanding started in the United States in 1980 as a demonstration project at two naval research facilities in California. In essence, it creates fewer job classes or occupational distinctions and broader pay ranges than traditional systems based on pay grades.

“EMS is a culture, and we would like to have everyone involved. We’re sending other people to training, including our maintenance superintendent and our instrument technicians. We even had our finance person involved.”

CLAIR WATSON

Broadbanding makes it easier for organizations to reward high performance even without giving promotions. It also provides more flexibility in recruiting and retaining talent because it enables managers to give greater weight to a person’s abilities and to consider market pay rates and competitors’ offers.

AID TO RETENTION

At Richmond, Watson says, broadbanding has helped significantly in attracting and keeping quality employees. “Once we implemented this program, it was amazing how many people wanted to get certified. We have five

Richmond Wastewater Treatment Plant PERMIT AND PERFORMANCE

	PERMIT	EFFLUENT (MONTHLY AVERAGE)
TSS	10 mg/l	2 mg/l
CBOD	8 mg/l	2.3 mg/l
Total Nitrogen as N	8 mg/l	12.5 mg/l
Total Phosphorus as P	0.5 mg/l	0.7 mg/l

bands, or pay scales, and when people know where their band starts and ends, and what they need to do to advance, they can see a light at the end of the tunnel.”

Whitehurst has seen positive effects at the plant. “The program gives operators the incentive to go back to school and learn about new technology,” he says. “It’s good for the plant, as the operators now have the knowledge they need to do their jobs better.”

All supervisors and Class I wastewater operators can earn an associate degree in water/wastewater technology at Mountain Empire Community College in Big Stone Gap, Va. Operators who want to get a higher license can take the University of California at Sacramento’s wastewater correspondence course, and can also attend one-week and various short-term wastewater operator courses at Virginia Tech.

Since the program began, seven employees have earned associate degrees. In addition, six operators have obtained Class I licenses and are now supervisors.

HIGHER MORALE

The training, EMS program and broadbanding have all improved employee morale. “We have definitely seen a change throughout the plant,” says Whitehurst. “Before, it was just a job, and people came to work and then they left. Now, people have a clear understanding of what’s expected. They know they can continue their education, and there is nothing holding them back.”

Watson agrees. “Our program makes people feel better about what they do,” he says. “Although money isn’t always the incentive, it sure helps!” **tpo**

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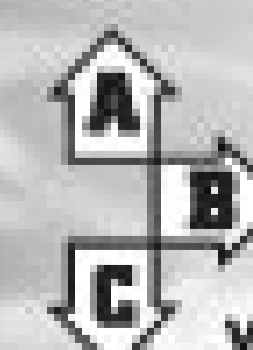
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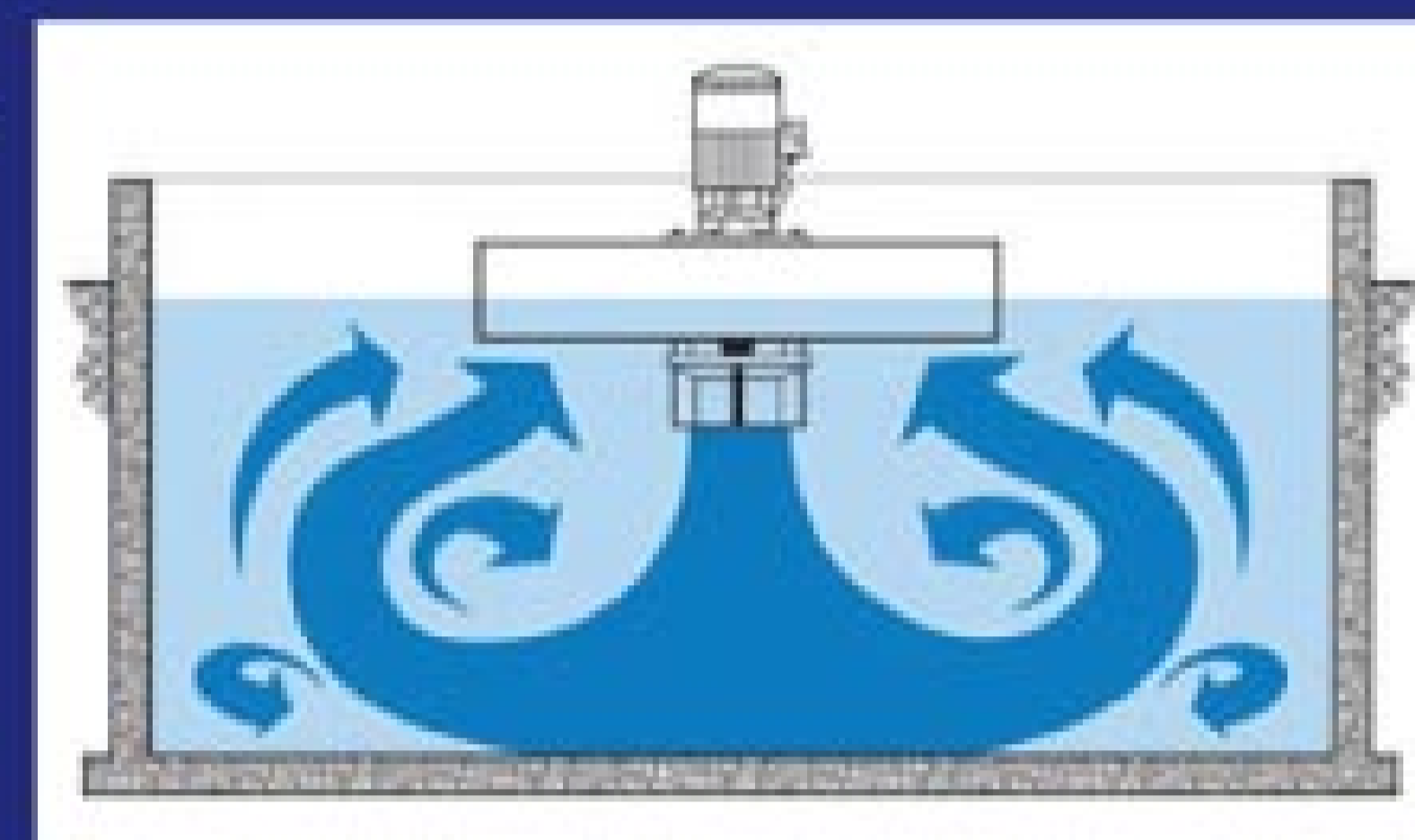


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LEEDing the Way

A PUMP STATION AT CLEAN WATER SERVICES TREATMENT PLANT IS THE FIRST OF ITS KIND TO RECEIVE CERTIFICATION AS A GREEN FACILITY

By Doug Day

Office buildings, schools, hotels, homes, banks and government buildings dominate the list of LEED certified buildings in the United States: buildings designed or refurbished to meet sustainability and energy efficiency standards.

And now there is an influent pump house on that list of nearly 2,000 buildings. "We wanted to see if it could be done with a process facility," says Mark Poling, director of the Wastewater Treatment Department for Clean Water Services, the water resource management utility for the half-million customers in the Tualatin River Watershed in northwest Oregon.

Completed in July 2008, the \$38 million, 180 mgd pump station is the first ever to win a Leadership in Energy and Environmental Design award with its Silver certification. It is part of the Durham Advanced Wastewater Treatment plant in Tigard, a suburb of Portland, the city with the second-most LEED certified buildings in the country, according to the U.S. Green Building Council, which developed the LEED standards.

LEED AS THE GOAL

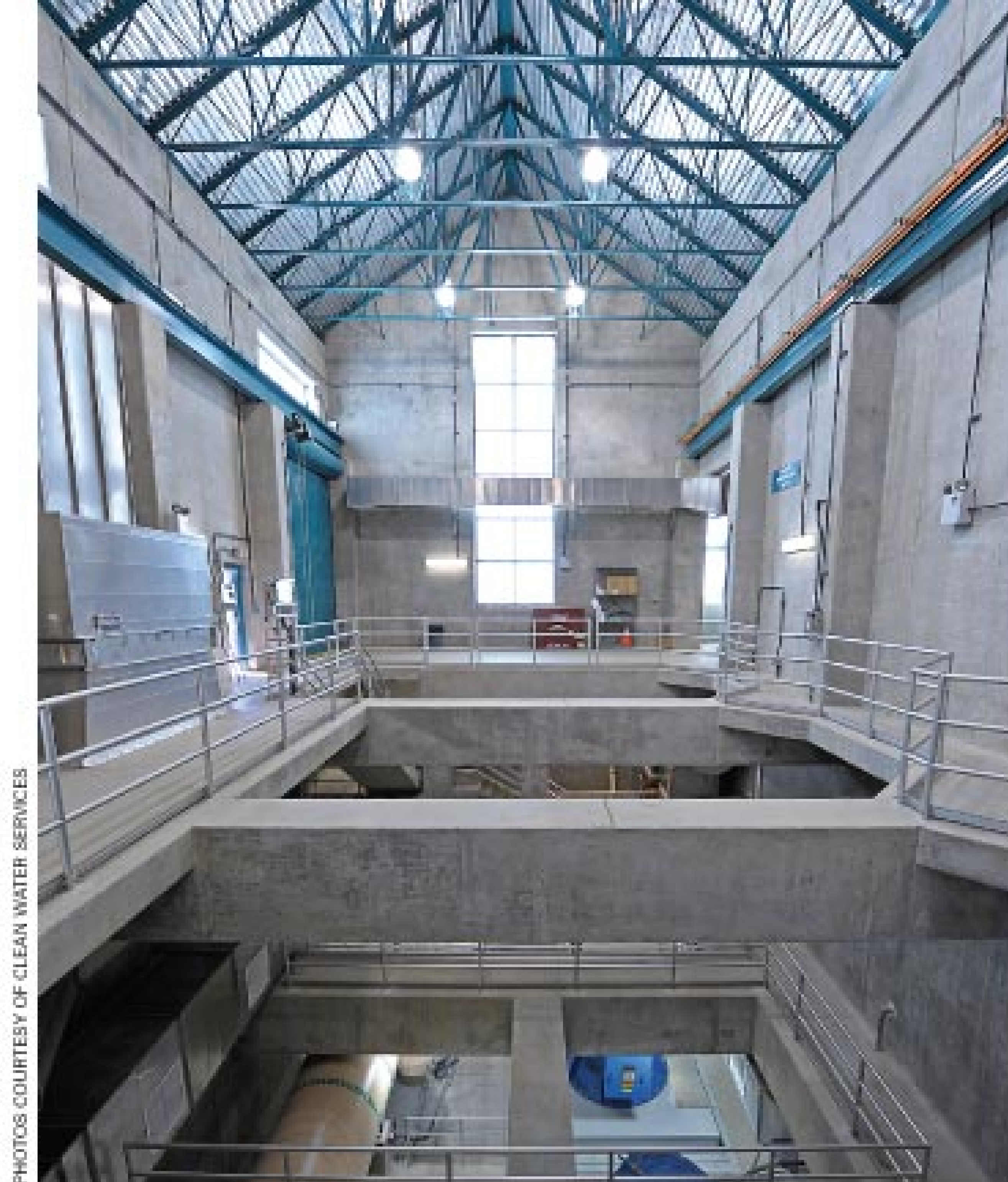
Led by project consultant MWH Global, headquartered in Broomfield, Colo., the design focused on LEED factors such as energy and water conservation, site selection, stormwater management and building materials.

"We're in the environmental business. This was a good direction for us to go. Our staff and the consultants did a superb job of building a large, sustainable facility."

MARK POLING

Poling says the pump station uses significantly less energy than a standard design: the annual 1.2-million kWh saved is equivalent to that used by 109 average homes and eliminates carbon emissions equal to cutting 1.4 million miles of automobile driving.

The annual electricity cost savings will be about \$77,000. The Energy Trust of Oregon (ETO) rewarded the plant with an efficiency rebate of \$415,791 to help fund the use of variable-frequency drives and premium-efficiency motors. The project also qualified for \$214,000 in Oregon Business Energy Tax Credits, which Clean Water



PHOTOS COURTESY OF CLEAN WATER SERVICES

The influent pump station dry well includes pumps with motors (blue) from WEG Electric Corp.



Discharge piping conveys flow from one of six large pumps from ITT Flygt.

Clean Water Services is able to sell to qualifying third parties.

A Siemens Water Technologies programmable logic controller (PLC) manages two 40 mgd pumps and four 25 mgd pumps manufactured by ITT Water & Wastewater - Flygt with variable-frequency drives from Siemens that operate the pumps at maximum efficiency.

PRECISE CONTROL

The building's air-handling unit, also with variable-frequency drives, keeps the motor control room at the optimal temperature, humidity and pressure. Automated pressure sensors control return air fans to maintain positive pressure. "VFDs are very sensitive to

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.



Jeff Keikkala, a plant instrument technician with Clean Water Services, inspects the Neo Seguro valves that direct flow from the influent pump station to the force mains that lead to the headworks.



Clean Water Services' \$33 million LEED-certified pump station is the agency's largest with a peak design capacity of 200 mgd.

hydrogen sulfide, and pump stations have a lot of it," says Poling. "Positive pressure prevents pulling air from the process area and

prevents the sulfides from corroding the circuit board and other components in the VFDs."

The pump station contains two wet wells because of the wide range of flows experienced throughout the year. "We get a lot of rain in the winter, and that's when we get our highest flows," says Poling. "But it's extremely dry in the summer." Summer flows average about 20 mgd versus peak flows of over 100 mgd in winter.

The wet wells are self-cleaning, a feature added to the design after operators and maintenance staff saw that capability in other facilities they visited. "The wet wells go through a cleaning cycle once or twice a week to remove the buildup of grease and debris and move it through the system in small amounts rather than getting a big flush during high flows," says Poling. "And we don't have to send operators to muck out debris."

Operators like the new pump station because it is easier to control and more reliable, especially during high flows. "The old pump station was a little touchy and it was difficult to get the maximum flow out of it," Poling says. "It was hard to stage pumps because we had three sizes of pumps. Some were old and some were newer, some were variable-speed and some weren't."

DESIGN CHALLENGES

The LEED system assigns points for efficiency and sustainability, but many credits do not apply to a process facility like a pump station. That made it challenging to get the certification.

"You need someone who really understands the LEED certification process and can find where you can get points," Poling says. Clean Water Services turned to Brightworks, a West Coast sustainability consulting firm with an office in Portland.

"Because wastewater plants are such huge energy consumers, we had a lot of opportunity to get points there," Poling says. But other criteria, such as access to public transportation, parking capacity, bicycle storage, do not apply.

Site selection is another LEED category, and while Clean Water Services may not have scored many points there, the location offered some unique design challenges. "This is the plant's outward face to a public park. It's quite prominent because it's three stories built into a hillside," Poling notes.

Part of the design was to make the building fit the look of the neighborhood. "The roof mimics the park building roofs," says Poling. "We pre-planted trees and shrubs that we knew wouldn't be disturbed by the construction and got those growing early to provide some visual screening from most of the park."

Along with the city park next door, the Durham plant is surrounded by a residential neighborhood, an elementary school, a high school and another park, so odor control was important.

At the former pump house, crews used bleach to scrub out odors. To save energy and cut chemical use, the design team selected a soil biofilter, sometimes referred to as a Bohn filter. Variable-frequency drives pull air from the wet wells and pass it through soil containing microorganisms that digest the odorous compounds. "We don't need chemicals — it's a much softer way of treating odors," Poling says.

OTHER GREEN PROJECTS

Clean Water Services has been working closely with Portland General Electric (PGE) and ETO since 2002 to reduce energy demand, boost energy efficiency and save ratepayers money. "We've replaced a lot of the lighting fixtures throughout our facilities," Poling says.

"You need someone who really understands the LEED certification process and can look to see where you can get points."

MARK POLING

"When we need to replace motors, we've gone to premium-efficiency motors, and ETO has provided rebates."

Nearly 4 percent of the nation's electricity use goes toward moving and treating water and wastewater, according to the Electric Power Research Institute. Poling points out that Clean Water Services is one of PGE's largest customers in Washington County. "Conservation is probably the greenest alternative because you don't have to generate the power in the first place," says Poling.

The Durham facility, one of four treatment plants in the district, also recycles more than 100 million gallons a year of cleaned wastewater for irrigation and more than 14 tons of biosolids daily for use as a soil amendment. It burns methane to generate more than 4 million kWh of electricity per year, enough to power 330 homes for a year.

"We're in the environmental business," says Poling. "This was a good direction for us to go. Our staff and the consultants did a superb job of building a large, sustainable facility." Information about LEED certification can be found at www.usgbc.org. **tpo**

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The pond and waterfall at the City of Mankato wastewater treatment plant enhance the grounds for the staff's enjoyment. Members of the public see it during plant tours, and some high school students have used it as a backdrop for graduation photos.

Rubble as Resource

THE STAFF AT THE MANKATO (MINN.) WASTEWATER TREATMENT PLANT BUILDS A WATERFALL AND POND FROM CONSTRUCTION DEBRIS

By Mary Shafer

PHOTOS COURTESY OF CITY OF MANKATO WASTEWATER TREATMENT PLANT

There was no wastewater treatment facility in Mankato, Minn., in the 1870s, when Laura Ingalls Wilder, who later would write the *Little House on the Prairie* memoirs, lived in nearby Walnut Grove. But the staff at the Mankato Wastewater Treatment Plant retains the heartland values of pride of place and making do with materials at hand that those books celebrate.

A plant upgrade to tertiary treatment in 2000 left mounds of stone rubble just inside the plant entrance. Instead of paying to remove it, the plant staff got creative and built a scenic pond with it.

Using an existing tree as a focal point, crew members cleared out brushy overgrowth and built a retaining wall of old Mankato limestone from a nearby quarry. Inside the wall, they formed the pond, about 10 feet across and five feet deep. Then they planted flowers to entice the eye.

"Anybody that comes in notices the pond. We have an open house every year in the early fall, and there have been a lot of compliments."

MARY FRALISH

USING THE FLOW

Just inside the chain link plant gate, an effluent stream runs along an old wooded area that had been excavated. Staff saw an ideal opportunity to incorporate a waterfall that would aerate the stream and create a delightful vista leading the eye to the pond.

Initially, the majority of treated effluent was pumped to a discharge point into a nearby stream and a small amount was diverted

to the pond. When first completed, the pond functioned solely as a scenic feature that simply allowed the effluent to evaporate.

"We weren't allowed to use it for irrigation or anything else because it didn't yet meet Title 22 standards," says Mary Fralish, deputy director of Public Works and Environmental Services.

California Title 22 Standards for Water Reuse, adopted by many states, specify a level of tertiary treatment sufficient to protect public health for uses that include food crops, parks, playgrounds, schoolyards, residential landscaping and golf courses.

In 2006, Mankato added a Water Reclamation Facility (WRF) to its back end, producing effluent that does meet Title 22 standards. Now, the plant's flow runs to a primary effluent pool, from which it is pumped in four different streams. The first runs underground directly to the stream outfall.

The second and smallest flow runs over the top of a ledge, about 15 feet to a second ledge, over which it falls into the pond. There it is left to evaporate, refilling as needed, based on a float indicator.

The third runs 1,500 feet underground to irrigate the grounds of Riverfront Park, a public area next to the treatment plant. The last is pumped underground to serve as cooling water for the Mankato Energy Center, a privately owned electric power plant 1.5 miles away. What doesn't evaporate in the cooling process is sent back through a loop of pipe to the Mankato treatment plant to join the main flow to the discharge point.

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.



Actual pond construction costs for the liner and landscaping plants came to less than \$1,000, paid out of the wastewater facility's general operating fund.

OPERATOR'S DESIGN

Maintenance operator Troy Shumski was the project's lead designer. Two maintenance people and one summer helper worked on it around their regular duties.

"We had talked for a couple months about having a feature like that," recalls Fralish. "Troy drew up some plans and got input from a local garden center's pond specialist. They came out and looked at it after it was finished, and they were impressed."

A single light illuminates the waterfall, which occasionally attracts

wildlife. "The guys keep a duck decoy out there, and we do have some ducks land in the pond," says Fralish. "They mainly land in the clarifier, though, because it's larger." Some shrubbery has been planted against the building to complement the pond.

Though the pond and waterfall serve mainly to enhance the grounds for the staff's enjoyment, some members of the public see it during plant tours, and some high school students have used it as a backdrop for graduation photos.

Fralish is proud of her staff's accomplishment. "Anybody that comes in notices the pond," she says. "We have an open house every year in the early fall, and there have been a lot of compliments." **tpo**

The City of Mankato treatment plant added a water reclamation facility to its back end in 2006 to produce reuse-quality water.

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Don Uitulugt, utility plant operator, measures the depth of primary solids at the Wyoming Clean Water Plant. Wyoming and nearby Grand Rapids have collaborated on biosolids management. (Photography by Dan Watts)

Joining *Forces*

TWO MICHIGAN CITIES COLLABORATE
ON A NEW DEWATERING FACILITY
TO ENSURE COST-EFFECTIVE BIOSOLIDS
MANAGEMENT FOR MANY YEARS TO COME

By Diane Gow McDilda



THE WEATHER IN KENT COUNTY, MICH., DOESN'T ALWAYS LEND ITSELF TO FARMING, BUT LOCAL farmers count on biosolids produced at the Wyoming Clean Water Plant to nourish their crops. And farmland isn't the only destination for the biosolids: Some is also pumped to nearby Grand Rapids in a combined biosolids management program.

The 24 mgd (design) Wyoming Clean Water Plant joined with the 61.1 mgd (design) Grand River Wastewater Treatment Plant in Grand Rapids to form the Grand Valley Regional Biosolids Authority (GVRBA). With rising transportation costs and an unpredictable regulatory environment, the cities decided to work together to manage biosolids cost effectively.

The authority became official on Earth Day 2004, when the mayors signed the articles of incorporation. The project began with construction of storage tanks and a dewatering facility at Grand Rapids, and installation of two pipelines with pump stations that allow Wyoming to pump material to the dewatering site.

At the dewatering facility, solids are centrifuged and stored in silos before transport to the Autumn Hills landfill in Zeeland or the Ottawa County Farms landfill in Coopersville.

While all Grand Rapids solids (16,000 dry tons per year) are treated at the dewatering facility, Wyoming delivers 25 percent (2,000 dry tons) of the 8,000 dry tons of solids it produces. Most of the Wyoming plant's waste activated sludge is dewatered and mixed with primary solids before being trucked to corn, bean and wheat fields.

"If we sent all our solids to Grand Rapids, we feel we might lose our contacts with farmers," says Kim Hackbardt, project manager of the GVRBA.

"It takes 65 minutes for the solids to travel to the Grand River plant. And then the valves say, 'The solids are here.'"

KIM HACKBARDT

A NEW HAT

Hackbardt was named project manager of the Grand Valley partnership last January, and he works under an operating team and a four-member board with two representatives from each of the two cities. He has been a manager at the Wyoming plant, which serves 140,000 customers, and has been involved with that city's biosolids program.

For well over a decade, he has been the man in the fields, meeting with farmers, inspecting fields and working with the city's hauling contractor.

Wastewater at Wyoming is treated using a primary clarifier followed by aeration and phosphorus removal. Solids from the aeration basin are pumped to one of two Bird Humboldt (Andritz Separation Inc.) centrifuges that produce a product at 6 percent solids. The material then goes to one of two 160,000-gallon day holding tanks. Primary sludge at 4.5 percent solids is also pumped to those tanks. There, the solids are dosed with





LEFT PHOTO: Utility plant operator Don Uitulugt checks cake from a Bird Humboldt (Andritz Separation Inc.) centrifuge at the Wyoming facility. ABOVE: Ron Kryger, utility plant operator, visually checks the cake level in a hopper with a Siemens Energy & Automation meter at the Grand Rapids facility.

lime to achieve pH 12 for two hours before transfer to one of three 2-million-gallon storage tanks.

"It's usually enough storage for the winter when the ground freezes over," says Hackbardt. "We usually quit land-applying the first week in January and resume the third week in March." When the farmland is accessible, biosolids are injected into the soil on farms up to 35 miles away. Transportation is handled by Synagro Technologies Inc. In a year, 26 million gallons of biosolids are land-applied.

Before the biosolids authority was formed, tank storage sometimes ran out before the ground thawed, and the Wyoming plant used two Ashbrook Simon-Hartley belt filter presses to dewater the material before transport to a landfill. Grand Rapids faced similar issues, and as the dewatering presses aged and the plants faced high costs to replace them, the cities began to discuss joining forces and share the expense of dewatering equipment.

CHECKING OPTIONS

The treatment plant staffs looked at digesters and a pelletizer, but found them too costly and eventually decided on dewatering followed by landfilling.

"The farmers get great results. When I came here 16 years ago, I said I would promote land application as long as it was successful. I go out to the fields before, during and after application. I see the crops. I've yet to see it ever be detrimental."

KIM HACKBARDT

Today, Wyoming solids destined for dewatering are stored in three wet wells, one for primary solids, one for waste activated and the third for either. Generally, two wet wells store waste activated sludge because at 1 percent solids it pumps faster than primary solids at 4 percent. Two 8-inch pipes, one pipe for primary solids and the other for waste activated, convey the material three miles from Wyoming to the dewatering site.

The Grand Rapids plant serves 265,000 customers and has an activated sludge process. It dewateres only primary solids. Magnetic

flowmeters (Siemens Energy & Automation) control the flow of solids from the pipelines to the dewatering facility. Mag meters in each line sense an increase in solids from 0.5 to 1.2 percent for activated sludge or 3 to 4 percent for primary and open the valves to the appropriate tanks. Each flush of solids through the pipe is followed by wash water. Here, the mag meters sense the decrease in solids and close the valves.

"It takes 65 minutes for the solids to travel to the dewatering plant," says Hackbardt. "And then the valves say, 'The solids are here.'" Water is flushed from the pipe by pumping it back to Wyoming in a loop configuration. If it goes down the activated sludge line to dewatering, it returns through the primary pipe. The process relies on careful measurements and communication between the treatment plants.

INTO DEWATERING

At the dewatering facility, the pipes empty into one of two 1-million-gallon storage tanks, one for primary and the other for waste activated sludge. When it's time to blend the materials, they are pumped to a 10,000-gallon storage tank before heading to three Siemens Water Technologies centrifuges. The centrifuges

and polymer dosing are operated through a touchscreen.

Initially, the addition of manic polymers caused excessive foaming. To keep the foam from making its way to the head of the plant with the centrate, spray bars were installed and a de-foaming agent used. Hackbardt hopes a switch to emulsion polymer will cure the foaming.

From each centrifuge, solids are transferred by an auger to a cake chute in the basement. Cake pumps then move the solids up to the 55-foot-tall storage silos. Semi-trucks back under the silos

SCHEDULING FLOWS

To make sure the proper amounts of solids are pumped to the dewatering facility at the Grand River treatment plant in Grand Rapids, operators at the Wyoming Clean Water Plant start their day by measuring the depth of solids.

Dropping a Sludge Judge (Nasco) device into the center cone of each primary clarifier tank, they pull a core sample that indicates the solids depth. Next, operators measure the sludge blanket thickness in the aeration basin.

They enter these depths into a computer program that calculates the volumes of primary and waste activated sludges to be dewatered onsite and to be pumped to Grand River. The program also calculates the amount of lime to be used to stabilize primary solids.

Similar information collected at Grand Rapids allows the scheduling of solids flows from each plant to the dewatering facility.



Biosolids are land-applied with a John Deere tractor pulling a Nuhn Quad Train applicator from Nuhn Industries Ltd. Farmers report excellent results from biosolids applications.



Dave Harris, utility supervisor of operations, makes adjustments to a centrifuge from Siemens Water Technologies at the Grand Rapids facility.

and are filled to a total of 50 wet tons. By contract, the hauler must empty each silo each week by Friday afternoon. That allows the plant to continue producing material over the weekend and have storage space for a Monday holiday if needed.

Cake from the silos is then trucked to the two landfills. Methane generated at the landfills from decomposing biosolids and municipal refuse is used to generate electricity.

STICKING WITH THE FARMERS

Although the biosolids contribute to electricity generation, Hackbardt wants to keep the farmers furnished with the material. "The farmers get great results," he says. "When I came here 16 years ago, I said I would promote land application as long as it was successful.

"I go out to the fields before, during and after application. I see the crops. I've yet to see it ever be detrimental. The only negative impact is that the trucks compact the soil, and we're working to keep them on the road. As far as the product itself, it's unbelievable."

It's easy for Hackbardt to push a product he believes in. "Three of our farmers said they've had their best beans ever," he observes. "And two have said they got their best beans on their worst ground." **tpo**

more info:

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Nasco
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From Food to Fuel

THE MILWAUKEE METROPOLITAN SEWERAGE DISTRICT LOOKS TO FEED ITS ANAEROBIC DIGESTERS TO BOOST PRODUCTION OF METHANE GAS FOR ENERGY

By Ted J. Rulseh

The Milwaukee Metropolitan Sewerage District has been a pioneer in beneficial use of biosolids: For 85 years, its Milorganite organic fertilizer, made from waste activated sludge at the Jones Island Water Reclamation Facility, has been a staple for golf courses, landscapers and homeowners.

Now, the district is exploring new frontiers in generating and using digester methane at its South Shore Water Reclamation Facility. The South Shore plant processes its own sludges, and primary sludge sent by pipeline from Jones Island, in its anaerobic digesters. The gas fuels a 5-MW cogeneration system that provides much of the site's electricity as well as heat for the digestion process and other needs.

The district is pursuing a variety of initiatives to add organic material to the digesters and so maximize gas production. One such effort is a "Food Is Fuel" public communication effort that encourages district residents to grind food waste in their garbage disposals and send it to the district instead of tossing it into the trash and having it hauled to landfills.

District public information manager Bill Graffin and director of water quality protection Pete Topczewski talked about the innovative programs in an interview with *Treatment Plant Operator*.

tpo: How important is digester methane to energy management at the district?

Graffin: Last year our anaerobic digesters at South Shore produced the equivalent of about \$800,000 worth of energy, based on

"We are now making some process changes that will significantly increase our production of methane and will allow us to use all of it. In years past, we had been flaring off up to 20 percent of the methane."

BILL GRAFFIN

market prices. The year before that, when natural gas prices were a lot higher than they are now, we produced the equivalent of about \$1.8 million.

We are now making some process changes that will significantly increase our production of methane and will allow us to use all of it. In years past, we had been flaring off up to 20 percent of the methane.

tpo: How did these digester fuel initiatives get started?

Topczewski: We are on the leading edge of efforts to increase methane production in digesters. Globally, anaerobic digestion is

used a lot more than it is here in the United States.

For several years, we have been working in this area with Dr. Daniel Zitomer, an associate professor and director of the Water Quality Center at Marquette University.

He works on methane projects all over the world. He's bringing some of his experience back home with him, and we're putting it to work here in Milwaukee. One of the first initiatives was to take glycol used at General Mitchell International Airport for deicing planes and inject that into the digesters.

tpo: How does that program work?

Topczewski: The glycol program has been ongoing for about five years. After they deice the planes, they vacuum up the deicing fluid and put it into holding tanks. Later, they transport it to the South Shore plant.

The annual volume varies. The airport uses only as much as necessary, and that's largely weather-dependent. We take everything they can give us, and it typically ranges from 250,000 to 300,000 gallons each winter. We see an increase of about 4.3 cubic feet of methane per pound of COD added to digesters from airline deicing fluid.

tpo: What role does food waste play in methane production at the South Shore plant?

Graffin: A few years ago we started a project in conjunction with InSinkEerator that involved having two large natural food stores take

all the scraps from their produce sections, grind it up and put it in a storage vessel to be trucked to our digesters.

Topczewski: We found that it was feasible to do, but the design of the storage vessel was not correct. The program ended with the stores just chopping up the vegetable waste in a

commercial garbage disposal and releasing it directly to the sewers.

The food stores happen to be in a section of the city that is served by our Jones Island treatment plant. So now those vegetable scraps are providing solids and nitrogen to help us make Milorganite fertilizer at Jones Island and keep the nitrogen level in the product above 5 percent.

tpo: What was the impetus behind the larger food waste program directed toward consumers?

Graffin: In the course of working with the food stores, we had discussions with people from InSinkEerator and decided we should

“‘Food Is Fuel’ is really a multi-year educational initiative. It takes a long time to change people’s habits — to get them to understand why they should do this and why they should care.”

BILL GRAFFIN

look at the bigger picture and educate district residents to send us their food scraps.

Food waste produces a tremendous amount of methane in landfills. The average family of four produces about 2,000 pounds of food scraps in a year. Our program gives people a good alternative to putting that material in the garbage. Composting is also a great alternative, of course, but not everybody wants to compost.

tpo: What did you do initially to promote the food waste initiative?

Graffin: In winter of 2008-2009, we worked with InSinkErator to put together some educational materials. We launched the “Food Is Fuel” program in spring 2009 by putting information up on our Web site and doing some media outreach. We did quite a bit with the media that spring.

We did a whole morning program with a local TV network affiliate down at South Shore. We also got some good radio play. We sent out a news advisory with a fruit basket to encourage them to talk about the program and call us if they had questions or wanted an interview.

We co-hosted one morning show on a popular station with a live broadcast for one of their workforce tour stops. It was a sponsored event where we could talk about anything related to MMSD and who we are. We touched on the “Food Is Fuel” campaign several times throughout the morning.

Meanwhile, InSinkErator developed some store tags about the program to hang near their garbage disposals in store displays and drive people to our Web site for more information.

tpo: What is being done to sustain momentum for the program?

Graffin: We kept the program placed prominently on the front page of our Web site. We kept promoting it hard for two or three months. Then we had some big rains hit in June, and that by necessity switched the focus of communications for a time.

Our educational outreach person plans to include “Food Is Fuel” information in school talks. We included program information in our basic brochure about the district, and that’s distributed at various public-speaking presentations and various events throughout the year.

We also include “Food is Fuel” in our “Sewer School” PowerPoint presentation that lays out who we are and what we do, and the facts and figures about the district. That presentation also includes various things our residents can do to help reduce the risk of sewer overflows, basement backups, flooding and polluted stormwater runoff.

We picked up “Food Is Fuel” promotion again this past spring. We began using Twitter late last year. In addition, we may create a video about it as time permits. Our videos do a tremendous amount of good for us in terms of getting the public’s attention. We put all the videos on our Web site via direct links to YouTube.

“We are very hopeful that we could easily see a 25 to 30 percent increase in gas production just with what Dr. Zitomer is exploring. If we can update our mixing system and start taking in some of the FOG, we could double our gas production.”

PETE TOPCZEWSKI

YouTube has a great platform for putting out videos and making it very easy for people to see them no matter what kind of viewing software they have. YouTube does the translation, and it comes out to be a very clear, clean, crisp presentation. That has been a fantastic communication tool.

tpo: What results has the district seen so far in terms of methane production from “Food Is Fuel”?

Graffin: As of now we can’t quantify the results. To see a major increase in gas production, we would need to have a very successful advertising, marketing and promotion campaign. This is a multi-year effort in getting people to think differently about what they do with their food scraps. It takes a long time to change people’s habits — to get them to understand why they should do this and why they should care.

tpo: What other measures are being looked at to increase gas production from the digesters?

Topczewski: We continue to work with Dr. Zitomer at Marquette. He is identifying waste high in BOD and COD that we could add to the digesters. Mostly, those include byproducts of the food-processing industry. Examples include syrup from soda bottling plants, byproducts of the brewing industry and wastes from plants that make soup bases.

Dr. Zitomer is pilot testing some of those, and this summer we plan to do some full-scale testing at South Shore. The aim is that instead of having businesses discharge these materials to the sewers, where they get diluted, we would take them in their concentrated form and put them directly into the digesters — co-digesting them with the sludges we produce at the treatment plant.

We’re also trying to find sources of high-strength waste that are not necessarily in our service area. We may be willing to take such material from the outside if people are willing to truck it to us.

tpo: Do fats, oils and grease have a potential role in increasing methane production?

Topczewski: Fat is good for that purpose. It has a lot of energy potential, but right now the mixing system in our digesters is not robust enough to enable us to accept grease. It turns into a blanket that smothers the microorganisms. We have a capital project going on to assess what it would take to redesign the mixing system in the digesters so that we could take the fats, oils and grease.

tpo: All told, what impact might these initiatives have on the volume of methane produced at South Shore?

Topczewski: We are very hopeful that we could easily see a 25 to 30 percent increase in gas production just with what Dr. Zitomer is exploring. If we can update our mixing system and start taking in some of the FOG, we could double our gas production. **tpo**

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WHETHER FOR EFFLUENT QUALITY OR BASIC MAINTENANCE AND HOUSEKEEPING, THE TOMAH (WIS.) WASTEWATER FACILITY GETS CONSISTENTLY HIGH MARKS

By Ted J. Rulseh

Team members gather for a morning "huddle" at the Tomah Wastewater Treatment Facility. From left, Mike Wetzel, grade 4 operator; Rod Sherwood, grade 4 operator; Brad Noth, grade 4 operator/mechanic; Don Pierce, plant supervisor; Brandy Leis, grade 4 operator; and Tom Beemis, operator in training. (Photography by Christopher Malinger)



DON PIERCE WILL BE THE FIRST TO ADMIT HE'S "A FANATIC about cleanliness." That explains why the Tomah (Wis.) Wastewater Facility, where he is plant supervisor, still looks brand new after 10 years.

Of course, Pierce and his team of five operators are no less meticulous about the quality of the effluent the plant discharges to the Lemonweir River. A biological nutrient removal process built around oxidation ditches helps the plant achieve greater than 98 percent removal of BOD, TSS, ammonia and total phosphorus.

Pierce and his fully cross-trained team monitor the treatment processes closely and, when challenges appear, share observations and ideas freely. They also keep the mechanical equipment reliable with a rigorous maintenance program, guided by a computerized maintenance management system (CMMS).

All that, along with effective sewer system maintenance and aggressive measures against inflow and infiltration, ensures high-quality, cost-effective service to the city's 9,000 residents and a growing business community.

AT A CROSSROADS

Tomah lies in hilly southwestern Wisconsin, at the junction of Interstate 90 and 94. The community has grown in recent years with industrial players such as The Toro Company, Cardinal Glass Industries, and a Wal-Mart distribution center.

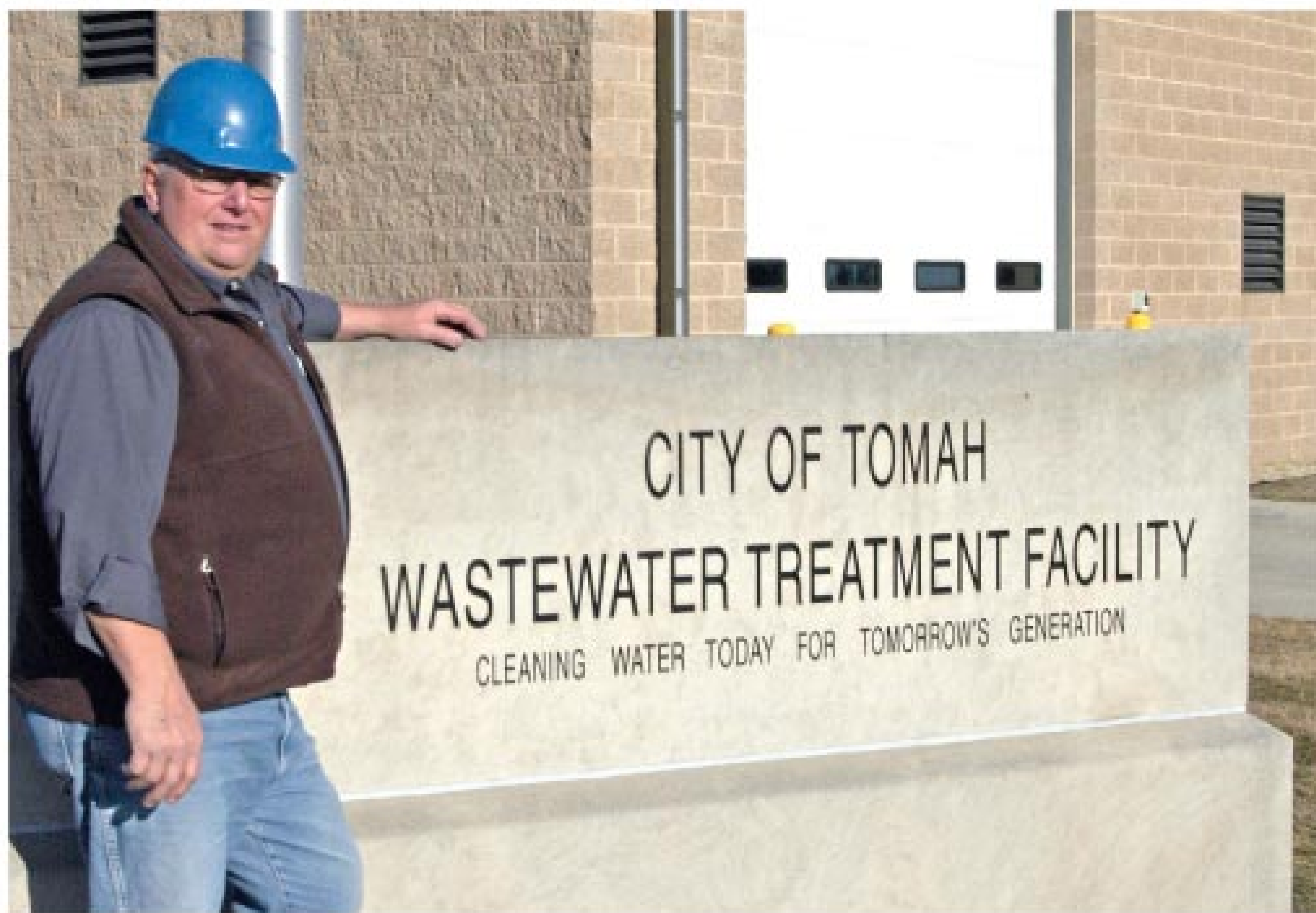
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Tomah Wastewater Treatment Facility, Tomah, Wis.

BUILT:	1999
POPULATION SERVED:	9,000
EMPLOYEES:	6
FLOWS:	2.2 mgd design, 1.04 mgd average, 6.2 mgd peak
TREATMENT LEVEL:	Secondary
TREATMENT PROCESS:	Biological nutrient removal – oxidation ditch
RECEIVING WATER:	Lemonweir River
BIOSOLIDS:	Lime stabilization (Class A), land application

The denitrification basin at the Tomah wastewater facility. The plant uses a biological nutrient removal process built around oxidation ditches.



Plant supervisor Don Pierce.



Operators Mike Wetzel and Brad Noth check the backup generator (Kohler Power) for the liquid/dry polymer mixing machine.

The city built its new 2.2 mgd (design) treatment plant in 1999. Besides seasonal BOD and TSS limits, it meets stringent standards for ammonia and total phosphorus.

Pierce rose to the plant supervisor position three years ago and has 25 years of experience with the city to go with nearly two decades as a sewer and water line installer in the private sector. As he approaches retirement, he holds his team to high standards, in part because one of them may ultimately replace him.

"I want all these younger guys coming up to learn our process well and get their Grade 4 licenses [highest level in Wisconsin], so one of them can take over when I'm gone," Pierce says.

Besides running the plant, Pierce and his team maintain seven lift stations and 56.5 miles of sewer, much of it 60 to 70 years old, and 75 percent of it installed below the water table. "We're working to replace older, problematic lines with PVC pipe," Pierce says. "In the next two years, the city will bond about \$5 million to replace about 50 blocks of sewer lines."

TALENTED TEAM

Some team members came to their jobs with especially relevant experience. Brandy Leis, a 12-year operator with his Grade 4 license, programmed and wired lift stations on a previous job. "He's a real asset," says Pierce. "He maintains our lift stations and does all the troubleshooting in those facilities."

Brad Noth (Grade 4, five years) is an accomplished mechanic and takes the lead on equipment maintenance. The other operators are Mike Wetzel (Grade 4, 12 years), Rod Sherwood (Grade 4, six years) and Tom Beemis (operator in training, two years).

"Tom, Brad and Rod take one-week rotations on the sludge presses," says Pierce. "Mike and Brandy rotate in the lab. We would like for everybody to be able to do everybody else's job."

The city helps operators get up to speed and advance in the profession. "When we first hire operators, we send them to the Introduction to Wastewater Treatment school, which is a six-day program offered at Western Wisconsin Technical College," says Pierce. "We give them one year to study for and pass the test for their entry-level Grade 1 license. If they don't pass, we can let them go — but we've never had that happen."

He believes that's partly because the job's compensation structure motivates operators to stay. Each operator works five hours per day on every fifth weekend, earning ten hours of overtime, plus four hours per day of regular pay for standby duty.

As operators progress, the city sends them to the classes they need for their higher-level licenses and pays their exam fees (one time only — an inducement to pass).

Pierce likes to draw on the collective expertise of his team. "You have different people who watch different things," he says. "We'll sit down at the break table and discuss what we observe. We work together like a football team. I tell them, 'If you see something that's going a little haywire, don't keep it to yourself. Tell everybody else, because someone might come up with a solution that will help us all out.'"

"We work together like a football team. I tell them, 'If you see something that's going a little haywire, don't keep it to yourself. Tell everybody else, because someone might come up with a solution that will help us all out.'"

DON PIERCE

REMOVING NUTRIENTS

Pierce believes the team's work is made easier by the plant's EWT Carousel biological nutrient removal system, supplied by Eimco Water Technologies. "It's a very consistent process," he says. "The oxidation ditch will take a shock load. It's amazing how well the process works."

Four pumps (Weir Specialty Pumps - WEMCO) raise influent to the head of the plant, where it passes through a bar screen (Parkson Corp.) and a vortex grit removal system (Jones and Atwood, part of Eimco Water Technologies) and enters a 90-foot-diameter fermentation tank (Eimco Water Technologies), where biological treatment begins under anaerobic conditions. The wastewater then enters a selector basin, where it is mixed in the absence of oxygen and phosphorus is released.

Next comes an anoxic basin where nitrogen removal occurs as the material is mixed to prevent solids settling. From there, the wastewater enters the front of the oxidation ditch, where mixing continues and dissolved oxygen is kept between 0.2 and 0.8 ppm. As it goes around the ditch, aeration is added



PASTEURIZED PRODUCT

The Tomah Wastewater Facility uses a process supplied by RDP Technologies to create lime-stabilized Class A biosolids, which are hauled to farms for beneficial use.

Sludge from the process is pumped to holding tanks and then fed to an Andritz Separation Inc. belt press along with polymer and ferric chloride. The material leaving the press, at 16 to 18 percent solids, is delivered by auger to a thermal blender unit, where it is heated to over 158 degrees F, and where hydrated lime is added.

After that step, the material, containing about 50 percent lime, drops into a pasteurization vessel, where it stays for 30 minutes at a minimum of 158 degrees F to kill all pathogens. From there, a belt conveyor takes it to a concrete slab sheltered by an open-sided shed and fitted with drains that capture any liquid and return it to the treatment plant headworks.

"We're required to have enough storage for 180 days' production, but we have enough for a full year," says Don Pierce, plant supervisor. "We run the process about three days a week and produce a quad-axle truckload per day. Last year we produced about 842 dry metric tons.

"When we first began producing Class A material, we thought we would be able to sell it. But the farm economy has been difficult, and when we talked about getting some money for the material, the farmers said they didn't want it."

and phosphorus uptake occurs. Dissolved oxygen at the back end of the ditch is kept at about 2.0 ppm.

From the oxidation ditch, the flow proceeds to the final clarifier (Eimco), where scrapers with spiral rake blades provide thorough mixing of the sludge blanket, which is maintained at a thickness of 2 feet. Activated sludge wasted from the bottom goes to three sludge tanks and then into the Class A biosolids process (see sidebar). Effluent from the clarifiers goes through a UV disinfection (Trojan Technologies) that uses 24 bulbs outfitted with an automatic cleaning system to reduce maintenance.

Pierce and his team keep a sharp eye on process parameters, often draw-

ing their first clues from test results in the laboratory. Experience has taught them to adjust the process seasonally. "In winter, we'll slow our wasting down because we need more bugs in the system to eat the BOD and TSS," he says.



RUNNING EFFICIENTLY

While the process performs reliably, the plant's efficiency has been enhanced by an aggressive program against I&I. "We recently completed an extensive sewer replacement, where we went through one part of town where the sewers were built during the second World War," says Pierce. "We dropped 300,000 gpd infiltration.

"I've been here for 25 years, and our flow back then was 1.7 to 1.8 mgd. In early December, our flow on one Sunday was 840,000 gallons. For a week and a half during that month, we didn't have a flow over a million gallons."

Pierce attributes that partly to a rate increase that encouraged residents and businesses to conserve water. "It's surprising that people are conserving that much," he says. "Our engineers say that people are changing. It used to

**TOMAH (WIS.) WASTEWATER TREATMENT FACILITY
PERMIT AND PERFORMANCE**

	PERMIT	INFLUENT	EFFLUENT	% REMOVAL
BOD	25 mg/l Nov.-Apr. 15 mg/l May-June/Sept.-Oct. 13 mg/l July-Aug.	355 mg/l	5.1 mg/l	98.5%
TSS	15 mg/l May-Oct. 25 mg/l Nov.-Apr.	369 mg/l	3.2 mg/l	99.3%
Ammonia	5.3 mg/l June-Sept. 9.4 mg/l Oct.-May	26.3 mg/l	0.06 mg/l	99.8%
Total phosphorous	2 mg/l	7.43 mg/l	0.13 mg/l	98.1%
Dissolved oxygen	7.5 mg/l July-Aug. 8.5 mg/l Sept.-June	-	10.55 mg/l	-



Brandy Leis, 12-year operator with Grade 4 license, runs tests in the laboratory.

“Of course, the software is only as good as the people behind it. The computer can tell you what to do, but it’s our job to get it done. We perform the maintenance, and as a result we have very few major problems.”

DON PIERCE

be that when we had a rate increase, everybody would lie low on using water for a month, and then go back to the same way they were. Not anymore.

“We have two oxidation ditches and two final clarifiers, and right now we only have one ditch and one clarifier online. The way people are conserving now, I don’t anticipate having to put that second ditch and clarifier on for another four or five years.”

Contributing to the plant’s efficiency and reliability is a CMMS from OPS Systems (now owned by Hach Company). “It organizes our entire maintenance program,” says Pierce. “Every week, we have 70 maintenance items to look at, from the Vac-Con Inc. jet-vacuum unit we use for sewer cleaning, to motors, to pumps.

“Of course, the software is only as good as the people behind it. The computer can tell you what to do, but it’s our job to get it done. We perform the maintenance, and as a result we have very few major problems.”

In 2005, the plant received a U.S. EPA Clean Water Act award in its region: second place for operation and maintenance among plants serving communities with populations under 10,000.

READY TO HELP

Maintenance includes general housekeeping, which Pierce insists upon. “Our landscaping looks good,” he says. “The plant is immaculate. I attribute that to our whole group. When the guys come in on weekends, they mop the floors and do general cleaning. If you don’t let it get grungy, it’s not a big deal to clean it up. Just because it’s a wastewater plant doesn’t mean it has to be dirty.”

While running his own facility effectively, Pierce is always willing to help his neighboring professionals. “We give a lot of waste sludge to neighboring communities if they need to sustain their processes,” he says. “Three or four operators call me now and then and say, ‘Hey, can you bring a load of sludge so I can reseed?’ I let them have it for nothing, because by giving it away we don’t have to run it through our press, and that saves us money. All I ask is that they pay for the hauling.”

Being a good neighbor is just another part of running a quality operation. **tpo**

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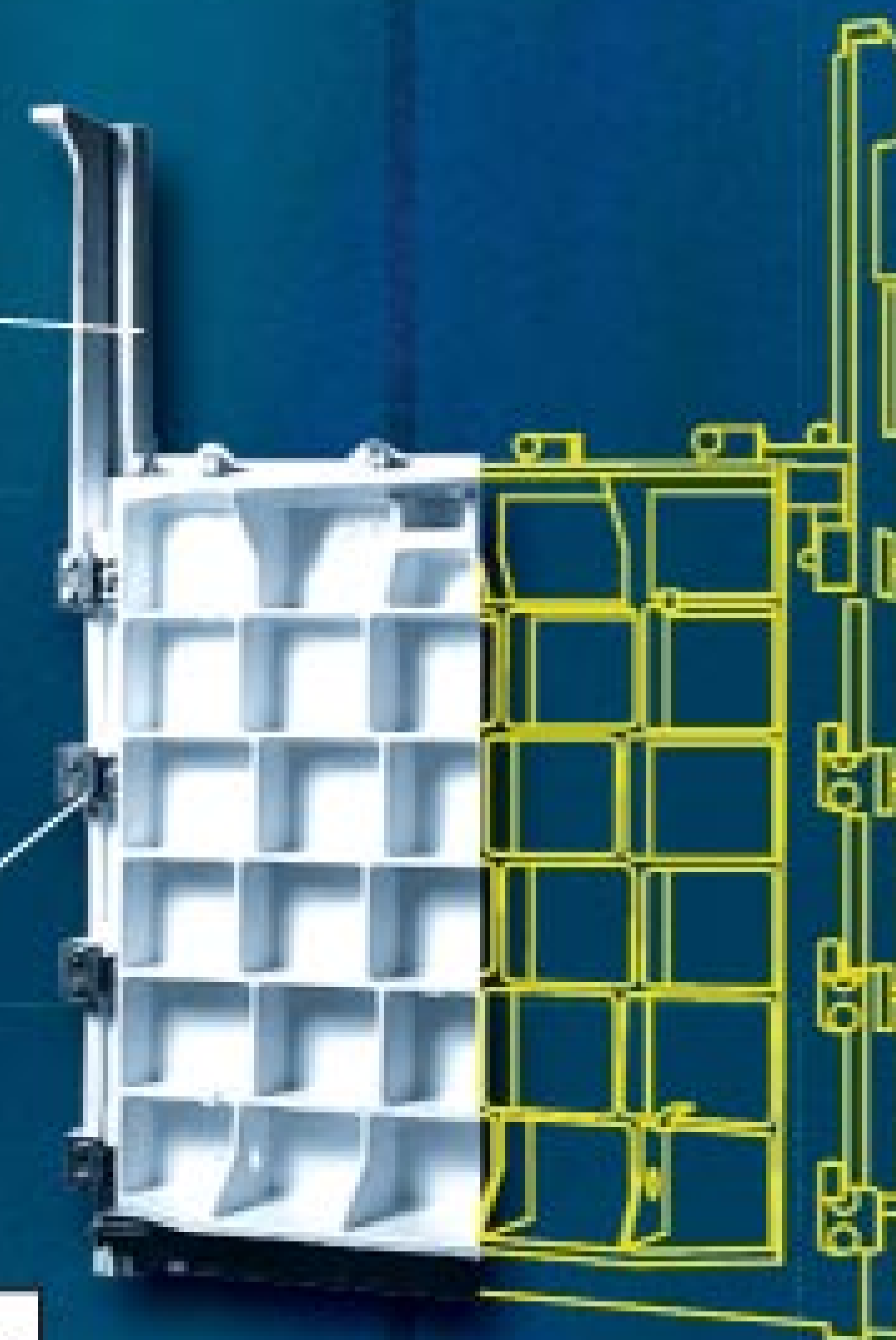
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1. VAL-MATIC OFFERS STAINLESS STEEL WASTEWATER AIR VALVES

Val-Matic Valve & Mfg. Corp. now offers all-stainless steel wastewater air valves in sizes from 1 to 4 inches for single housing and from 1 to 8 inches for dual housing. Constructed of 316 stainless steel, the valves are of lightweight design, require no regular maintenance and provide years of reliable operation in harsh conditions, including grit and wastewater service, desalinization, mining, and leaching applications. **630/941-7600; www.valmatic.com.**

2. STACO ENERGY PRODUCTS INTRODUCES FLU-10S UPS

The second generation FLU-10S three-phase uninterruptible power supply from Staco Energy Products Co. is designed to offer computer-grade power. Measuring 46 inches high, 20 inches wide and 32 inches deep, the unit has a standard battery run-time of nine minutes with optional batteries for extended run times. Features include front-end harmonic correction, eliminating the need for additional filtering, while double-conversion technology protects the connected load from sags, swells, harmonics, noise and voltage imbalances without going to battery operation. **866/266-1191; www.stacoenergy.com.**

CONTROL MICROSYSTEMS OFFERS CLEARSCADA PLATFORM

The ClearSCADA host platform from Control Microsystems Inc. and Longwatch Inc. provides video surveillance of remote processes and

assets. The platform can be integrated with the Longwatch Video Surveillance Platform and Video Historian Platform, along with IP surveillance cameras to capture and convey security information. The video system uses Modbus protocol and is event-driven to conserve bandwidth. The Longwatch system continuously takes and stores video. When motion is detected, an alarm is raised and a video snippet is attached to the alarm message and sent to the control site showing what happened before and after the event. Through a graphic display in ClearSCADA, operators can view what is occurring on site, eliminating the need for someone to investigate the alarm. **888/267-2232; www.controlmicrosystems.com.**

3. SJE-RHOMBUS OFFERS I-LINK LIFT STATION NOTIFIER

The I-Link lift station notifier from SJE-Rhombus, available with two- and four-year service plans, provides Web-based monitoring that collects and reports system status and alarm events. Model LSN 100 monitors and sends notifications based on digital inputs for high level, low level (or fault) and power loss. The unit monitors pump cycle count and run time for up to three pumps. Model LSN 200 also monitors pump performance and pump current. **800/746-6287; www.sjrhombus.com.**

4. ENDRESS+HAUSER INTRODUCES LIQUIPHANT M DENSITY METER

The Liquiphant M density meter from Endress+Hauser is designed to provide online measurements, eliminating the need for off-line procedures and laboratory measurements. A built-in density calculator can be customized, enabling the unit to provide measurements achieved by lab instruments. The meter can calculate density in mass or volume units. Customized applications include content measurement and concentration, quality statements, purity indication and product identification, among others. **317/535-1329; www.us.endress.com.**

5. AEGIS INTRODUCES 841 SHAFT GROUNDING RING

The 841 bearing isolator shaft grounding ring from AEGIS is designed to protect heavy-duty motor bearings from harmful VFD-induced shaft currents and contaminants. It is suited for IEEE 841 motors controlled by variable-frequency drives. **866/738-1857; www.est-aegis.com.**

6. SENSOR INTRODUCES STAND-ALONE GAS DETECTORS

Four models of stand-alone gas detectors from Sensor Electronics, engineered for wastewater treatment plants, react immediately to dangerous levels of hydrogen sulfide, methane, sulfur dioxide or chlorine. Each detector links to a compact transmitter fitted with LEDs that glow green as long as the gas levels are safe. If levels change, the LEDs change to amber and then red. Gas levels in ppm or percentages are shown on digital readouts. **800/285-3651; www.sensorelectronics.com.**

BLUE RIBBON OFFERS LIFT STATION LEVEL TRANSMITTER

The Lift Station level transmitter with Birdcage design from Blue Ribbon is designed for low-maintenance operation in lift station or raw sewage level applications. A 3-inch diameter sensing body eliminates plugging. The Birdcage design features an all-welded stainless steel body coupled to a jacketed polyurethane cable rated to 1,100 FT WC. An integral vent tube provides a barometric reference and a hydrophobic vent filter protects against moisture. **716/773-9300; www.blueribboncorp.com.**

7. PENTAIR OFFERS FUSION G7 WALL-MOUNT ENCLOSURES

Hoffman brand Fusion G7 global wall-mount enclosures from Pentair Technical Products feature a scalable design with internal component mounting provisions and options. Enclosures are available in 30 standard metric sizes from 300 by 300 by 225 mm to 1,500 by 900 by 425 mm. The units include a galvanized back panel and removable bottom plate for cable entry modifications and wire installation. **763/545-1730; www.pentair.com.**

8. STAFFORD OFFERS CORROSION-RESISTANT COLLARS, COUPLINGS

Shaft collars and couplings for pump drive and structural systems from Stafford Manufacturing Corp. are offered in 303 and 316 stainless steel, brass, bronze and other materials for various power transmission and structure system requirements. The corrosion-resistant collars come in 1-piece, 2-piece and set-screw styles in sizes up to 16 inches I.D. Couples are available in 1-piece, 2-piece and 3-piece styles up to 6 inches I.D. All can be modified with special bores, keyways, mounting holes, flats, hinges, threads and more. **800/695-5551; www.staffordmfg.com.**

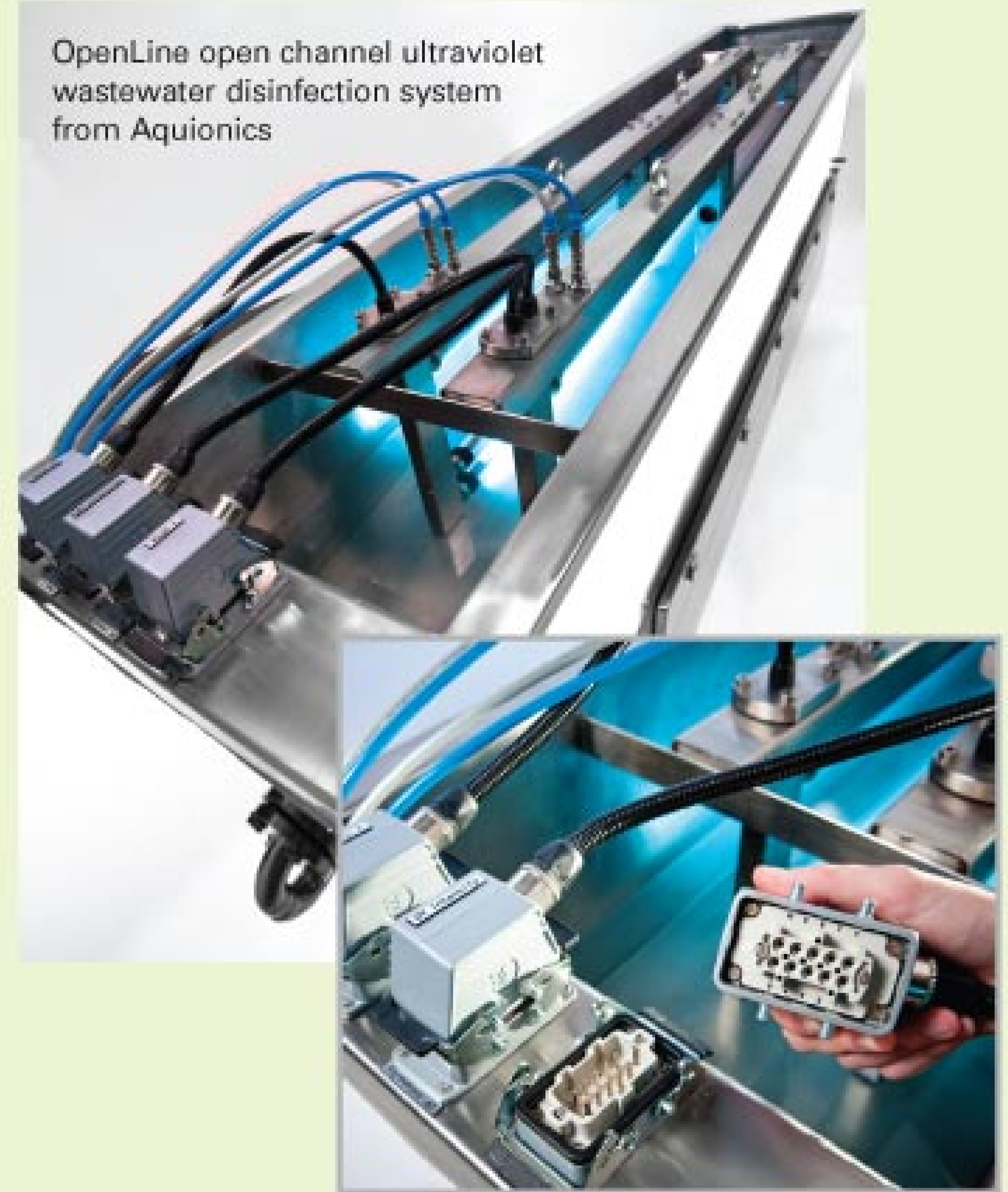
ECOWAVE INTRODUCES 1000 SERIES DRYER

The 1000 Series biosolids drying unit from EcoWave is designed to produce a Class A product using a microwave/near-infrared process that is energy efficient and highly scalable. It produces little to no odor, has low operation and maintenance costs and minimizes emissions of secondary pollutants such as dust, CO, CO₂, NO_x and SO_x. A 50-wet-ton-per-day machine has less than a 900 square-foot total recommended install area.

The technology combines the heating characteristics of microwave and near-infrared rays. The action of microwaves generating heat inside and the near-infrared rays heating the surface enhances heating and drying. The electric drying technology uses an agitator-equipped screw conveyor that agitates the material being moved in the dryer in order to apply heating evenly, for a uniformly dried product. EcoWave has fully functioning pilot unit mounted to a truck available for demonstrations. **321/217-3181; www.ecowaveusa.com.**

product spotlight

OpenLine open channel ultraviolet wastewater disinfection system from Aquionics



Aquionics Designs Universal UV Disinfection System

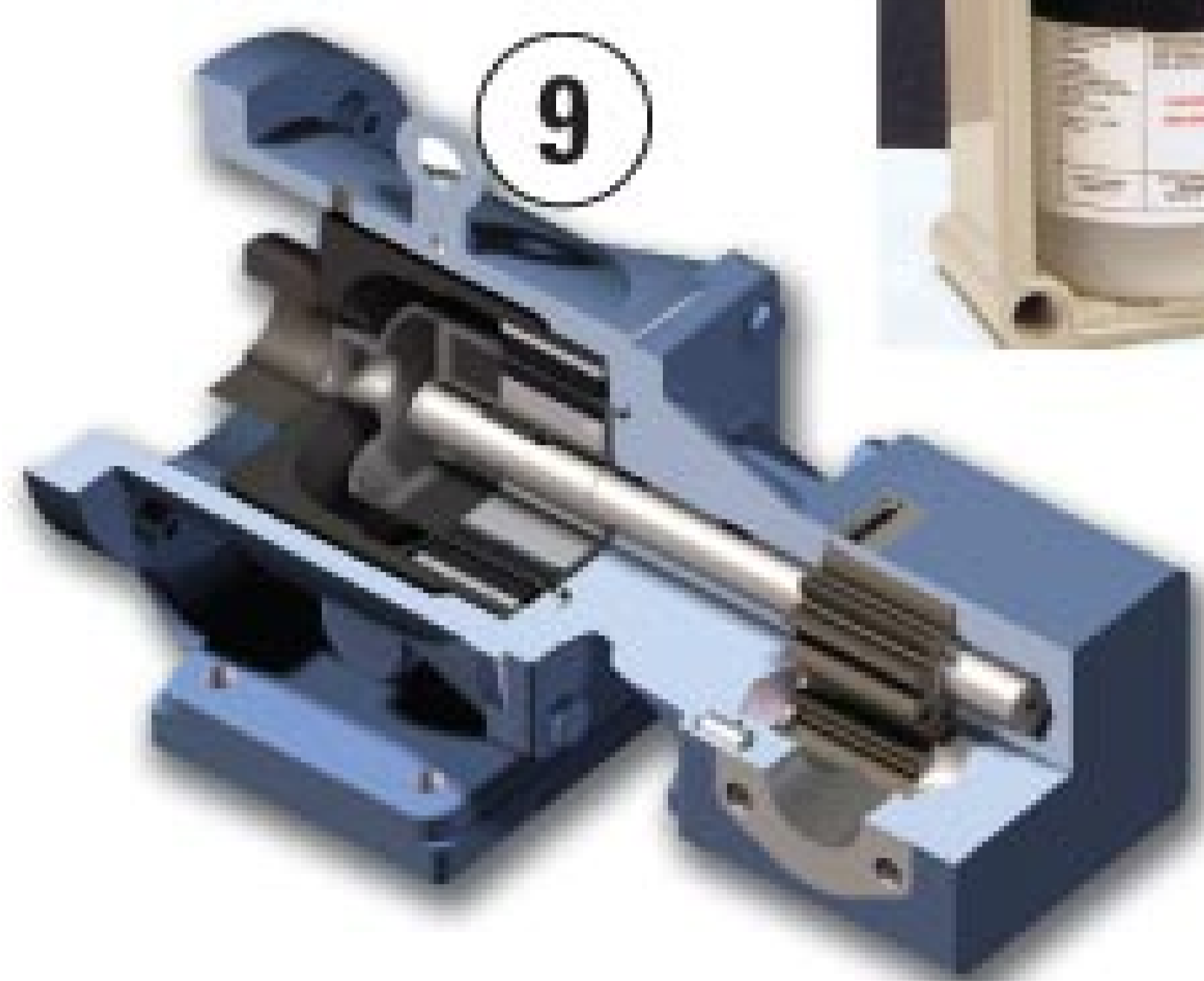
By Ed Wodalski

The OpenLine open channel ultraviolet wastewater disinfection system from Aquionics is engineered to treat secondary wastewater flows up to 2.5 million gpd. The system uses a low-pressure, high-output amalgam lamp that offers a stable output over its 14,000 hours of operating life. The flexible, modular design provides simple installation and maintenance. The unit is simply placed on a flat surface and the inlet and outlet piping is connected.

The unit is designed to plug into an existing treatment facility without customization, says Oliver Lawal, vice president of technology. "From an engineering and design standpoint, it just bolts onto the back of whatever they've got," he says. "It doesn't matter if it's a reactor clarifier or sequencing batch reactor. All you need is a concrete slab." The system measures 7 feet long and about 1 foot wide.

The self-contained unit negates the need to install lamp wires through conduits or chemical feed systems. Chemical free, the unit uses automatic, long-life Viton wipers, powered by a self-contained air compressor, to keep the quartz sleeves surrounding the UV lamps clean and ensure optimum UV output at all times.

Lamp replacement takes about five minutes, and this and other routine maintenance can usually be performed by on-site staff. Assuming the system runs year-round, the only maintenance is a lamp and wiper ring change every 18 months. The system's ballasts have a variable output between 50 and 100 percent and are easily accessible. **859/341-0710; www.aquionics.com.**



9. VIKING EXPANDS SG SERIES PUMP LINE

The SG series line of high-pressure positive displacement pumps from Viking Pump has been expanded to 190 gpm with either Viking Mag Drive, single or double cartridge seals, component mechanical seals or lip seals. The series offers 29 displacements with pressures to 500 psi standard and some to 2,500 psi. All operate at up to 4-pole motor speeds and offer either foot-bracket or close-coupled mount to both NEMA C and IEC frame motors. The pumps are capable of handling liquids from 1 to 250,000 cST viscosity. **319/266-1741; www.vikingpump.com.**

ITT INTRODUCES REDESIGNED FLOJET PUMPS

Flojet Triplex Series high-pressure pumps from ITT Corp. feature a three-chamber configuration, enabling the self-priming pumps to operate at flows up to 1.4 gpm and pressures to 150 psi. Available in 12- and 24-volt DC and 115- and 230-volt AC models, enhancements include improved priming, stable bypass pressures from 120 to 125 psi and 25 percent increase in pump life. **714/557-4700; www.flojet.com.**

10. IN-PIPE OFFERS BACTERIAL ADDITIVE

In-Pipe Technology Company offers a high-concentration formulation of facultative, symbiotic, spore-forming, naturally occurring bacteria added at strategic locations in the collection system to improve wastewater treatment.

The process enhances the microbial community so that more reactions occur in the sewer biofilm and increase metabolism of wastewater compounds. The bacteria convert TSS to a soluble format that is more bioavailable, allowing conversion of the soluble organic compounds into carbon dioxide and nitrogen. The processing of organic matter in the collection system reduces the biological load to the treatment plant. **888/325-5033; www.in-pipe.com.**

SEAMETRICS INTRODUCES WMP104-100 MAGMETER

The 1-inch WMP104-100 molded plastic magmeter from Seametrics is designed for flows under 80 gpm. It is available in both battery and externally powered options. The flowmeter is chemically resistant and has no moving parts. A digital display shows the flow and accumulated total. A pulse output is available for pacing external devices. **253/872-0284; www.seametrics.com.**



11. COD ANALYSIS

The SC400 for COD analysis is a rugged, waterproof, handheld colorimeter that can test three ranges of COD (0-150 mg/l; 0-1,500 mg/l; 0-15,000 mg/l). The instrument, from Orbeco-Hellige Inc., has a large backlit display, a real-time clock, 16-point data storage and a mode that allows the user to calibrate against prepared standards. It comes with a 16-mm tube adapter and a battery in a case. **800/922-5242; www.orbeco.com.**

12. TORREY PINES INTRODUCES ECHOTHERM CO2 COLUMN HEATER

The CO2 EchoTherm HPLC column heater from Torrey Pines Scientific Inc. has a temperature range from room temperature to 90 degrees C (194 degrees F) readable and settable to 0.1 degree C (32.18 degrees F). The unit holds columns up to 30 cm long (approximately 1 foot) by 1/4-inch or 3/8-inch diameter. Larger columns can be used by removing the column clips that hold the smaller columns. Features include digital display of target and chamber temperatures, injection counter, 30-day timer with alarm and settable auto-off. The unit operates on 12 volts DC and comes with a benchtop universal power supply. **866/573-9104; www.torreypinesscientific.com.**

13. SEL OFFERS FEEDER PROTECTION RELAY

The SEL-751A feeder protection relay with arc-flash detection from Schweitzer Engineering Laboratories is designed to reduce false trips and improve power system reliability. Fiber-optic, light-sensing technology and overcurrent protection work together to detect arc-flash hazards. **509/332-1890; www.selinc.com.**

GLOBAL WATER GROUP INTRODUCES TREATMENT, RECYCLING SYSTEM

An advanced, modular wastewater treatment and recycling system from Global Water Group Inc. is designed to process water in half the time of conventional aeration systems. Using modular units, the system operates in combination with separate recycling and purification units. The systems are applicable for flows from a few thousand gallons to tens of millions of gpd. Standard configurations or custom design, the units feature no sludge disposal, minimal maintenance and effluent that meets World Health Organization drinking standards. **214/678-9866; www.globalwater.com. tpo**



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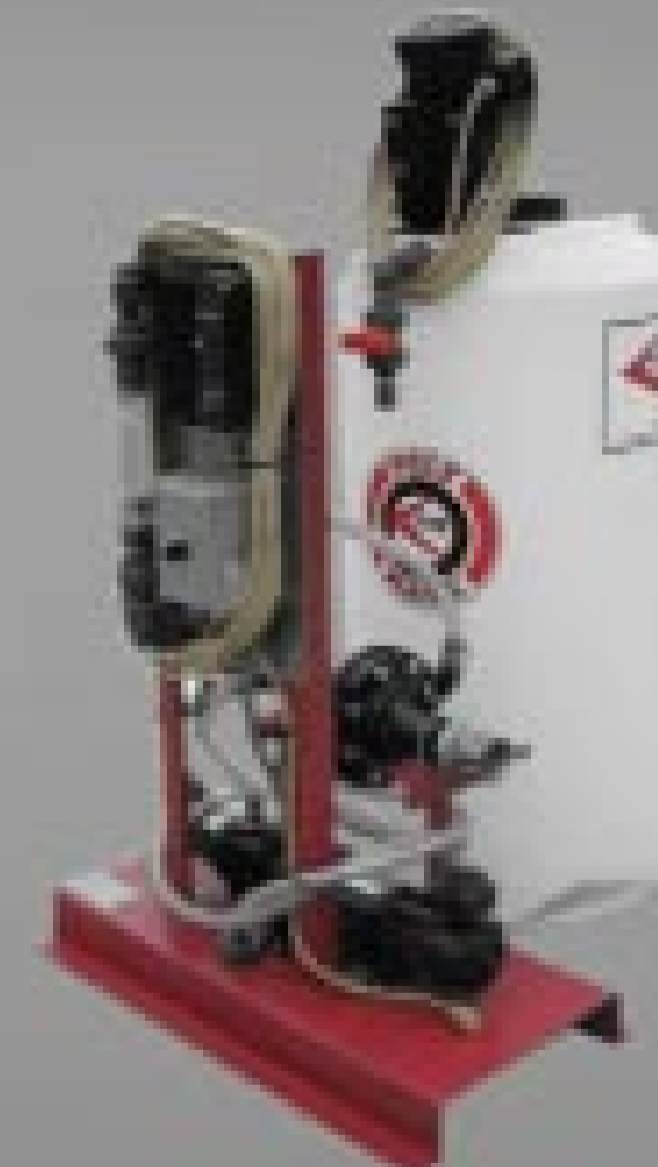
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A Better Blend

AN AUTOMATED EMULSION POLYMER BLENDING SYSTEM HELPS A TEXAS TREATMENT PLANT IMPROVE DEWATERING AND CUT POLYMER COSTS

By Scottie Dayton

The Wallace R. Knox Wastewater Treatment Plant in Texas City, Texas, operates one of two belt presses seven days a week during normal work hours, dewatering an average of 72,000 gpd of feed sludge.

Every three to four weeks, however, the spring-loaded check valve in the aging emulsion blending system became caked with polymer. It took the staff one day to dismantle the chemical feed pump and clean the mixing chamber with polymer solvent.

"We had capacity to store sludge in the digester for a day or two, but interrupting the dewatering process wasn't very efficient," says wastewater superintendent Calvin Bremer. "Neither was the polymer mixing chamber. It was breaking the polymer chains and not giving us a homogenized mix."

Bremer consulted Matt Davis at Hartwell Environmental Corp., a distributor in Tomball, Texas. Davis brought in George N. Argiris from Pulsafeeder Inc. in Houston, who suggested two systems.

Bremer chose the Polyfeeder emulsion polymer blending system from Pulsafeeder Inc., a Unit of IDEX Corporation, in Rochester, N.Y. Since it went online in June 2009, the unit has worked without interruption, increasing dewatering production, and saving the city thousands of dollars in polymer expenses.

"The new system is far more efficient. It mixes the polymer through the sludge better so it dewateres faster with a much drier cake. It has improved our process quite dramatically."

CALVIN D. BREMER

VERTICAL LOOP REACTOR

The Knox plant flow averages 4 to 6 mgd. Wastewater is treated in a vertical loop reactor, basically an oxidation ditch system flipped on its side. A horizontal baffle divides each rectangular tank into upper and lower compartments. Disc aerators are on top and coarse-bubble diffusers are on the bottom. The under-over flow pattern allows reactors to be installed in deeper tanks, reducing land requirements.

The aerobically digested sludge is dewatered in a 2.2-meter Klampress filter press from Ashbrook Simon-Hartley and a 2.5-meter



PHOTOS COURTESY OF CALVIN BREMER

ABOVE: Sludge flows onto the belt press for dewatering. The Polyfeeder system mixes the polymer thoroughly with the sludge so that it dewateres faster with a drier cake. RIGHT: Water flows from the sludge during dewatering. The belt press runs seven days a week during normal work hours, dewatering an average of 72,000 gpd of feed sludge.



Series 518 Sludgepress from Enviroquip, a Division of Eimco Water Technologies, that the staff is rehabilitating. The waste activated sludge runs 8,000 to 10,000 mg/l mixed liquor suspended solids (MLSS) with 2 to 3 percent solids.

"With the old injection system, we ran the presses at 150 gpm and got 16 to 18 percent solids cake," says Bremer. "Today, we process at 200 to 250 gpm and get 18 to 21 percent solids cake."

The real eye-popper came when Bremer looked at the data for polymer used. The old system required about 13 gpd, and Bremer spent \$2,139 on a 275-gallon tote every three weeks. "The Polyfeeder uses about 5.4 gpd," he says. "I was astounded when I saw the numbers. Now we go a month and a half before ordering the next tote."

MAKING IT FIT

The staff installed the modular polymer system in one day. To make room for it on the catwalk, they unbolted and moved the hydraulic pump. John Condame and an associate from Pulsafeeder then programmed the unit's straight-forward digital control and trained the entire staff to operate it in one session.

Share Your Idea

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

Send your ideas to editor@tpomag.com or call 877/953-3301

"There was a bit of a learning curve, but they caught on quickly," says Bremer. "What's really cool is that the operators don't have to make a bunch of adjustments. They just set the water to where they want it, adjust the polymer percentage, and the computer does the rest. For the most part, the system runs the same day in and day out."

In two months, operators learned to get the most from the system. The machine has a clear, high-shear mixing chamber and an anti-clog injector lance that discharges into the process stream. The unit has run without major maintenance. Operators change a hose occasionally, but they do it in the morning before starting the press.

"The new system is far more efficient," says Bremer. "It mixes the polymer through the sludge better so it dewateres faster with a much drier cake. It has improved our dewatering process quite dramatically."

The Knox plant lime stabilizes and heat processes some cake into Class A biosolids. The city's Solid Waste Management Department mixes the material with wood chips to make mulch used in ditches and parks. "The pH is too high for flowerbeds," says Bremer. "We're looking at doing some Class B composting, but that's down the road."

Within seven months, the Polyfeeder paid for itself in polymer saved. The Knox treatment plant staff is considering upgrading the emulsion blending system for the Sludgepress when it is rehabilitated. **tpa**

more info:

Ashbrook Simon-Hartley
800/362-9041
www.as-h.com

**Pulsafeeder Inc.,
a Unit of IDEX Corporation**
585/292-8000
www.pulsafeeder.com

**Enviroquip, a Division of
Eimco Water Technologies**
512/834-6043
www.enviroquip.com



ABOVE: Operator Bill Garvin starts the Polyfeeder emulsion polymer blending system. RIGHT: The digital control on the Polyfeeder emulsion polymer blending system is designed to be straightforward and easy to operate.

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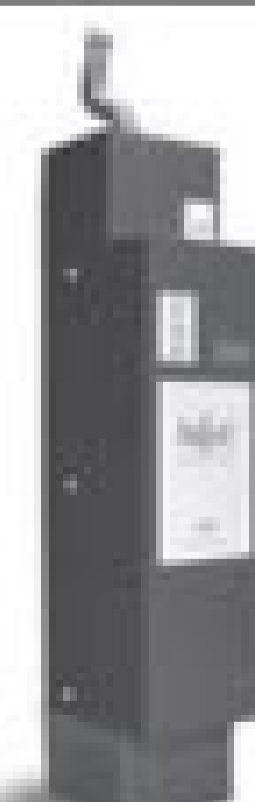


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TPO invites your national, state or local association to post notices and news items in this column. Send contributions to editor@tpomag.com.

people/awards

The **Water Environment Federation** was named to the 2010 Associations Advance America Honor Roll by the American Society of Association Executives and The Center for Association Leadership.

Patricia Adams, Bridgette Myles and **Regina Seetahal** received scholarships from the New York Water Environment Association in honor of the late Lucy Grassano.

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

education

British Columbia

The British Columbia Water and Waste Association has a Wastewater Treatment and Biosolids Management Seminar on June 4 in Burnaby. Visit www.bcwwa.org.

Illinois

The Illinois Water Environment Association has these courses:

- June 18 – Laboratory Seminar, Downers Grove
- June 25 – Plant Operations Seminar, DeKalb

Visit www.iweasite.org.

Kansas

The Kansas Water Environment Association has these courses:

- June 3 – Wastewater Stabilization Ponds, Dodge City
- June 8 – Environmental Ethics, Kinsley
- June 9-10 – Advanced Activated Sludge Concepts, Olathe
- June 16-17 – Advanced Activated Sludge Concepts, Goddard
- June 17 – Small Wastewater Systems, Dodge City
- June 22 – Treatment Plant Safety, Garden City
- June 29 – Ethics, Dodge City
- July 6 – Wastewater Reclamation and Reuse, Dodge City
- July 8 – Natural Systems for Wastewater Treatment, Dodge City
- July 13 – Safety, Liberal
- July 15 – Wastewater Stabilization Ponds, Dodge City
- July 20 – Special Environmental Topics, Dodge City
- July 22 – Ethics, Dodge City

Visit www.kwea.net.

Nova Scotia

The Maritime Provinces Water & Wastewater Association has these courses:

- June 3 – Calculations in Wastewater Technology, Windsor, Nova Scotia
- June 4 – Wastewater Problem Solving, Windsor

Visit www.mpwwa.ca.

Maryland

The Chesapeake Section American Water Works Association has a Short Course for Water and Wastewater Operators Seminar on June 6-10 in Chestertown. Visit www.csawwa.org.

North Carolina

The North Carolina Water Environment Association has these courses:

- June 10 – Safety, Raleigh
- June 15 – Plant Optimization, Charlotte
- July 27 – Advanced Wastewater Processes/Emerging Technology, Raleigh

Visit www.ncsafewater.org.

Texas

The Texas Water Utilities Association has these courses:

- June 1 – Wastewater Collection, Carrollton
- June 15 – Safety, Jefferson
- June 29 – Safety, Carrollton
- July 20 – Wastewater Lab, Greenville
- July 27 – Wastewater Treatment, Victoria

Visit www.twua.org.

WEF

The Water Environment Federation has released the fourth annual *Journal of the U.S. SJWP*. It shares the thoughts of today's young scientists and gives students experience in scientific writing and publication. The publication is available for download on the WEF Web site at www.wef.org.

Wisconsin

The Wisconsin Department of Natural Resources has these courses:

- June 10 – Classic Collection System Seminar, Watertown
- July 29 – Northwoods Collection System Seminar, Marshfield

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

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CALENDAR OF EVENTS

June 2-4

Iowa Water Pollution Control Association Annual Conference, Ames. Call 515/232-4952 or visit www.iawpca.org.

June 2-4

Mississippi Water Environment Association Annual Conference, Hilton Garden Inn, Tupelo. Visit www.mswea.org.

June 6-9

Membrane Applications 2010, Hilton Anaheim, Anaheim, Calif. Call 703/684-2441 or visit www.wef.org.

June 7-9

New York Water Environment Association Spring Technical Conference and Exhibition, Radisson Hotel Rochester Riverside, Rochester. Call 877/556-9932 or visit www.nywea.org.

June 13-16

Water Environment Federation Collection Systems 2010, Phoenix, Ariz. Call 703/684-2441 or visit www.wef.org.

June 13-16

Pennsylvania Water Environment Association Annual Conference and Expo, Penn Stater Conference Center Hotel, State College. Call 570/549-2204 or visit www.pwea.org.

June 15-17

Ohio Water Environment Association Annual Conference and Expo, The Columbus: A Renaissance Hotel, Columbus. Call 614/488-5800 or visit www.ohiowea.org.

June 15-18

Canadian Water Resources Association Annual Conference, Hyatt Regency, Vancouver, B.C. Visit www.weao.org.

June 19-24

American Water Works Association ACE 10 Convention, McCormick Place Convention Center, Chicago, Ill. Visit www.awwa.org/ace10.

July 18-21

Georgia Association of Water Professionals Annual Conference and Expo, Savannah International Trade & Convention Center, Savannah. Visit www.gawp.org.

July 22-23

Nebraska Water Environment Association's Heartland Operators Conference, Holiday Inn, Kearney. Call 402/228-5221 or visit www.ne-wea.org.

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Suiting Up

AN OHIO WASTEWATER OPERATOR MOONLIGHTS BY MAKING REPLICAS OF SPACESUITS WORN BY ASTRONAUTS IN THE APOLLO SPACE PROGRAM

By *Scottie Dayton*

By day, David Jackson works full-time as an Ohio Class 3 wastewater operator in the Pickerington Water Reclamation Department. By night, he becomes a 48-year-old wanna-be astronaut who re-creates full-size A7L Apollo spacesuits.

The replicas are so accurate that Jackson earned a page on the NASA Apollo Lunar Surface Journal Web site. Two suits are displayed in museums in Germany. At present, Jackson is casting and welding one for a private collector in Sweden and another for himself.

The hobby began in 2005 while Jackson recovered from a fractured right foot. "I needed something to do," he says. "I grew up during the Apollo missions, and believe the A7L and Saturn V rocket that carried it are the 20th Century's greatest technological advancements. It's always been my dream to put on that suit and step off the ladder of a LEM (lunar expeditionary module)."

The suits have gloves, emergency oxygen supply and backpack, two visors in the over-helmet, pressure helmet, communications helmet, lunar over-boots, body suit of arms and legs with boots, and liquid-cooling garment. Jackson averages 35 hours per week reproducing the components.

To afford materials — fabrics cost \$200 per yard — Jackson began selling plastic spacesuit castings on eBay. "I make the molds from the real items, which are very difficult to obtain," he says. "The castings sold faster than I could produce them.

"The toughest part was balancing a reasonable price with recovering my

David Jackson wearing one of his creations.



cost and earning something for my time. Without my day job, I'd be broke by now." Jackson works on a special order basis but is not accepting any more orders until he finishes the two current suits.

Jackson machines and anodizes all the hardware in his shop. Many original items were supplied by Ken Thomas of Hamilton Sundstrand Aerospace in Windsor Locks, Conn. "Without his help, none of my efforts to preserve the past through reproductions would be possible," says Jackson. After machine-sewing the first two suits himself, he hired a professional seamstress.

Jackson also contributes historical information to NASA and has his biography posted at www.hq.nasa.gov/alsj/DavidJackson.html. He chronicles the making of his spacesuits at <http://apollospacesuits.com>. **tpo**

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Odor Control/Disinfection

By Benjamin Wideman

NEUTRAL PH

The Monashell biofiltration odor control system from Bord Na Mona Environmental Products Inc. reuses waste shells as media to maintain a neutral pH, allowing for biological treatment of odorous sulfur compounds without chemicals or nutrient addition.

The waste airstream is directed into re-circulating water in the unit, allowing contact between selected microorganisms and odorous compounds. The bacteria reside on the shell media, which contains high levels of CaCO_3 and neutralizes acid byproducts of sulfide oxidation. The system is effective for treating a broad range of compounds and high levels of H_2S and organic sulfides. **800/787-2356; www.bnm-us.com.**



Monashell odor control system from Bord Na Mona Environmental Products



Hydro-Pulse Mixing System from Pulsed Hydraulics Inc.

PROCESS TANK MIXER

The Hydro-Pulse Mixing System from Pulsed Hydraulics Inc. mixes wastewater process tanks such as lift station wet wells and open-topped sludge storage tanks. It creates pulses of 40-60 psig compressed air-bubble masses, which are distributed at the bottom of the structures.

The pulses create a bottom-to-top circulation and prevent accumulation of biosolids at the bottom. Because solids are not allowed to settle or float, they do not deteriorate biologically to create odors. Operational parameters such as pulse rate, air pressure and pulse volume can be adjusted to create a variable-speed system. **800/641-1726; www.phewater.com.**

RETRACTABLE COVER

The structurally supported cover system from Geomembrane Technology Inc. consists of a retractable sheet of high-strength, UV-protected, coated fabric tensioned across a series of low-profile aluminum arches that span a tank opening, serving as odor control.



Structurally supported cover system from Geomembrane Technology Inc.

The cover is sufficiently airtight to capture odorous off-gas for removal by ventilation, yet it can be quickly detached on three sides and retracted to expose the tank contents for inspection or maintenance. Rain or snow-melt water runs off. Intermediate aluminum walkways divide long tank covers into sections for easy retracting. Hatches can be located in the walkways for inspection or sampling access. Off-gas removal piping connects directly to the cover system.

603/569-0676; www.gtcovers.com.

STOPS H_2S ODORS

O-Mega chemical-free systems from Vapex Environmental Technologies eliminate hydrogen sulfide odors from lift stations, wet wells, headworks, grit chambers and other structures. Its process generates a hydroxyl ion fog that is sprayed into odorous spaces. The fog fills the headspace and reacts with and destroys the vapor-phase hydrogen sulfide. The structure acts as the reaction chamber, and the reacted mist condenses back into the water stream while killing bio-growth and reducing corrosion. **888/907-0004; www.vapex.com.**



O-Mega chemical-free systems from Vapex Environmental Technologies



GB2+ system from Enviro-Zyme International

ACTIVATED CHARCOAL

The GB2+ system from Enviro-Zyme International uses activated charcoal to absorb odors. For plant-wide odor problems, it can be placed in air plenums or inside air ducting. **800/882-9904; www.envirozyme.com.**

FIBERGLASS TANK COVERS

Made from high-strength pultruded FRP, Enduro tank covers from Enduro Systems Inc., are corrosion-resistant and deliver a long-term solution for odor, algae and debris control. Designed specifically for water and wastewater applications, the cover system offers easy removability, integrated lift handles, gasketed seams, fully encapsulated manways, and the longest span available in flat FRP cover panels. Covers can also be integrated with the company's baffle wall systems for low total system cost. **800/231-7271; www.endurocomposites.com.**



Enduro tank covers from Enduro Systems Inc.

COLOR-CODED

pH buffers from Taylor Technologies are made with high-purity water and American Chemical Society-grade chemicals. Color-coded buffer solutions are offered at pH 4.0, 7.0 and 10.0. There are also colorless reference buffers ranging from pH 2.0 to 12.0. **800/837-8548; www.taylortechnologies.com.**



pH buffers from Taylor Technologies



ECO₂ SuperOxygenation technology from ECO Oxygen Technologies

PURE OXYGEN

ECO₂ SuperOxygenation technology from ECO Oxygen Technologies is an environmentally friendly odor- and corrosion-control solution that can be applied in force mains or upstream of headworks and primary clarifiers to avoid corrosion. The system dissolves pure oxygen into water to raise the DO level.

Greater than 90 percent absorption efficiencies can be obtained using pressure to achieve DO concentrations of 50 to 150 mg/l. The

technology eliminates hydrogen sulfide odor and corrosion by adding enough pure oxygen to establish and maintain aerobic conditions. Hydrogen sulfide is oxidized, and the formation of additional H₂S is prevented. **317/706-6484; www.eco2tech.com.**

BUILT TO FIT

Defender tank covers from Environetics Inc. are custom-built to fit new or existing tanks. The clear-span structural aluminum frames provide strength. The reinforced geomembrane covers have hinged hatches that allow easy access. The low-profile design minimizes internal volume, reducing treatment system requirements. **815/838-8331; www.environeticsinc.com.**



Defender tank covers from Environetics Inc.

METABOLIC STIMULANT

NRP10-1000 all-natural metabolic stimulant from Natural Resource Protection Inc. controls production of hydrogen sulfide and corrosion in collection systems and treatment plants. It stimulates the aerobic microorganisms to levels at which they reduce the organic electron donor molecules available to the anaerobic sulfide, reducing microorganisms for their sustained metabolism.

This mechanism, along with the reduction in the anoxic laminar layer that exists at the interface of the pipe and the water stream, further reduces the viability of H₂S-producing bacteria. No sulfuric acid in the system means that pH is not acidic, and corrosion is reduced dramatically. **800/448-0499; www.nrp-inc.com.**



SWEET package from Global Treat Inc.

The system is water-cooled and needs no lubrication. **800/370-4410; www.globaltreat.com.**

VACUUM-BASED DELIVERY

The SWEET (Submersible Wastewater Efficient Effluent Treatment) package from Global Treat Inc. is a vacuum-based chemical delivery system for chlorination and dechlorination. It uses process water from the contact chamber instead of potable water for vacuum creation. It also provides optimal mixing, reducing chemical off-gassing. There is no external water piping. The system



TrojanUV3000Plus disinfection system from Trojan Technologies

ONLINE CLEANING

The TrojanUV3000Plus disinfection system from Trojan Technologies reduces operation and maintenance requirements through an ActiClean online chemical and mechanical cleaning system. **888/220-6118; www.trojanuv.com.**

PASSIVE COLLECTION

The Odor-Pac from Precision Systems is a passive odorous gas collection device that is an alternative to larger, more elaborate systems. The system looks like a typical control panel found at a lift station and installs in minutes. Its non-reactive, gas-absorbing media requires only annual changes, which can be done by one person in a few minutes. **708/891-4300; www.precision-systems.com.**



Odor-Pac from Precision Systems

ECO-FRIENDLY INGREDIENTS

Odoreze wastewater odor control spray from Imtek Environmental Corp. is formulated from a blend of natural ingredients to deodorize wastewater. It destroys odoriferous gases like organic acids, ammonia, amines, mercaptans and hydrogen sulfide produced by anaerobic bacteria. The deodorizer is safe, biodegradable, non-toxic and non-flammable and does not contain harmful chemicals or metals. All ingredients are on the FDA Generally Regarded as Safe (GRAS) list. **770/667-8621; www.noodor.biz.**



Odoreze odor control spray from Imtek Environmental Corp.



Earth Works Water Treat Series from Green Way Products

HIGHLY REACTIVE LIGNIN

The Earth Works Water Treat Series from Green Way Products provides a natural and environmentally friendly solution for controlling malodorous biological reactions, corrosion due to elevated H₂S, and high BOD/COD and TSS.

The primary active ingredient is a liquid blend of naturally occurring organic material containing highly reactive lignin molecules that acts as a biological sponge to absorb and permanently bind H₂S created in biological degradation processes. The product should be metered into the system's continuous flow streams 300 feet ahead of where H₂S is released. **800/241-7951; www.greenwayproducts.net.**

(continued)

SOLAR-POWERED CIRCULATOR

The LumenAER from Aeromix Inc. is a solar-powered circulator that distributes low-oxygen water from the bottom and exposes it to the surface for rapid oxygenation and distribution. It provides an environmentally friendly solution to issues such as foul odors and excessive chemical use. **800/879-3677; www.aeromix.com.**



LumenAER solar-powered circulator from Aeromix Inc.

BINDS HYDROGEN SULFIDE

The De-Sulph-A-Nator from AQUAFIX functions by binding hydrogen sulfide in a collection system or wastewater tank or on a belt press, preventing odor formation. It can be used by metering or pouring into the sewer system or into a wastewater tank. **888/757-9577; www.teamaquafix.com.**



De-Sulph-A-Nator from AQUAFIX

COVER SYSTEM

Composi-Cover from Fiberglass Fabricators Inc. is a flat odor-control cover system that works with rectangular and round tanks. It can also function as an algae/weir cover system. Covers can accommodate long, unsupported spans. The system includes large, lightweight access hatches and unlimited penetration options. Covers resist chemicals, corrosion and UV light. **888/593-3552; www.fibfab.com.**



Composi-Cover from Fiberglass Fabricators Inc.

ALKALOID ACCELERATOR

BYO-GON from Byo-Gon Inc. is a natural alkaloid compound that acts as a cell growth accelerator in biological systems. It stimulates existing biological systems to activate bacterial amylases and cause a shift from anaerobic fermentation to respiration. The resulting process consumes ammonia and sulfides that would otherwise cause offensive odors. Additionally, because biological reactions are driven further toward completion, intermediate acid compounds and VFAs are minimized, reducing odor in collection systems and wastewater treatment facilities. The technology has been used in numerous applications over the past 25 years at dosages from 0.5 to 1.5 ppm. **800/580-5509; www.byogon.com.**



BYO-GON from Byo-Gon Inc.

pletion, intermediate acid compounds and VFAs are minimized, reducing odor in collection systems and wastewater treatment facilities. The technology has been used in numerous applications over the past 25 years at dosages from 0.5 to 1.5 ppm. **800/580-5509; www.byogon.com.**

MAINTENANCE-FREE

Aluminum planks for odor control from Ohio Gratings Inc. are available unpunched or with a variety of punch patterns. Made of extruded aluminum, the planks are relatively maintenance-free and corrosion-resistant and have no parts to work loose or splinter. Slip-resistant surfaces can be applied to increase safety. **800/321-9800; www.ohio-gratings.com.**



Aluminum planks for odor control from Ohio Gratings Inc.

FIXED-BED SYSTEMS

Peacemaker dry-air scrubbers from Syneco Systems Inc. are one- or two-vessel fixed-bed systems containing several stages of demand-dependent media. The media mix and vessel size is determined by the H₂S level. An integral polishing bed removes other organic odors.

The scrubbers remove 99 percent of H₂S in applications with levels as high as 1,000 ppm. No maintenance and no chemicals are needed. The only moving part is the blower. When the media is spent, the entire scrubber is exchanged or the media bed is replaced, depending on scrubber size. **800/442-7575; www.synecosystems.com.**

BIOLOGICALLY ACTIVE

BIO ENERGIZER from Probiotic Solutions is a biological treatment that cuts odors, reduces sludge, decreases BOD and diminishes costs in wastewater treatment plants. The product is a bio activator, scientifically formulated as a broad-spectrum stimulant composed of organically complex nutrients and natural growth promoters that enhance the native biology of treatment. It creates a growth environment where diverse biology can thrive. Wastewater treatment facilities benefit from odor control and from faster and more complete sludge oxidation. **800/961-1220; www.probiotic.com.**



BIO ENERGIZER from Probiotic Solutions

TREATS H₂S ODOR

H₂S No More (BH-5009) Sulfide Scavenger/Odor Control Agent from B.H. Enterprises Inc., is an organo-amino compound for treatment of hydrogen sulfide. Its chemistry specifically targets H₂S, organo-sulfur compounds, and mercaptans and is synergistic with wastewater systems, bacteria and enzymes.



H₂S No More Sulfide Scavenger/Odor Control Agent from B.H. Enterprises Inc.

In wastewater applications, it quickly binds up sulfur, including stripping sulfur from poisoned beneficial aerobic bacteria and enzymes that have been deactivated by the sulfur bond. The reaction shows a beneficial and natural increase in oxygen, optimizing the biochemical balance of the system. The product is all organic, non-hazardous, fast reacting and freeze/thaw stable. It requires no special tanks, mixing, pumps or chemical-resistant piping. It can be added directly to sludge, at the head of the plant, or anywhere upstream of the odor problem. **866/997-0654; www.bhenterprise.com.**

product is all organic, non-hazardous, fast reacting and freeze/thaw stable. It requires no special tanks, mixing, pumps

or chemical-resistant piping. It can be added directly to sludge, at the head of the plant, or anywhere upstream of the odor problem. **866/997-0654; www.bhenterprise.com.**



SINGLE-STAGE GENERATOR

The Aqua3000 from Adolphus Harris Beckart Environmental Inc. is a single-stage chlorine dioxide generator designed to provide safe and simple odor control. The system removes the guesswork and offers an efficient alternative to chlorine, bleach and other reagents. With four times the oxidizing power of chlorine alone, chlorine dioxide is an efficient compound for bacterial control. The single-stage design minimizes special needs in transporting, operating and housing odor-control equipment. 262/656-7680; www.beckart.com. tpo

Aqua3000 from Adolphus Harris Beckart Environmental Inc.

industry news

Torony Appointed VP of Product Management

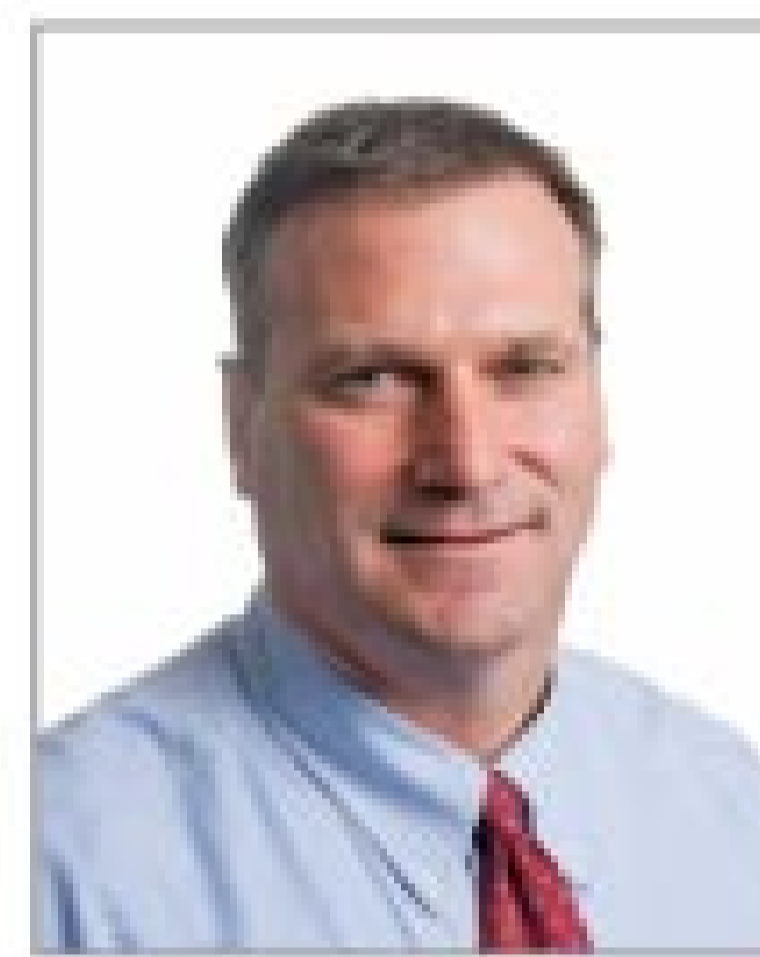
Jim Torony has been appointed vice president of product management and marketing for the North American operations of ABS Americas and Cardo USA, provider of wastewater technology solutions. Torony brings 25 years of industry experience to his position.



Jim Torony

Parkson, Vapex Form Odor Control Partnership

Parkson Corp. and Vapex Environmental Technologies have partnered to bring Vapex's O-Mega odor control technology to the North American municipal market. O-Mega hydroxyl ion fogging technology is designed to eliminate odors and reduce pH corrosion found in wastewater systems. The companies also will offer the Sentinel scrubber control system that monitors the gas passing through the scrubber and is designed to reduce scrubber chemicals by up to 60 percent.



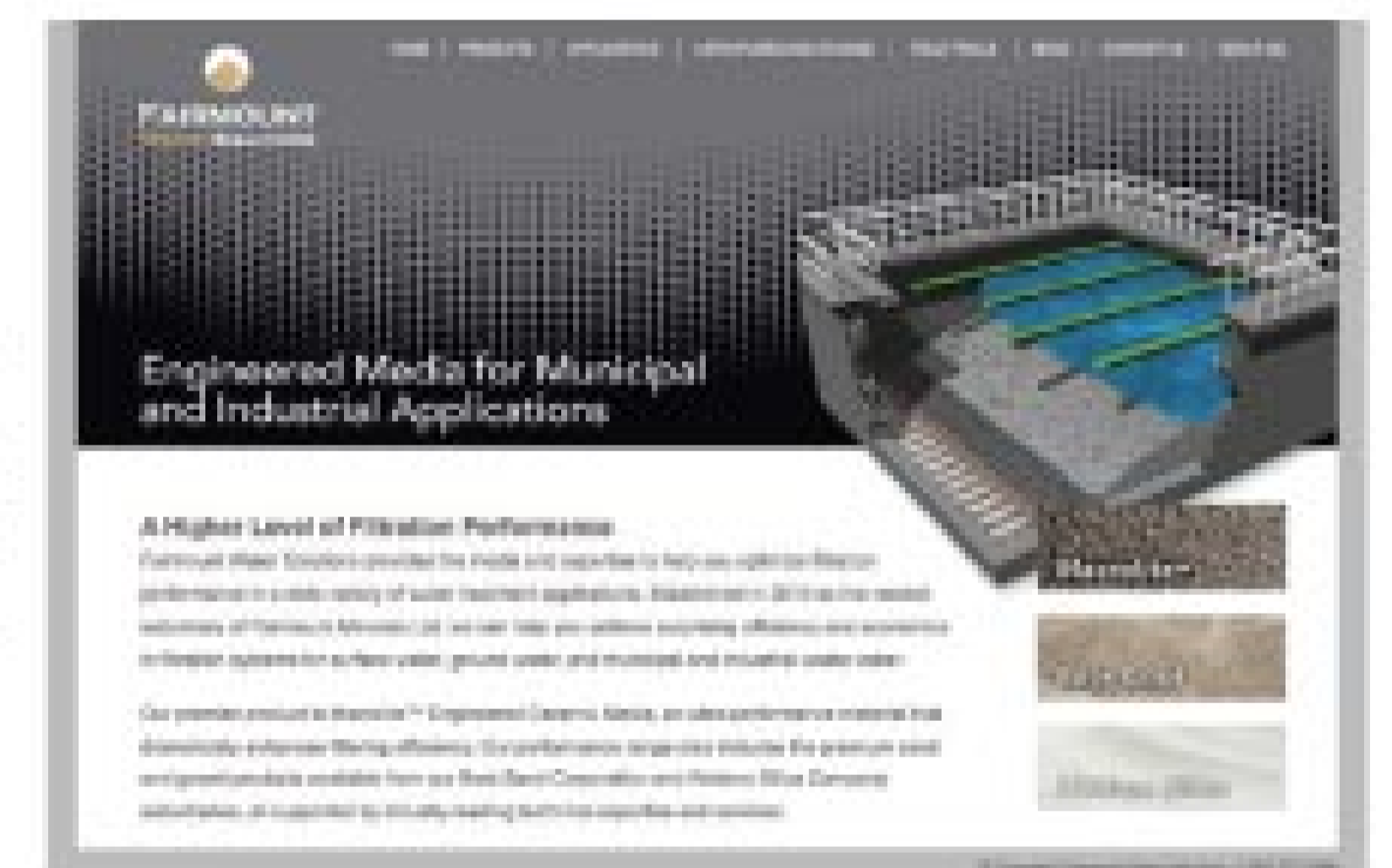
Jim Quasey

Quasey Joins Industrial Scientific

Jim Quasey has joined Industrial Scientific Corp. as vice president-global operations. He will be responsible for all global manufacturing, manufacturing engineering, supply chain, quality and operational excellence functions within the company. Quasey also will serve as a member of the Corporate Executive Council. He has Bachelor of Science degrees in mechanical engineering/design and industrial engineering from Ohio State University and an MBA from Carnegie Mellon's Tepper School of Business.

Fairmount Launches Water Treatment Web Site

Fairmount Water Solutions' new Web site, www.fmwater.com, includes company information on municipal water and wastewater treatment solutions.



Hach Publishes BOD Guide

Hach Co. has published a BOD guide with testing advice and analysis products. The guide offers techniques to simplify the five-day BOD test, including suggestions for sampling, measurement and tracking, blank and sample preparation. The guide is available at www.hach.com/bodposter.



Sierra Instruments Redesigns Web Site

Sierra Instruments has redesigned its Web site and logo. The new landing page introduces the company's "Think Ahead" clean energy campaign and offers a 40-page clean energy guide, www.sierrainstruments.com/cleanenergy. The guide includes high-performance flow measurement tools to help create biofuel from solid waste as well as technical literature, white papers and educational videos. tpo

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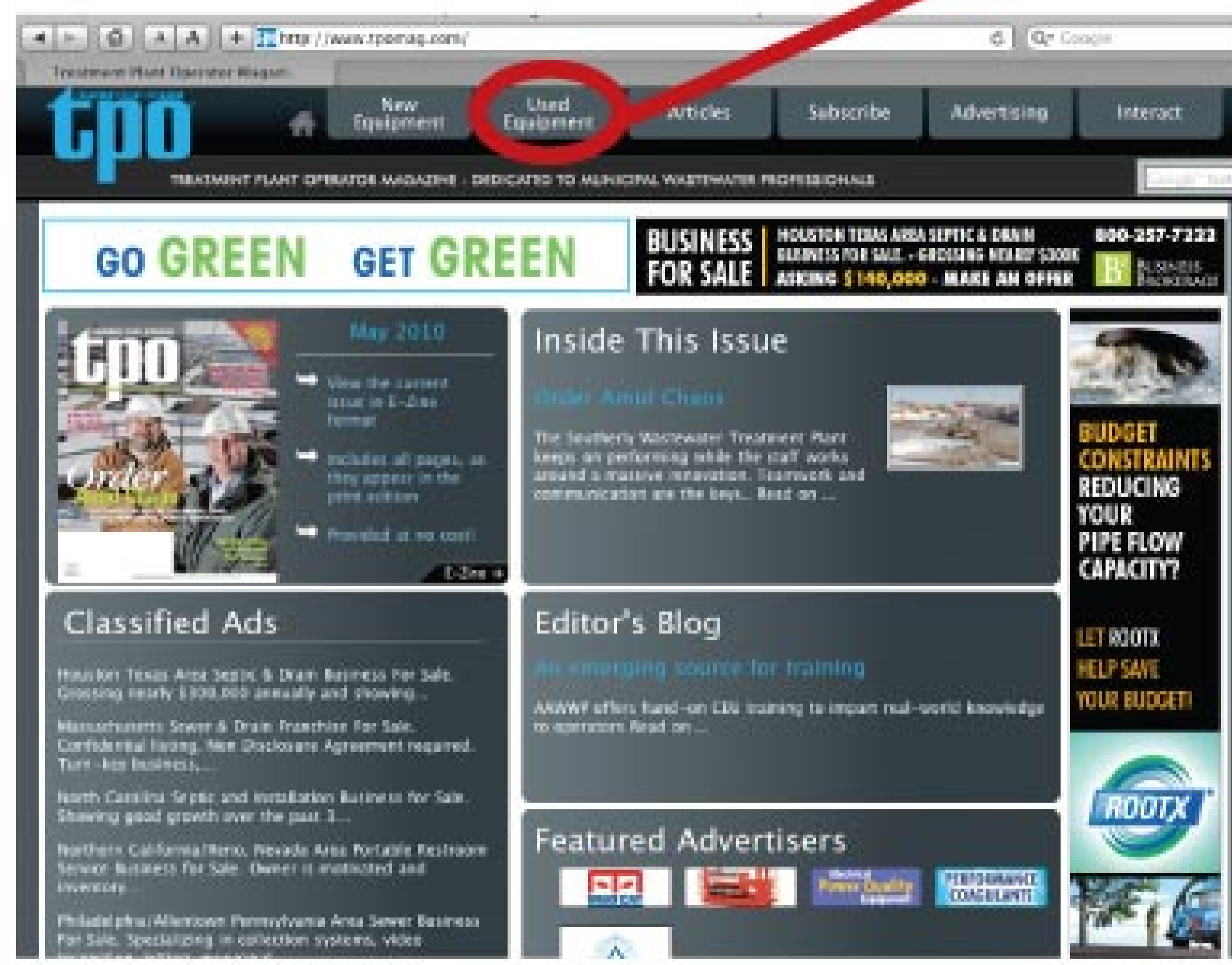
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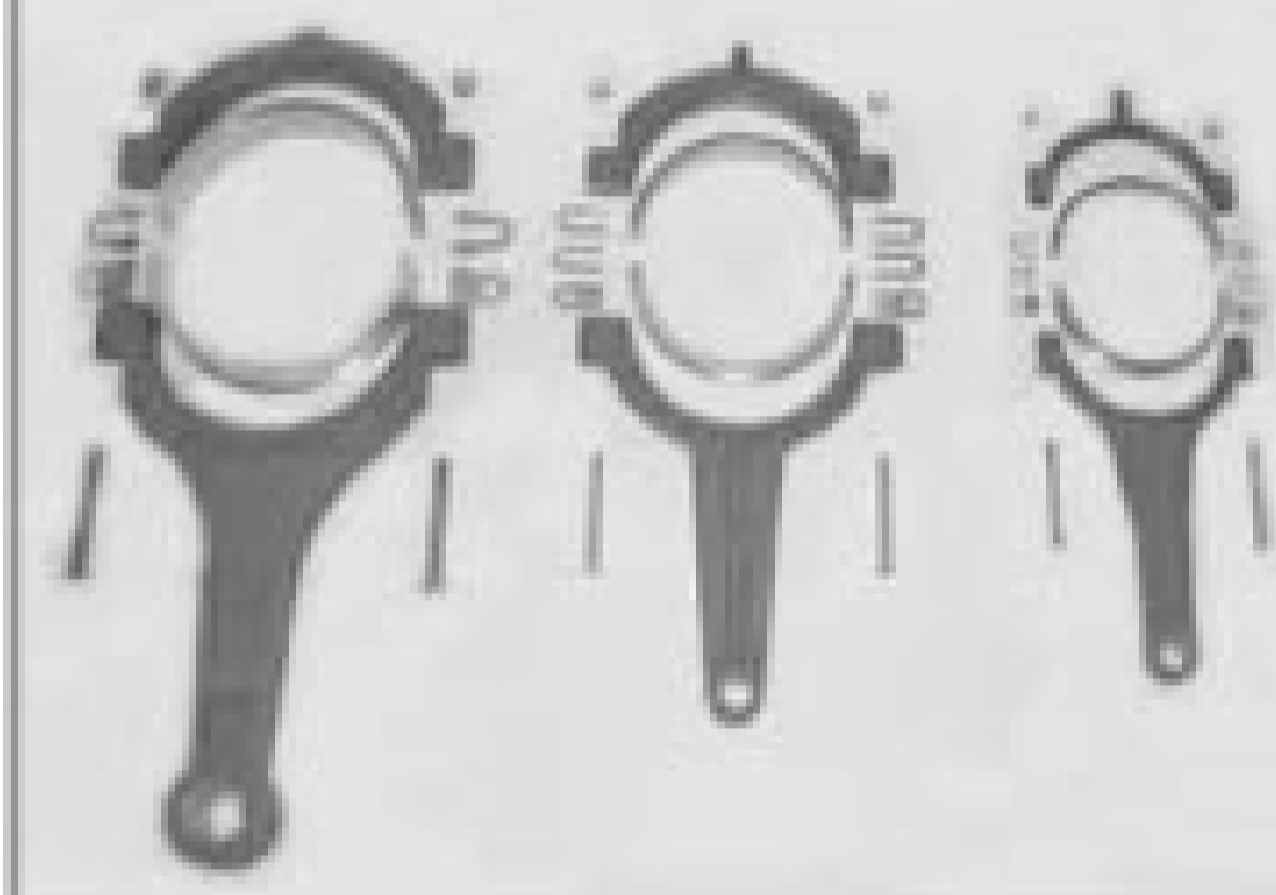
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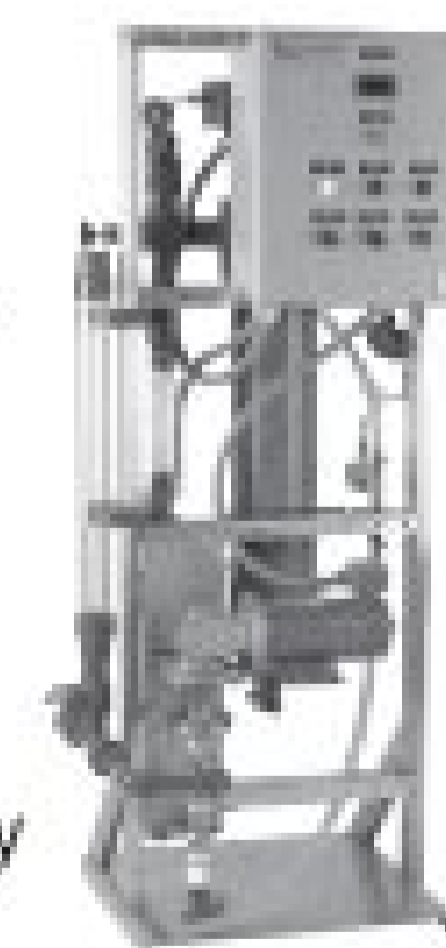
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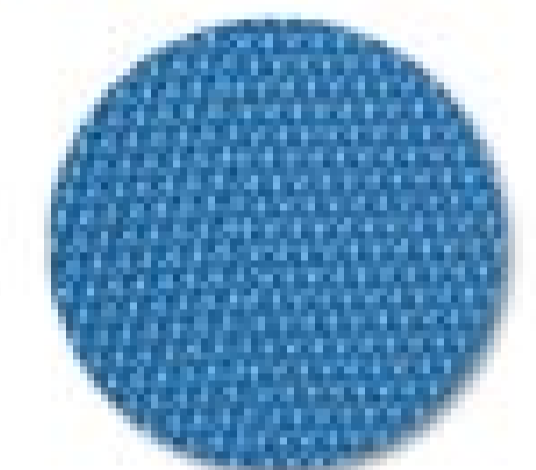
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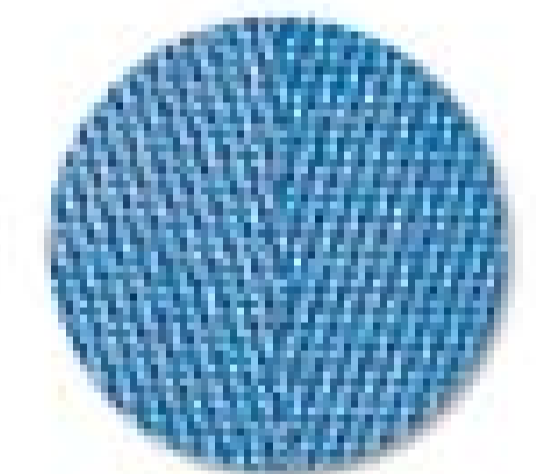
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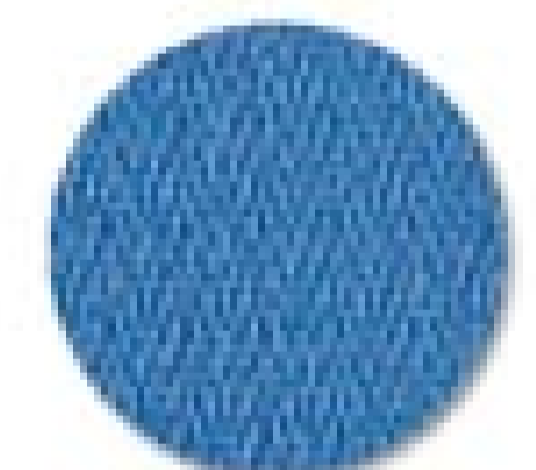
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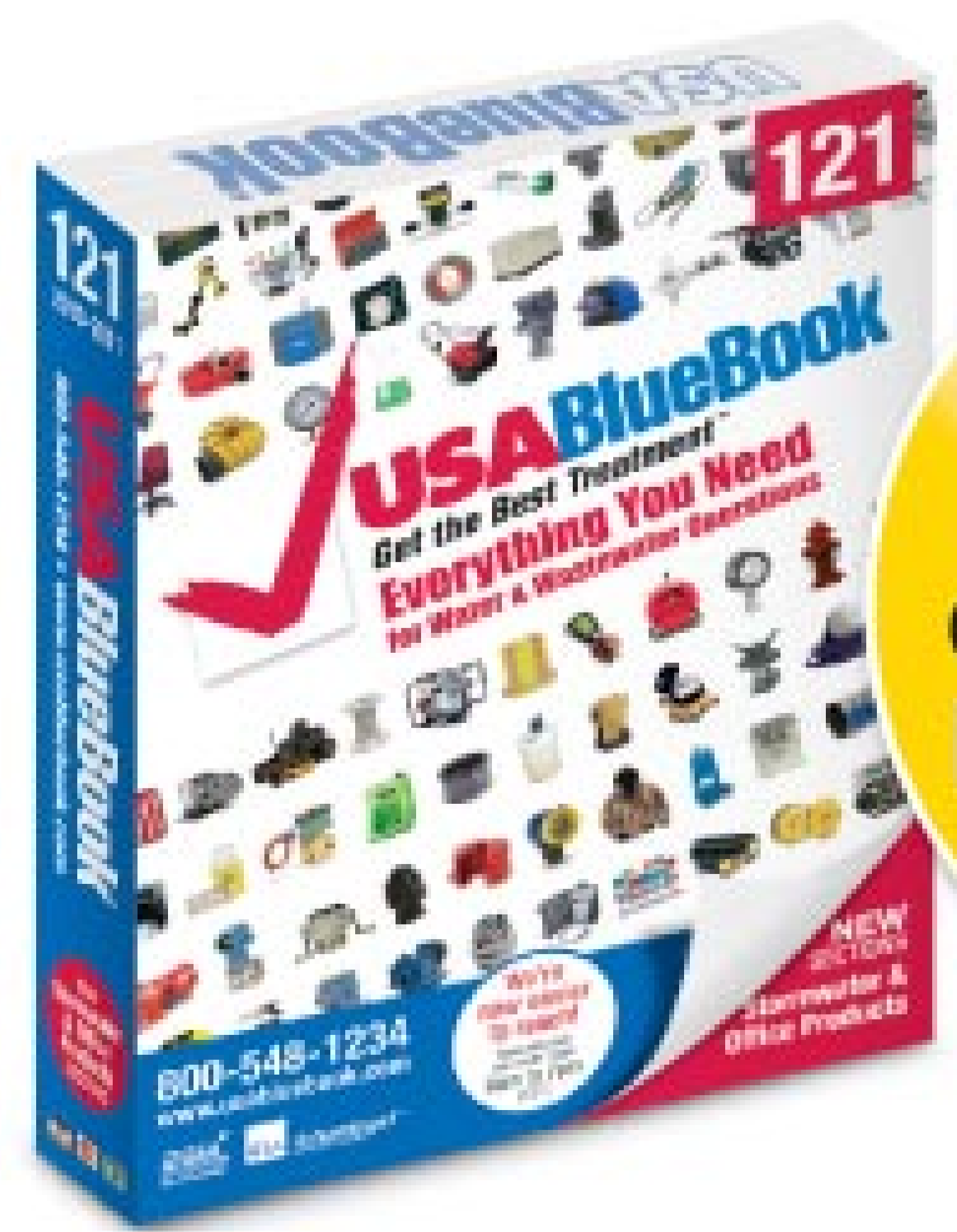


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