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JUNE 2015

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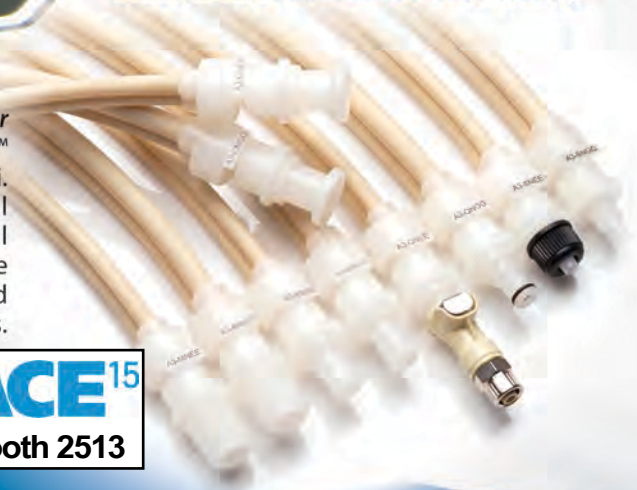
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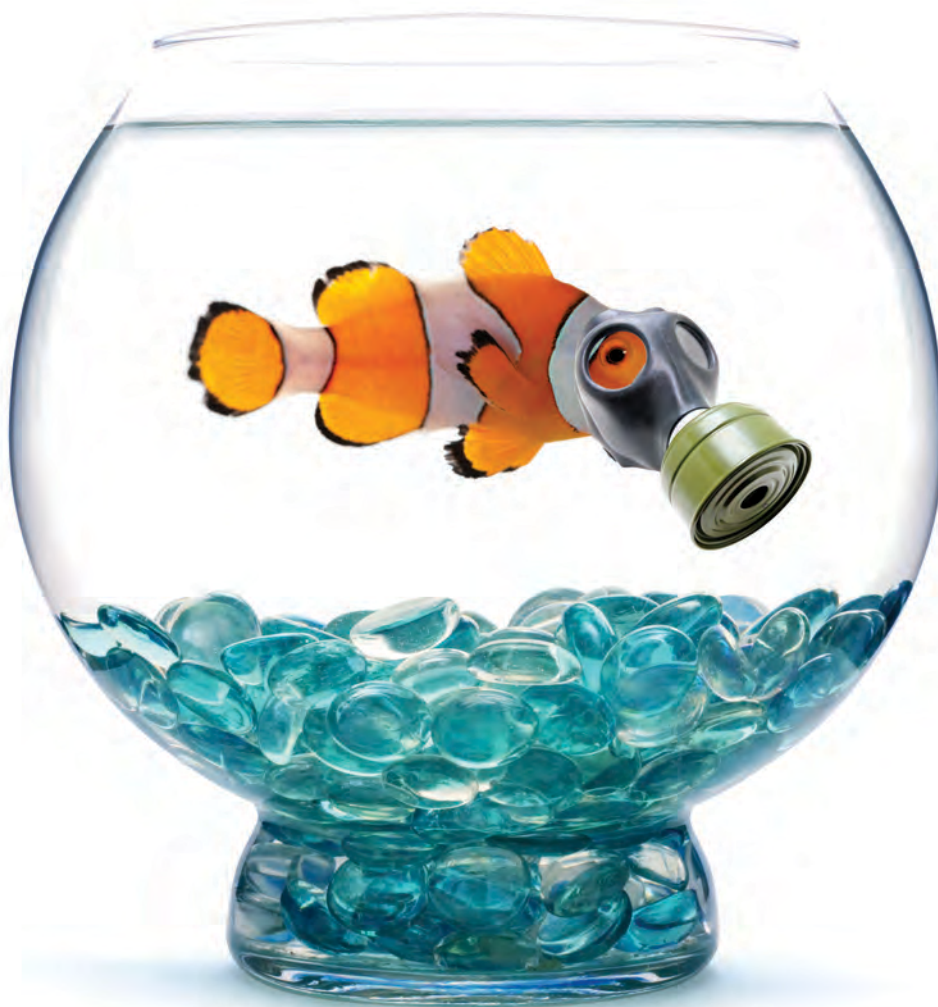
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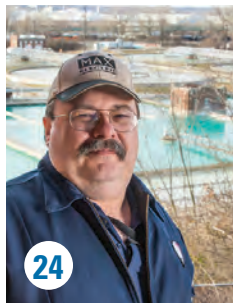


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### on the cover

Biosolids from Metro Vancouver wastewater treatment plants are used widely, for landfill cover, farm fertilizer, mine reclamation, park landscapes and more. Laurie Ford heads the biosolids management program.

(Photography by Abigail Saxton)

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It's a paradox of the profession: Many operators pride themselves on quiet competence, when a more public profile could benefit their facilities and the water professions in general.

By Ted J. Rulseh, Editor

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Public service runs in Steve Woodworth's family. He and his team take pride in keeping the water on and the river clean in the Wisconsin city of Oconto.

By Ted J. Rulseh

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**DEDICATED TO WASTEWATER & WATER TREATMENT PROFESSIONALS**

Published monthly by COLE Publishing, Inc.

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

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**CIRCULATION:** 71,813 copies per month.

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let's be clear

## Should You Be Well-Known Around Town?

IT'S A PARADOX OF THE PROFESSION: MANY OPERATORS PRIDE THEMSELVES ON QUIET COMPETENCE, WHEN A MORE PUBLIC PROFILE COULD BENEFIT THEIR FACILITIES AND WATER PROFESSIONS IN GENERAL

By Ted J. Rulseh, Editor



**F**ormer U.S. Olympic and University of Wisconsin hockey coach Bob Johnson had a favorite saying: “Never try to teach a pig to sing. It wastes your time and annoys the pig.”

In other words, certain players had certain skills. Accept that and don't try to make them be something they're not.

What has that to do with water and wastewater operators? Well, they're in a profession that badly needs public advocates, yet as a class they are not extroverts. While some of course are excellent communicators and love leading the plant tours and staffing the booth at the county fair, many more prefer quiet competence, doing an important job exceedingly well, not really caring if they get credit.

So, water agencies need public spokespeople, yet many people on their teams lack the skills and inclination for that role. So, what to do? Find that person on the team who overtly or secretly likes public communication. And coach that person up.

**A HIGHER PROFILE**

I came upon this issue while writing a profile of Steve Woodworth for this issue of TPO. Woodworth, operator-in-charge of water and wastewater in the northeast Wisconsin city of Oconto, is widely known around town. He didn't campaign to be popular. He became known partly by association (his father was police chief for many years) and partly through his job (he used to read water meters and fix water services and so met many homeowners).

The fact people know him definitely makes his job easier. Yet most water and wastewater operators aren't well-known. Ask most people in their communities who runs the water or wastewater treatment plant and they wouldn't know. And that suits those operators just fine.



So if the plant staff members prefer to stay quiet, who talks to the news media when a storm threatens to cause a sewer overflow? Who stands up at the public meeting and defends the proposed rate increase?

Some big agencies have a full-time public or media relations person on staff. Some have executive directors or managers adept at public communication. But others have neither. The solution, it seems to me, is not to let that situation persist and hope for the best. The solution is to find, develop and reward a communicator.

### IN THE JOB DESCRIPTION

Having a resident communicator doesn't mean hiring a new person at a salary the agency can't afford. It does mean finding that one person on staff who either openly or secretly loves to talk to people, and empowering him or her to be a spokesperson.

The point is that, like it or not, communication with the public is part of a water agency's job. As with running the lab tests, maintaining the equipment and snowplowing the driveway, someone has to do it. If it doesn't get done, the damage can be significant.

It doesn't have to be the plant manager or superintendent — some of them fit the "quietly competent" mold. It could be a front-line operator. It could be an administrative assistant. All it takes is someone who understands the agency, understands the processes and cares deeply how the public perceives both.

Find that person. Offer to add communications to his or her job description, in return for a meaningful bump in pay (because what gets rewarded gets done). Get that person some reasonable training — through seminars given by the local operators' association, through courses at the community college, through a Dale Carnegie course, through membership in the local Toastmasters chapter — whatever it takes, whatever is available.

In time, you'll develop an enthusiastic, go-to person for all manner of media relations, public outreach, youth education and other functions.

### IT'S ESSENTIAL

Of course, it's not as easy as all that. Becoming a skilled communicator, like becoming a capable operator, takes time and effort. But it's better to start the process than live with an unacceptable status quo.

The point is that, like it or not, communication with the public is part of a water agency's job. As with running the lab tests, maintaining the equipment and snowplowing the driveway, someone has to do it. If it doesn't get done, the damage can be significant.

How does your agency handle the communicator role? Do you have advice that could benefit other water and wastewater utilities and departments? Share your struggles or successes by sending me an email to [editor@tpomag.com](mailto:editor@tpomag.com). I promise to respond, and we'll publish some of the responses in a future issue. **tpo**



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## Planning to own a digester?

An open letter to new parents of anaerobic digesters:

No one knows a child better than the parents. If you've been in the business for a while, you know your plant and system like no one else. A bond forms between you and your plant, much like that of a parent for a child. You spend your days making sure it is fed properly, relieves itself properly, has enough air to breathe and is healthy in every way within your control.

Then the time arrives for an upgrade or process addition. Liken it to your child entering day care for the first time. You know that if little Flo is fed dairy, she will be up all night, and so will you. You know that if your plant is suddenly fed a new diet, it will have an upset system. In the case of anaerobic digestion, this means it will vomit, sometimes so much so that its lungs (gas piping) will fill with vomit (rising sludge) and it may experience Montezuma's revenge, exuding solids from every orifice.

The entire system may become fouled (think perforated colon) or worse. It could blow the top right off — talk about spontaneous combustion! Waste will get into delicate filters and carbon beds. Gas will enter manholes and become a grenade waiting to detonate. Think about the worst gastric distress you've ever had, and that is how your digester feels.

Helpful folks (think grandparents — OK, engineers) will try to tell you the best way to calm your child's symptoms. They will tell you that the child is resilient and will get over it. That perhaps you fed it too much or it could use some prune juice. Wanting to make things better as soon as possible, you listen to the experts and make the recommended changes, but you have a nagging feeling that these are not the correct things to do.

Deferring to folks who know they know better, you watch your child as it continuously vomits, gurgles and belches as if its stomach is a witch's cauldron, all the while emitting noxious gases that no one should endure. Finally, you take the bull by the horns. You do what your gut tells you to do. You decrease the food and increase the quality. You make sure elimination is optimized, and the vomit and diarrhea begin to decrease slowly.

Instead of alternating between flatulence and diarrhea, little Flo begins to sound more normal, and soon she is looking for more food. This is when you know her stomach has finally settled. You've mastered the art of feeding the perfect diet in perfect proportions, which results in a well-tuned digestive system, eliminating just the right amount of gas while maintaining the perfect amount of solids in the bowels.

And all is well — until the next problem arises. But using your knowledge of the child, you will be able to eliminate multiple possibilities and finally home in on the problem and solve it — again, until the next time.

The moral of the story is although any new system brings a learning curve, there is a correct-most-of-the-time formula for every system. While others can offer advice and textbook answers, no one knows the system more intimately than you, the operator. Don't be afraid to challenge the experts and do what your gut tells you. Don't be afraid to reach out to other operators who may have had similar issues, or to people who know the framework and can brainstorm with you to come up with more options.

Your state environmental department and the U.S. EPA can be your friends; even engineers can be your friends. But only fellow operators and folks who have this business coursing through their veins like you — people who are distressed when a system is upset and overjoyed when problems are resolved — can understand and help.

You may not be the most popular person in the world, but you are the one who will be up all night with the sick child, and you will be the one who will be driven to distraction until it is stable. There is nothing wrong with beginning with the textbook or trying to make the system meet a certain number or percentage or detention time, but ultimately each system is as



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# A Versatile *Resource*

**BIOSOLIDS FROM WASTEWATER TREATMENT PLANTS AT Metro Vancouver are put to use just about everywhere nearby.**

From cover material at landfills, to fertilizer on grasslands and hay fields, to land reclamation at copper and molybdenum mines, to soil for city parks and recreation areas, biosolids from MV's wastewater treatment plants go to beneficial uses.

"It's a different mindset," says Laurie Ford, program manager for Utilities Residuals Management at MV, which serves the British Columbia city of Vancouver and its surroundings — a total population of 2.4 million. "It's always been our intention to use the material beneficially. More recently, we have worked with our upstream project teams to design systems that produce high-quality end products."

The utility's website calls the approach integrated resource recovery: "It's a new way of thinking about waste — as a valuable resource and not just something that must be disposed of."

The biosolids program dovetails nicely with MV's efforts to lead the way in municipal sustainability. It's also cost-effective. "Because of where we are, landfill space that will accept biosolids is nonexistent," Ford says. "Our after-dewatering costs for reuse



Bill Saunders, operations foreman, overlooks the primary sedimentation tanks at the Annacis Island Wastewater Treatment Plant in Delta, British Columbia.



Biosolids from Metro Vancouver are used for multiple purposes that include landfill cover, park landscaping and farm fertilization. The thermophilically digested product meets British Columbia Class A standards.

can run between \$50 and \$120 a metric ton. That is actually cheaper than shipping the material to the nearest landfill that will accept biosolids, which is in Alberta, 900 kilometers [560 miles] away.”

### ROAD TO REUSE

The 494 million liter per day (130 mgd) Annacis Island Treatment Plant is the largest secondary plant among five treatment facilities serving the 23 municipal members of MV. Eighty percent of the biosolids headed for reuse are processed there.

Raw influent enters the plant from a trunk line operated by MV and fed by local sewers owned by the member municipalities. After bar screening and grit removal, the wastewater settles in 13 primary sedimentation tanks. Secondary treatment consists of four trickling filters filled with plastic media, followed by aeration basins. The water then flows to secondary clarifiers before disinfection with sodium hypochlorite and dechlorination with sodium bisulfite. The Fraser River receives the effluent.

Influent and effluent pumps are EBARA. Treatment processes are controlled by a distributed control system from ABB Automation. A rotary auger press (Parkson Corp.) screens the primary solids, and a dissolved air flotation unit (Evoqua Water Technologies) thickens the waste activated sludge. A small amount of solids originating at MV’s Northwest Langley Plant (12.2 million liters per day/3 mgd) is added to the flow.

Primary and waste activated sludge are mixed and digested anaerobically at thermophilic temperatures (55 degrees C/130 degrees F). Polymer conditions the digested solids, which are dewatered in centrifuges (Alfa Laval Ashbrook Simon-Hartley). Piston pumps (Schwing Bioset) move the biosol-



The chlorine contact tanks at the Annacis Island Treatment Plant.

## Metro Vancouver (B.C.) Wastewater Treatment Services



FOUNDED: | 1914

POPULATION SERVED: | 2.4 million

TREATMENT PLANTS: | Two primary, three secondary

FLOWS: | Total 1.2 billion liters per day (312 mgd)

BIOSOLIDS PROCESSES: | Thermophilic digestion, mesophilic digestion

BIOSOLIDS VOLUME: | 70,000 to 75,000 bulk metric tons (77,000 to 82,600 tons) per year (all plants)

BIOSOLIDS USE: | Landfill/mine reclamation; hay, grassland and park fertilizer

WEBSITE: | [www.metrovancouver.org](http://www.metrovancouver.org)

GPS COORDINATES: | Latitude: 49°13'50.92"N; longitude: 123° 0'27.42"W

ids to hoppers before transport to application sites. The process at Annacis Island produces 40,000 to 45,000 metric tons (44,000 to 50,000 tons) of dewatered biosolids per year. The cake, at 26 to 30 percent solids, meets British Columbia Class A standards.

MV uses similar processes for smaller amounts of biosolids at the 70 million liter per day (18 mgd) Lulu Island and the 90 million liter per day (23 mgd) Lion’s Gate treatment plants. Both use mesophilic digestion to produce Class B biosolids, used on grasslands and farm fields.

MV tests its biosolids regularly for metals, pathogens and vector attraction. The agency follows rigorous source control standards that improve biosolids quality by limiting contaminants entering the wastewater. For example, through the Sewer Use Bylaw, MV works with dentists to reduce mercury from amalgams, and with photo imaging operations to limit silver.

### FINDING USES

A Utilities Residuals Management team of project coordinators, environmental technicians and engineers manages the biosolids from the loading zone to the final destination. Finding sites is a constant challenge. “We’re always looking for new beneficial use sites,” Ford says. Because Greater Vancouver practices source separation of food and yard wastes, compost is abundant in the area. A surplus of organic material and nutrients in a small geographic area makes it difficult at times to find places to reuse MV’s biosolids.

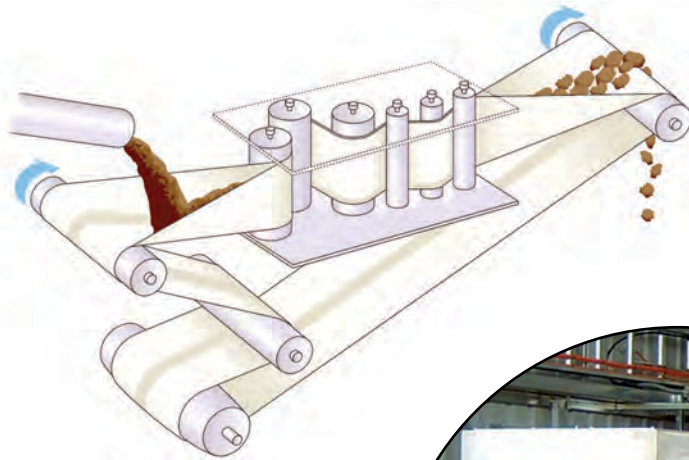
That’s why a recent project with the Regional District of North Okanagan was important. MV sent 3,700 metric tons (4,000 tons) of dewatered biosolids to the district’s Vernon Recycling and Disposal Facility, about 440 kilometers (273 miles) northeast of Vancouver, where it was mixed with sand, yard waste compost and mineral soil. The finished material was used as top-

(continued)

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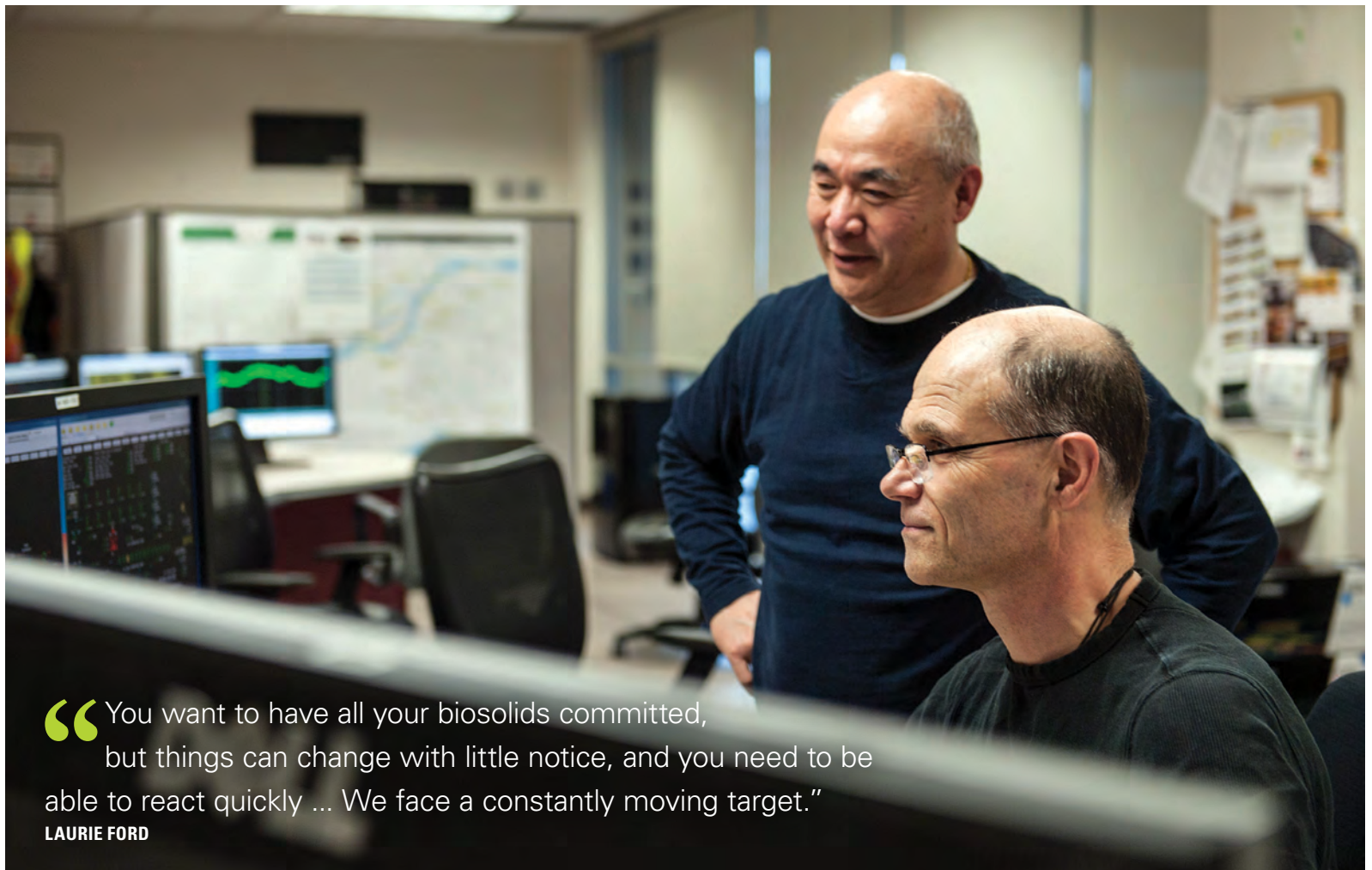


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“ You want to have all your biosolids committed, but things can change with little notice, and you need to be able to react quickly ... We face a constantly moving target.”

LAURIE FORD

Paul Quan, left, and John van den Boogaard oversee the operations room at the Annacis Island plant. The facility is digitally monitored.

soil cover for about 8 hectares (20 acres) of the Pottery Road Landfill, which the district is closing.

The Vernon facility served as the mixing site to limit odor issues: There are no homes nearby. The Pottery Road application site is in the middle of a residential area. Loaders and backhoes mixed the material at two part biosolids, three parts compost, one part mineral soil and two parts sand. After coarse mixing, the material was mixed a second time to create a finer product.

Spreading was completed over the winter. The topsoil covering is 150 mm (6 inches) thick, over 300 mm (12 inches) of clay and 700 mm (28 inches) of fill. The site was planted with grass in May. The community plans to use the site for recreation. “Metro Vancouver is easy to work with,” says Nicole Kohnert, manager of regional engineering services with the district. “They are experienced in biosolids reuse and have a good rapport with the environmental ministry here.”

### RECLAIMING MINES

The Pottery Road Landfill is one of several MV beneficial reuse sites. The dewatered cake, containing nitrogen and phosphorus, provides an organic boost to soils. In 2014, about 10,000 metric tons (11,000 tons) of the material was spread on grasslands where cattle graze.

In this application, nothing is mixed with the biosolids. The material is broadcast onto the fields, where the soil naturally assimilates it through degradation and rainfall. “We’ve been delivering biosolids for agricultural purposes for over 15 years,” Ford says. “It’s very effective in establishing good soil on nutrient-deficient lands.”

*(continued)*

## AND ENERGY, TOO

Metro Vancouver (MV) uses biosolids in a beneficial way beyond improving land and crops, and that is to generate heat and electricity. The Annacis Island Treatment Plant’s cogeneration system provides all the heat needed for the anaerobic digestion process, plus almost all the heat for the plant itself and 45 percent of its annual electric power demand.

First, the gas is scrubbed with activated carbon. Then, Jenbacher engines (GE Energy) with 3.2 MW capacity generate electricity. Heat captured from the engines raises the digesters to thermophilic conditions 55 degrees C (130 degrees F). MV estimates that by using methane from digestion, the Annacis Island plant reduces greenhouse gases by up to 660 metric tons (725 tons) per year and saves \$2.6 million on electricity. MV is also working on sewer heat recovery and new uses for wastewater, like growing algae that could eventually be turned into biofuel.

Energy recovery is common among MV treatment plants. The Iona Island facility uses cogeneration engines, and biogas heats the Lulu Island plant. At the Lion’s Gate facility, biogas drives engines for the influent pumps, and the plant recovers engine heat for digester and plant heating. Biogas also fires a boiler providing supplemental process heat and fulfills building and cooling loads. The utility is also working with the local gas company to upgrade remaining biogas to biomethane for injection into the natural gas pipeline.



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MV has been delivering biosolids to copper and molybdenum mines for reclamation for even longer — more than 20 years. Canada’s Surface Mining and Reclamation Act of 1975 promotes reclamation through its abandoned mine program. MV’s biosolids are mixed

“It’s always been our intention to use the material beneficially. More recently, we have worked with our upstream project teams to design systems that produce high-quality end products.”

**LAURIE FORD**

with the mine’s overburden — material removed during surface mining — or directly applied and mixed with mine tailings and waste rock. “The biosolids add nutrients and organic matter to the material which generally has little organic and nutrient content,” Ford says.

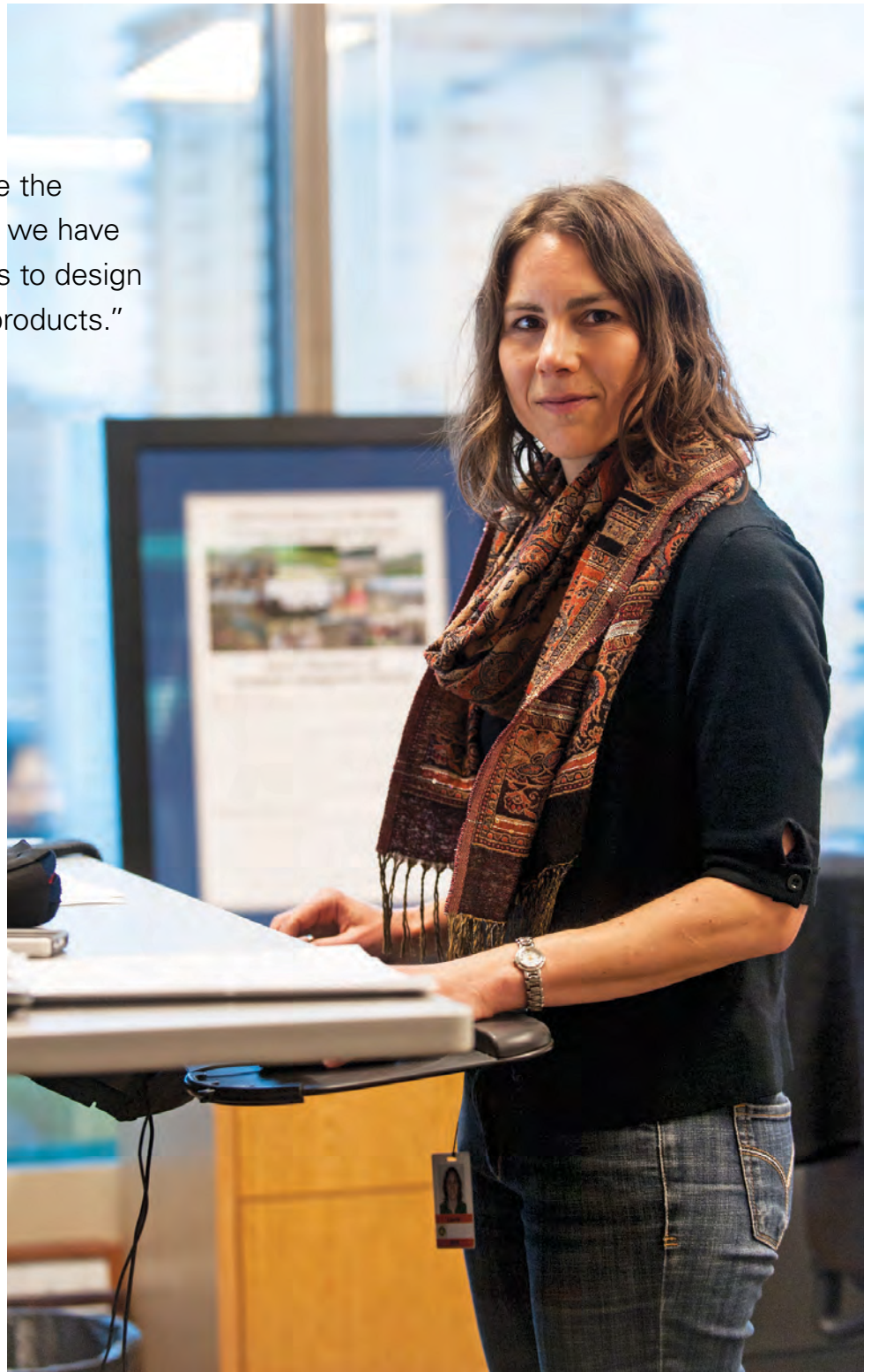
In another arrangement, MV has a soil manufacturing contract that calls for 10,000 metric tons (11,000 tons) of biosolids a year to be used for landscaping projects at parks and other MV properties. Because of the long distances to many reuse sites, MV is always on the lookout for ways to cut costs. The organization uses contractors who haul loads into the city and normally would be returning empty. That works especially well with the utility’s mining customers, who truck ore into Vancouver, then fill up with biosolids for the return trip. “That way, we save on fuel costs as well as greenhouse gas emissions,” Ford says.

### CONTINUING CHALLENGES

The MV team has contracts into coming years for agricultural and mining reuse projects. “You want to have all your biosolids committed, but things can change with little notice, and you need to be able to react quickly,” Ford says. “With mines, reclamation is not always their first priority. If the price of copper goes up or down, that can change the demand for biosolids and can make planning difficult. We face a constantly moving target. Where do we send our biosolids, and what is the nature of the places we are sending the material to?”

Since 1990, MV has delivered hundreds of thousands of tonnes of biosolids to dozens of beneficial reuse sites. That record earned the utility the 2010 Award of Excellence from the Northwest Biosolids Management Association. Sites have included the Vancouver International Airport, the Sea to Sky highway between Vancouver and Whistler, numerous landfills and mine reclamation sites, gravel pits, rangelands, city parks and silviculture projects.

With experience like that, it’s a good bet that Ford and her team will continue to find places for MV’s biosolids: “We’re old hands at this.” **tpo**



Laurie Ford heads the biosolids management program at Metro Vancouver, which serves a population of 2.4 million in the British Columbia city of Vancouver and its surroundings.

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# More With Less

THK HYBRID SYSTEM THICKENS WASTE ACTIVATED SLUDGE IN A COMPACT FOOTPRINT WITHOUT REQUIRING POLYMER ADDITION

By Ted J. Rulseh

**T**hickening of waste activated sludge (WAS) before anaerobic digestion can reduce costs substantially. Typically, WAS is more difficult to thicken than primary sludge. Traditional methods include gravity belt and rotary drum thickeners and dissolved air flotation (DAF).

Now, Centrisys, a manufacturer of dewatering centrifuges and other products for the wastewater treatment industry, offers a hybrid technology designed to thicken without polymer and with low electricity consumption, and therefore at an attractive cost.

The company's THK hybrid thickening system also offers a compact footprint, an automated process that requires minimal operator attention and a closed-system design that simplifies the control of odors. Michael Kopper, president of Centrisys, talked about the technology in an interview with *Treatment Plant Operator*.

**tpo:** What was the rationale for bringing this technology to the market?

**Kopper:** We looked at the market and noted issues in thickening processes, including high consumption of polymer, odor concerns and hydrogen sulfide discharges causing corrosion and requiring extensive air-handling systems. We set out to develop a technology to address those concerns with a more hygienic, more controllable and more reliable process.

**tpo:** Why is thickening of WAS so beneficial?

**Kopper:** Primary sludge thickens relatively easily to 3 to 4 percent solids. WAS coming from final clarifiers is typically at 0.8 to 1.1 percent solids.

If you feed WAS to anaerobic digesters at 1 percent solids, there is a high energy cost to maintain those digesters at the optimum 97 degrees F. In addition, the volume of the digesters will be extremely high. If we increase the solids content from 1 percent to 4 percent, we reduce the overall volume by 75 percent.

**tpo:** Why is your technology called a hybrid thickening system?

**Kopper:** We combine centrifugal forces for settling the solids with air injection that helps to float the solids out of the machine. We basically use the centrifuge concept and the DAF concept in a single device.

**tpo:** In basic terms, how does the thickening process work?

**Kopper:** The WAS is pumped from the final clarifiers into the centrifuge at a prescribed flow rate. The solids particles settle within the centrifuge and are conveyed below a divider disc to a small solids discharge chamber. Into this chamber we introduce a small amount of air — about 1 to 20 cfm. Air bubbles then attach to the solids particles, reducing their specific gravity to below the specific gravity of the water, causing them to float. Through that and a system of piping, hydraulic pressure of the liquid in the machine forces the solids out of the chamber. The water separated from the solids is sent to the headworks or, preferably, back to the aeration basins.

**tpo:** How does the design of the system control odor?

**Kopper:** The system is completely enclosed, and therefore the odor cannot escape. So, rather than having to vent an entire room for odor control,

we only have to vent the device itself into an air-handling system and ultimately to an odor-control system.

**tpo: How much operator attention does the technology require?**

**Kopper:** The system is fully automated. We would expect an operator to walk by once in the morning, take a sample and make sure the machine is running properly. The daily labor should amount to about half an hour.

**tpo: How does the footprint of this technology compare with alternatives?**

**Kopper:** We have about one-thirtieth the footprint of a DAF system of similar throughput, and about 50 percent of the footprint of a gravity belt or rotary drum thickener.

**tpo: How much energy input does this system require?**

**Kopper:** The system uses electricity at an average rate of 0.11 kW/gpm. That means if we run 1,000 gpm for one hour — thus 60,000 gallons processed — the machine would consume about 110 kWh.

**tpo: How much can facilities expect to save with this technology by eliminating polymer for WAS thickening?**

**Kopper:** Generally speaking with a gravity belt or rotary drum thickener, the polymer dose is 6 to 10 pounds per dry ton of solids. If we assume the avoidance of 8 pounds of polymer per dry ton, and a price of \$2.50 per pound, a 120 gpm THK system processing 2,360 dry tons per year would yield annual polymer savings of \$52,600.

“We combine centrifugal forces for settling the solids with air injection that helps to float the solids out of the machine. We basically use the centrifuge concept and the DAF concept in a single device.”

**MICHAEL KOPPER**

for larger facilities is that by adding a small amount of polymer — on the order of 1 to 3 pounds per dry ton of solids — we can double the flow rate through the machine. That means we don't need mechanical standby capacity — we add capacity by adding that small dose of polymer.

**tpo: What has been your experience with this technology under field conditions?**

**Kopper:** We have six units in operation. We have done an enormous amount of testing around the world, in China, in Europe and in the United States in cities such as San Francisco, New York, Miami, San Antonio and Austin [Texas]. The results to date are very favorable. A unit in our home city of Kenosha, Wisconsin, has been running for three years, and so far there are no issues with the machine. We feed an average of about 150 gpm, achieving on average 94 percent solids capture at 4.5 to 5 percent discharge solids. Power consumption is 16.5 kWh for 9,000 gallons of WAS processed. The economic payback is about two years. **tpo**

**tpo: How are these systems sized, and for what size facilities are they designed?**

**Kopper:** We offer units in 200 gpm, 300 gpm and 600 gpm capacities. Generally, the technology is suitable for facilities with average wastewater flows of at least 5 mgd. The larger the facility, the better the payback will be. A point of interest



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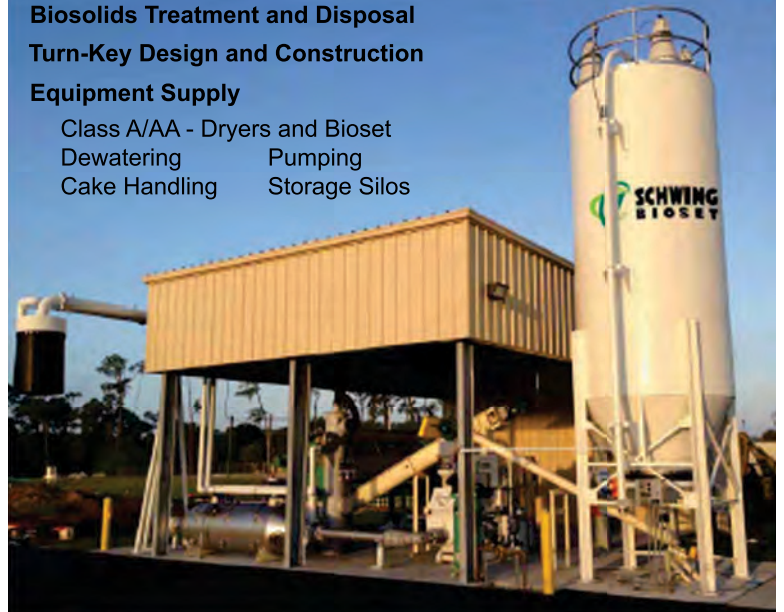
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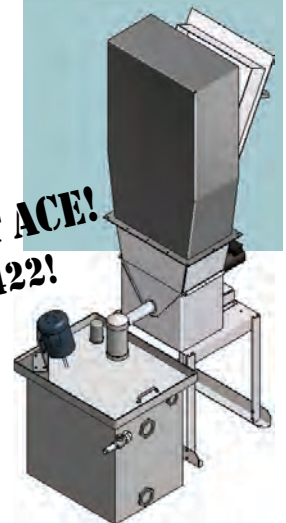
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One of four solar-powered ultrasonic algae control buoys is placed in Canoe Brook Reservoir No. 1.



PHOTO COURTESY OF AMERICAN WATER

## Lowering the Blooms

ULTRASONIC TECHNOLOGY PROVIDES AN ECONOMIC, ENVIRONMENTALLY FRIENDLY ALTERNATIVE TO CHEMICALS FOR CONTROLLING ALGAE GROWTH IN SHORT HILLS, NEW JERSEY

By Ed Wodalski

Algae blooms are a regular occurrence at the Canoe Brook Water Treatment Plant in Short Hills, New Jersey. Over the past five years, the plant team has tried various methods to control the growth, which typically persists for weeks or months during late spring and summer.

Contributing to the problem is a fairly shallow reservoir that allows sunlight to penetrate to the bottom of the lake, and high levels of organics pumped in from the nutrient-rich Passaic River. Looking to attack the algae at its source, the plant historically applied copper sulfate at the first sign of blooms. Although a short-term fix, the chemical created long-term problems.

The Canoe Brook plant tested and deployed in one of its reservoirs a chemical-free remedy in a new device that attacks algae cells using high-frequency sound waves.

### DRAWBACKS OF CHEMICALS

Copper sulfate treatments at Canoe Brook failed to pass the cost-benefit test. “The first treatment of the year would go great, but the rest would have no effect whatsoever,” says Scott Brezinski, water quality supervisor for New Jersey American Water at Canoe Brook, which serves 126,000 customers in 25 municipalities. “Copper had lost its effectiveness for us.”

Dying algae cells sank to the bottom of the reservoir and degraded, fur-

ther increasing organic carbon and decreasing dissolved oxygen. Copper sulfate also had the potential to lyse algae cells, releasing taste and odor compounds and possibly algal toxins. The treatments were also expensive: Material and labor costs for application and monitoring were about \$85,000 a year.

“When the plant was reconstructed in 2012, we included ozone and granular activated carbon, so there never were any tastes or odors released out of the plant,” Brezinski says. “It was more treatment challenges. In the past, before the plant was redesigned, there would be periodic taste and odor complaints. The new plant eliminated that, but the plant wasn’t performing as well as it could have been because of the high algae levels.” In particular, the algae led to short filter runs.

### SONIC SOLUTION

Seeking a less costly and more environmentally friendly alternative, Canoe Brook learned about LG Sonic algae treatment technology through American Water’s Innovation Development Program in September 2013. The program, launched in 2009, seeks out innovations and brings them to the water industry. To date, the program has examined more than 600 technologies.

“Isle Utilities, an independent technology and innovation consultancy that brings together technical and commercial specialists, held a seminar

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for American Water where a number of technologies were presented, and this was one of them,” says Dr. Orren Schneider, water technology manager with American Water.

Manufactured in The Netherlands by LG Sound, the underwater device uses high-frequency sound waves to attack algae cells. The treatment is widely used in commercial and residential applications but is relatively new for municipal drinking water reservoirs, Schneider says.

In May 2014, four solar-powered ultrasonic algae control buoys were assembled and placed in Canoe Brook’s Reservoir No. 1. The purchase price was about \$150,000, and Schneider estimates a payback period of 1.8 years.

Designed to eliminate up to 90 percent of algae, the chemical-free system is safe for fish and plants. It prevents growth by transmitting ultrasonic waves that target gas vesicles in the algae, causing them to become less buoyant and sink to the bottom of the reservoir. The sonic treatment thus helps prevent algae and blooms from forming; less algae means less decay. Copper sulfate is used to kill blooms if they form.

LG Sonic’s Chameleon Technology makes it possible to adjust the program according to water conditions, algae type and application, enabling the device to treat cyanobacteria, green algae, diatoms and other unwanted growth.

LG Sonic’s Chameleon Technology makes it possible to adjust the program according to water conditions, algae type and application, enabling the device to treat cyanobacteria (blue-green algae), green algae, diatoms and other unwanted growth.

Deployed in spring and retrieved in November, each buoy has three ultrasonic transducers that cover about 50 acres. One main buoy also monitors factors such as turbidity, dissolved oxygen, pH and temperature. Data linked through a cellphone card to an LG Sonic server can be tracked in real time.

“We used data received from the sensor package on the buoy and collected samples on a daily or weekly basis to look at algae, organic matter, and taste and odor compounds,” Schneider says. “Toward the end of the project, we analyzed the economic and operational data and assessed how much it cost or saved.”

### POSITIVE OUTCOME

Test data showed a 20 percent reduction in chemical usage in 2014, allowing for 83 percent longer filter runs, despite pumping 20 percent more water than the previous year. Annual savings are estimated at \$78,000 (\$18,000 in copper sulfate and \$60,000 in monitoring costs).

Water turbidity and total organic carbon also declined, reducing the concentration of taste- and odor-causing compounds in raw water. Concentrations of geosmin (one taste and odor compound) in Reservoir No. 1 were less than 5 ng/L, compared to 55 ng/L at one point in untreated Reservoir No. 2.



PHOTO COURTESY OF LG SOUND

Ultrasonic waves target gas vesicles in the algae, causing them to become less buoyant and sink.

Based on the initial results, American Water is looking to install ultrasonic systems at several plants in Kentucky and Hawaii. “This was the first time the LG Sonic units had been used in drinking water in the U.S.,” Schneider says. “We were surprisingly pleased with the results and how fast we saw the impact.” **tpo**

# RUNNING WITH THE BALL

AWARD-WINNING OPERATOR KEVIN WILLIAMS SUCCEEDS AT ONE OF MISSOURI'S LARGEST WATER PLANTS BY HELPING OTHERS AS SUPERVISOR, TRAINER AND PROBLEM-SOLVER

STORY: **Trude Witham**  
PHOTOGRAPHY: **Denny Medley**

KEVIN WILLIAMS GREW UP AROUND WATER TREATMENT PLANTS: HIS earliest memories include riding in a truck with his dad to locate a water main break.

He didn't choose a career in water treatment out of high school, instead taking computer programming courses at a vocational school in Platte City, Missouri. Finding jobs scarce in that field, he went to W.W. Grainger and worked in assembly, inventory handling and quality control before finding his way to the Kansas City Water Supply Treatment Plant as an operator trainee in 1999.

It was the start of a productive career that now spans 16 years of challenges. As chief operator, Williams oversees 13 pumping stations with 91 pumps, five water towers and 2,800 miles of pipe. He's also challenged to keep up with technology, balance a tight budget and decide which equipment to replace at an 87-year-old plant. For his efforts, Williams earned the 2014 State Operator of the Year award from the Missouri Water and Wastewater Conference, after first winning a regional award.

Besides supervising 10 operators on his shift, Williams works on "special projects to help people." For example, he followed his father as a Department of Natural Resources (DNR) trainer. "This isn't required as part of my job, but I started providing classroom and hands-on training on the side so operators could get their DNR credit hours for retaining their water licenses," Williams says. "I update plant training and treatment materials and then reapprove them through the DNR." It's another way he gives back to the profession.

## PASSING THE TEST

When Williams was hired at the Kansas City plant, he had no operator certification. "I went in cold, with no training, but was able to earn my D



Kevin Williams, chief operator, Kansas City Water Supply Treatment plant.

trainee license and then my C license the first year, after they sent me to a DNR 12-day training class," he says. Three years later, he earned his B and A licenses. After five years as an operator and five as a senior operator, Williams moved up to chief operator in 2009.

His mentors include Carl Stepp, plant purification superintendent; Doug Carr, pumping superintendent; and Mike Klender and John Reddy III, plant managers. But his first mentor was his father, David Williams. "He provided training, support and advice and was always there when I needed him. He gave me the work ethic to achieve my goals."

The Kansas City Water Supply Treatment Plant is operated by Kansas City (Missouri) Water Services, which also handles water distribution, wastewater collection and treatment, and stormwater management for 600,000 customers, besides serving 33 wholesale customers in the region.

The city's first water plant opened in 1875. A new facility built in 1928 increased capacity from 5.0 to 110 mgd, and a 1950s upgrade raised that to 207 mgd. Today, the plant is permitted for 240 mgd and delivers an average of 104 mgd.

Raw water from the Missouri River and a well-field is pumped to six primary basins for settling and chemical addition (polymer and return lime sludge from the secondary basins). After chlorine, lime, potassium permanganate and ammonia addition, the water goes to six secondary settling basins. It is treated with carbon dioxide and, if needed, with carbon to improve taste and odor before moving to six final settling basins. From there, the water enters the plant's 36 filters and is treated with fluoride and phosphate.

Twenty-eight operators keep the plant running around the clock. Williams typically works 7 a.m. to 3 p.m. and is one of two supervisors on that shift. After holding a quick meeting with the night shift operator to discuss





As chief operator, Williams oversees 13 pumping stations with 91 pumps, five water towers and 2,800 miles of pipe, as well as in-plant systems including the filter room (meters by Precision Digital).

“ We have different levels of operator experience, from 20-plus years to four months, and all the chief operators are mentors and are here to train our subordinates. We always let operators realize their full potential.”  
**KEVIN WILLIAMS**

A Waukesha natural gas engine (GE Energy) provides emergency power to the plant’s pumps.



## Kevin Williams, Kansas City (Mo.) Water Supply Treatment Plant



POSITION: | **Chief operator**

EXPERIENCE: | **16 years**

EDUCATION: | **Computer programming courses at Platte Country Area Vocational Technical School, Platte City, Missouri**

CERTIFICATION: | **Level A water treatment**

MEMBERSHIPS: | **Missouri Water and Wastewater Conference (MWWC)**

GOAL: | **Advance to plant superintendent**

GPS COORDINATES: | **Latitude: 39°0'49.17"N; longitude: 94°31'49.47"W**

## A TRAINING INNOVATION

Kevin Williams goes the extra mile to help operators succeed at the Kansas City Water Supply Treatment Plant. For example, he works on special projects like the full-size filter training module he designed and built.

"It took us four months to build," he says. "It was modeled after one of the plant's 36 filters, but used a lot less water. It takes 160,000 gallons of water to backwash one of our filters, whereas my design used less than 100 gallons or so." The plant used his model for concept training but also trains operators on the plant's regular filters so they can learn computer automation and equipment troubleshooting.

Williams' module was 7 feet tall by 6 feet wide and used clear tubes so that operators could see the inner workings of the filters. It contained the correct amount of sand and gravel and was a fully functional filter. It was also used for plant tours.

Unfortunately, the filter was destroyed during a spring storm. "I knew it was coming but was too busy at the time to secure the filter properly, and it blew over," Williams says. He planned to build a new one last winter: "They will allow me time during work to do this, so I just have to fit it in with the maintenance shop's welders and mechanics. It was my project and first design, but we all had a hand in the finished product. The guys were great; I told them I needed something to do a certain thing, and they made it happen."

any problems, Williams huddles with the shift operators. "On a typical day, I'm checking the SCADA pumping screen, taking care of the time cards, working with contractors and overseeing treatment adjustments after operators have completed chemical analysis every four hours. If everything is running smoothly, I catch up on paperwork."

He also trains new operators. "We like to bring them in and train them ourselves with courses we have adapted for the purpose and with classes approved by the DNR."

### HIRING FROM WITHIN

As chief operator, Williams must stay on his toes. "We have different levels of operator experience, from 20-plus years to four months, and all the chief operators are mentors and are here to train our subordinates," he says. "We always let operators realize their full potential." The plant promotes from within, and employees are groomed to move to the next level.

Williams is a goal-oriented manager: "I like to give operators the tools they need to be able to run with the ball. I was given the chance to do more than just fill a time slot, and I want that for everyone else."

Besides Williams, the chief operators (Level A certified) are Robert Slusher, first shift; Mike Brower and Tad Miles, second shift; and John McCord, third shift. The first-shift operators reporting to Williams are:



Kevin Williams and his team are challenged to keep plant equipment in good repair and replace older equipment with new technology.

- Senior operators Cody Gazaway (Level A) and Tommy Hardy (Level B)
- Level C operators Darry Brown, Carl Hininger, Lawrence Hoffman, Dustin Layton, Scott Lochner, David Scott and Luther Tidwell
- Level D operator Robert McCall

### MEETING CHALLENGES

The plant's greatest challenge is keeping the equipment in good repair and replacing older equipment with new technology. Water supply maintenance technicians and electricians handle most equipment and plant maintenance.

"The plant is too big for us to wear many hats," Williams says. "Operators don't tear apart pumps but spend all of their time operating the plant." That includes staying on top of water supply changes, such as when water mains are isolated for projects or repairs, or when the fire department calls

for more pressure. Scheduled equipment checks help make sure all is running properly.

“Money is tight, but the city is doing a fine balancing act to keep equipment running by setting aside some funds for repairs and replacements,” Williams says. The operators serve as eyes and ears by collecting data on needed equipment upgrades. For example, the plant recently replaced or redesigned its 36 filters.

“It was cumbersome to juggle the timing of handing off the various filters to the contractors to work on,” Williams recalls. “Also, jackhammers near the filters caused shaking, which in turn enabled particles trapped by the sand to sift down and pass through the filters. We had to run quite a few turbidity samples by hand after that.”

A new carbon feed system was added November 2014. “As the system grows, we add new pump stations and water towers,” says Williams. “Our Arrowhead booster station went from a one-pump shed to a large building complex with three electrical units and two gas engines with a 5-million-gallon standing reservoir.” The utility is adding a new water tower in the north-east section of the city and rehabilitating a major pumping station with seven 30 mgd pumps and another station with four 25 mgd pumps.

“Our ultimate goal is to convert from manual to automated systems,” Williams says. “Our challenge is to upgrade at a pace where everything will interface easily. That takes a lot of time and planning.” Although upgrades are handled by city engineers, plant operators can make suggestions about projects during the planning stage.

The plant team is proud of the product water quality. “Our goal has always been to stay at least 10 years ahead of regulatory changes,” Williams says. “Treatment-wise, we are always ahead of the curve.” Aside from an increase in organics and odor in fall and farm runoff with spring rains, treatment is fairly routine. “It’s the same thing every year, and we have perfected the treatment because we know what chemicals to add and when. If we see issues with the water, we check samples right away in our state-certified lab.”

## FUTURE GOALS

Although Williams will be eligible to retire in nine years, he would like to move up, not out. “Most people don’t stay in one place that long, but I stuck with it, moved up and learned a lot,” he says. “I’ve met the qualifications for a superintendent position, so that’s what I’d like to do at some point.

“My dad and my mom, Martha Jane Williams, are the biggest supporters I will ever have. My family is important, and I’m very proud of my wife, Teresa, who has raised our daughter to be a very smart girl in her third year of college. Teresa is a great sounding board, since she is the one who has to listen to me every day after work. I am lucky she has stood by my side for the last 23 years.”

Stepp, purification superintendent, enjoys working with Williams because of his enthusiasm and his willingness to learn and to help train others: “He looks for ways to improve himself as well as plant processes.”

Says Williams, “There isn’t a day that I don’t learn something new, and I will stay here as long as they’ll have me.” **tpo**

“Our ultimate goal is to convert from manual to automated systems. Our challenge is to upgrade at a pace where everything will interface easily.”

**KEVIN WILLIAMS**

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# Up With Reuse

CONTINUING PROMOTIONS, INCLUDING A MASCOT, HELP POMPANO BEACH PUMP UP RESIDENTIAL CONNECTIONS FOR ITS RECLAIMED WATER IRRIGATION SYSTEM

By Jeff Smith

Efforts to encourage Pompano Beach residents to connect to the city's reuse water irrigation system reached a new high in 2014 when the winner of a promotional contest suggested the name of Squirt as a sprinkler head mascot.

Since then, Squirt has taken on a personality, growing arms and legs, wearing sunglasses and showing up all over town promoting reuse water's benefits, says utilities director Randy Brown. The mascot and other promotions have helped this city on Florida's Atlantic Coast increase reclaimed water use significantly.

## CONTEST KICK-START

The city's reuse facility went online in 1989 as a 2.5 mgd filtration and disinfection system with 73 homes connected. Initial community acceptance was slow, partly because of high hookup costs, which have since been removed. Today, 625 homes and more than 300 businesses are connected, and a second storage tank has been added to handle the current 7.5 mgd capacity.

The reuse system, named OASIS (Our Alternative Supply Irrigation System), originally supplied only the city's two 18-hole golf courses. Promotions directed at residential hookups met limited success. But in spring 2014, the "Name Our Sprinkler Head Mascot" contest was opened to all Pompano Beach K-12 students.

From more than 15 entries, utilities staff members Isabella Sagle, Fran Oney, Maria Loucraft and Brown selected Squirt, submitted by fourth-grader Reese Hartsell. As a prize, Hartsell won a purple iPod Nano, the color symbolic of the reclaimed water system's purple pumps and piping. Hartsell's teacher, Candyce Rapp, whose class had the most entries, won a \$100 gift card.

## SUSTAINABLE APPROACH

Loucraft, utilities compliance and efficiency manager, says the unique thing about the reuse system is that there is no wastewater treatment plant in the city; the col-



The mascot Squirt helps Pompano Beach market its reclaimed water for use in residential irrigation.

lections system carries wastewater to a county facility. A portion of that facility's secondary effluent, on the way to its ocean outfall, is pulled into the Pompano Beach reuse facility for tertiary treatment.

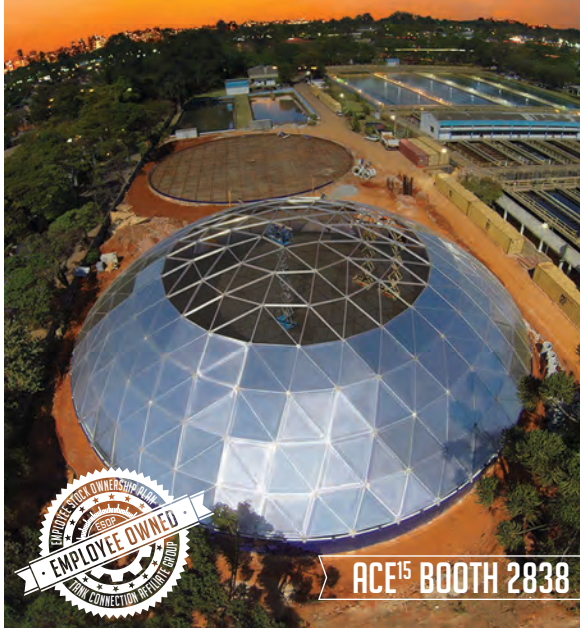
"The key thing is that it's sustainable for the city," says Brown. "Every gallon of reuse water saves a gallon of drinking water, so we can delay expenditures on infrastructure, like treatment plants. We can protect our consumptive use permit and use water for things that are important, like having enough supply for the future during times of economic growth. If we need the water, we've got it. Reuse also helps to relieve the demand on some of the city's wellfields, which were starting to see saltwater intrusion."

The reuse facility lies near a major thoroughfare and a large shopping center. Because appearance and security are major concerns, the utility in 2014 replaced a surrounding chain-link fence with nearly 900 feet of decorative aluminum fencing in a high-gloss black finish. The tops of the fence bend outward from the plant and are capped with steep pyramid-shaped




The hallway in the administration building displays a poster used to promote the OASIS program.

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The reclaimed water plant grounds are attractively landscaped.

“Every gallon of reuse water saves a gallon of drinking water, so we can delay expenditures on infrastructure, like treatment plants.”

**RANDY BROWN**

responded to a call for ideas for a logo to symbolize the reuse mission. The winning entry was enhanced by a commercial artist in exchange for recognition.

The contest also yielded the plant's tagline: Making it Clean and Turning it Green. In August 2012, the plant promoted residential hookups with an Evening at the OASIS. Festivities included music by a local guitarist, a variety of foods and a plant tour.

Promotion of residential connections is an ongoing effort, Brown says: "Typically we expand the distribution system by 10,000 to 20,000 feet a year, and we usually connect 150 to 200 homes each year. So this program has been quite successful."

tpo

ends. Twelve security cameras are monitored by an operator in the control room. Entry gates are equipped with magnetic card readers.

## SPRUCING UP

To present a more professional image during plant tours, the administrative offices received new paint, furnishings and wall hangings in 2014. Strategic landscaping helps shield the plant from passers-by. "It's really a beautiful facility and no one really knows it's there because it just sort of blends in," Loucraft says.

Contests have been part of other reuse promotions. In 2005, residents

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# *Trial* By Fire

AN OKLAHOMA WATER PLANT TEAM OVERCOMES STARTUP, TRAINING  
AND OPERATIONS CHALLENGES WITH A NEW MEMBRANE FILTRATION SYSTEM

STORY: **Trude Witham**  
PHOTOGRAPHY: **Brett Rojo**



“ This \$60 million membrane plant was built by our citizens to provide Broken Arrow with clean, safe potable water. The operators and I have not lost sight of the trust these citizens have given us.”

**JIMMY HELMS**

The intake tower at one of the two pre-sedimentation basins at the Verdigris Water Treatment Plant.

## THE VERDIGRIS WATER TREATMENT PLANT IN

Broken Arrow is one of the largest membrane plants in Oklahoma and the country. While the plant operators are happy with the plant and the water quality it produces, getting to that point has been a bumpy ride at times.

For years, the city purchased water from an outside authority, delivered through a 23-mile pipeline that was showing its age. In 2004, the city embarked on a seven-year project to study, approve, design and construct its own 20 mgd treatment plant. In April 2014, the new facility along the Verdigris River began delivering water to the city's 100,000 residents.

The city chose low-pressure microfiltration (MF) membrane technology out of a desire to use fewer chemicals and in view of concern about changing regulations, especially for disinfection byproducts. While starting up any new plant can be challenging, the Verdigris team found it especially so.

Many operators had little to no water treatment experience, and the membrane technology thoroughly tested their mettle. An algae problem further complicated matters. The team persevered, and today the plant operates superbly, producing water with 0.013 to 0.015 NTU average turbidity and 2.6 to 3.0 mg/L average total organic carbon (TOC).

## CHOOSING MEMBRANES

Since membrane filtration is fairly new for drinking water plants, and even more so in Oklahoma, the state required a pilot study at the Verdigris plant. The city evaluated systems from four vendors and ultimately chose a system from Pall Corporation using Microza UNA-620A membrane modules. “I visited three California plants with similar systems, and I liked what I saw,” says Jimmy Helms, plant manager.

The system consists of 10 membrane racks with 115 modules per rack. It is sized for 20 mgd (28 mgd in warm weather from higher flux through the membranes), expandable to 40 mgd. The hollow-fiber membranes



The team at the Verdigris Water Treatment Plant includes, from left, Eli Prock, assistant plant manager; Jed Beloncik, Robert Sherman, and Blake Shepherd, operators; and Jimmy Helms, plant manager.

## Verdigris Water Treatment Plant, Broken Arrow, Oklahoma



FOUNDED: | 2014

POPULATION SERVED: | 100,000 (35,000 metered customers)

SERVICE AREA: | Broken Arrow

SOURCE WATER: | Verdigris River

TREATMENT PROCESS: | Membrane filtration

DISTRIBUTION: | 600+ miles of water mains

SYSTEM STORAGE: | 17 million gallons

KEY CHALLENGE: | Stay ahead of regulations, find qualified operators

WEBSITE: | [www.brokenarrowok.gov](http://www.brokenarrowok.gov)

GPS COORDINATES: | Latitude: 36°4'3.26"N; longitude: 95°34'30.80"W

remove contaminants by physical straining of particles larger than the 0.1-micron membrane pore size. Six 200 hp pumps push the water through the membranes, which are backflushed several times a day. Filtered solids are sent to three on-site lagoons.

Raw river water enters two intake screens (Concord Screen), is pumped via vertical turbine pumps through a 42-inch pipeline and enters one of two pre-sedimentation basins. Pretreatment basins with four parallel trains achieve rapid mix, flocculation and sedimentation. Aluminum chlorohydrate is added as a coagulant. Plate settlers (Jim Myers & Sons, Inc.) separate the solids and send clarified water to the membranes.

After membrane treatment, the water is disinfected with sodium hypochlorite (MicrOclor generators, Process Solutions) then fed with chloramines as a secondary disinfectant. Fluoride is also added. The finished water is sent to a clearwell, and four 900 hp U.S. Motors vertical turbine pumps (Nidec Motor Corporation) deliver the water to the city's distribution system. The entire treatment system is controlled and monitored with a SCADA system (Rockwell Automation).

### ASSEMBLING THE TEAM

The plant has nine operators, most of whom were hired six months before the new facility came online. Eli Prock, assistant plant manager, started half-way through the construction process. "We initially had high turnover, as some found that water treatment wasn't for them," says Helms. "Eli came from 100 miles away and relocated in Broken Arrow. We were able to attract a few college graduates looking for jobs, and others were operators with past experience."

The plant is in a rural area, so most of the staff commutes from Tulsa and other suburbs. Says Helms, "While staffing is not totally stable, it's getting better. One operator retired, and a 13-year employee is leaving. So, we're trying to institute an operator progression pay plan." The plant pays for new operators to attain higher certifications. And while every operator must have at least a Class D license, new operators can work under supervision with a temporary license for a year until they can attend training.

As manager, Helms maintains morale by "giving ownership. We let them know that it's their plant and so it's up to them to make it run efficiently.





The membrane treatment system uses Microza UNA-620A membrane modules (Pall Corporation). Each membrane rack can hold 150 modules.

“ We initially had high turnover, as some found that water treatment wasn’t for them ... We were able to attract a few college graduates looking for jobs, and others were operators with past experience.”

**JIMMY HELMS**

We’ve been excited about this new plant from the beginning, and this carries over to new employees.”

The operations team handles everything, including laboratory testing, maintenance, cleaning, grounds maintenance, and repairing broken pipes and instrumentation. The plant is staffed around the clock. Each shift has two operators for safety reasons (one operator on weekends).

The team reports to Helms, who has been with the city for 33 years and holds Class A water operator certification. Besides Prock (Class B license), he supervises operators John A. Williams (Class B), Dewight Harp and Robert Sherman (Class C), Jed Beloncik, Michael Story and Jordan Wilson (Class D) and Richard Daniels and Blake Shepherd (temporary licenses).

Several operators also hold water laboratory, wastewater operator and wastewater laboratory licenses. Helms believes the operators’ greatest strength is their adaptability: “They realized very quickly that things don’t stay the same, and you have to adjust. I’m very impressed that they are able to figure out ways to overcome problems, even though they don’t all have a lot of experience.”

## LEARNING THE ROPES

After almost a year and a half, Helms reports that the operations team members feel much more comfortable with the new equipment. On-site training sessions by vendors, with an overview of equipment operation and maintenance, helped the operators come up to speed. Plant staff videotaped the sessions for later review and to help train new team members as they come on board.

Operators had to learn two SCADA systems: one for the pumps, chemical dosing process and other systems, and one for the membrane system. “The SCADA was not one of the more difficult things to learn,” says Prock. “On all the equipment, we used the more experienced operators to help those with less experience, and that worked out well.”

The on-site hypochlorite generation process was not difficult for the operators to grasp and has been mostly problem-free. “It has a high capital cost, but a payback over a period of time,” says Helms. “We chose it because chlorine gas is becoming more regulated, and everyone is trying to get away from using it.”

*(continued)*



Outflow tubes from the membrane racks that send the water through the primary disinfection treatment pipeline.

Daily air purge is performed to clean debris from the intake screens at the Verdigris River.

“Broken Arrow is one of the few cities in the state that has experienced steady growth. We will probably need to double plant capacity in 10 years, which means we’ll need to start planning in five years.”

JIMMY HELMS



## POWER OF THE NETWORK

Operators at the Verdigris Water Treatment Plant find it helpful to network with others in the industry, whether through personal contacts or memberships in professional organizations. Jimmy Helms, plant manager, is a member of AWWA, and the plant hosted the Southwest Section plant tour in October 2014 for about 50 people.



Jimmy Helms

The team also networks with operators at the Tulsa water treatment plant, where the team includes a brother of Eli Prock, assistant plant manager at the Verdigris facility. Helms, meanwhile, knows superintendents and operators at other plants in the area.

Networking was crucial when the Verdigris plant considered membrane filtration. Helms visited plants in Oklahoma and California and spoke to operators about their experiences with membranes. “That was a huge help, and it’s also why I decided to get a service contract on our system so we would have telephone support,” says Helms.

“One thing that I found key to this project was developing professional and personal relationships with the engineers at HDR. They are the ones who suggested and arranged for me to visit the California membrane plants. Without their expertise, we probably would not be where we are today.”

While Helms thinks plants should encourage operators to join national professional organizations, he realizes that most cities can’t afford memberships for everyone. “They can only allocate so much for outside costs, and they need to be prudent with ratepayers’ money.” Prock says the National Rural Water Association and state affiliates are great resources: “The people who work there have a tremendous amount of experience. If they haven’t seen it, they usually know someone who has.”

The learning curve on the membrane system was steep. “The system has more of everything, both mechanically and electrically,” says Helms. “It’s like the difference between your old station wagon and a Formula One race car. It’s a high-performance machine.” Prock agrees: “There are a lot of things to tweak, like the clean-in-place cycle and the once-an-hour air scour and backwash.”

## TAMING THE ALGAE

If adjusting to new technology wasn’t enough, the Verdigris River threw the team a serious curveball in summer 2014. Algae growth in the river during that time limited water production at the plant. As the outside temperature rose, people began using more water, and an unusually large amount of algae from the river began clogging the plant’s membrane filters.

“If you look at a map of the river, you will see a navigational channel created for barge traffic,” says Helms. “They built a series of dams, and there are little S-curves, or oxbows as we call them, so there’s not much water flow. When we pull that water in, if conditions are just right, the algae growth explodes.”

Operators found that the normal three-and-a-half-hour membrane clean-in-place procedure was ineffective. With water consumption greater than the plant could produce, they couldn’t do a longer, more effective cleaning, which would have taken 13.5 hours. Since the plant was pumping treated water at a reduced capacity, the city asked residents to conserve water until the problem could be fixed.

The operations team solved the problem after a month by using pre-chlorination and a copper-based algaecide. Helms credits Prock with developing a short-term membrane cleaning protocol, with assistance from Pall. “We brought in a field technician from Pall to help us through the process, which involved adjusting air velocities for the air scour and a short clean-in-place until we could do a full-blown cleaning,” says Helms.

Broken membrane fibers posed another challenge. “We use feed water to backflush the membranes and then send air through them,” Prock says. “But because the membranes were packed with all the accumulated solids, the water and air stream caused broken fibers.” Operators had to remove modules from the rack and take them apart to repair the fibers, a time-consuming job.

“Unfortunately, there was no initial training on the membrane system that covered what to do if the membranes became clogged with algae,” says Helms. “It was a trial by fire, but also a learning experience that we will never forget.”



Eli Prock uses the plant SCADA system (Rockwell Automation).

## FUTURE GROWTH

The plant was designed for expansion, which Helms says will need to happen fairly soon to accommodate growth: "Broken Arrow is one of the few cities in the state that has experienced steady growth. We will probably need to double plant capacity in 10 years, which means we'll need to start planning in five years."

Helms also expects regulations to change: "Every five to six years, the EPA reviews a list of contaminants and finds new things to regulate. The next thing could be pharmaceuticals. So, we have to be prepared."

Helms offers advice to other communities planning to build new facilities. "Knowing what I know now, my advice is to get new employees in place during the construction process," he says. "Send them to similar plants so they can talk to the operators." He suggests allowing them to take part in some of the equipment assembly: "If we could have had all our people in place, that would have been a good training tool."

"Our operators received some of the equipment training four months before plant startup. That needed to occur just before startup. The exception was a four-day class on the membrane system with a Pall instructor that was given closer to startup and taped by a professional videographer. At the end, the operators took a written exam and then received hands-on training. It was the only training done that way."

Prock observes, "We received some of the training so far in advance that when it came time to operate that equipment, we were asking ourselves, 'Where's the on button?'"

Still, Helms is pleased with the way things turned out: "This \$60 million membrane plant was built by our citizens to provide Broken Arrow with clean, safe potable water. The operators and I have not lost sight of the trust these citizens have given us. I am so proud of the way the operators have stepped up to make this facility a success." tpo

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# A Fresh Start in Life

AN APPRENTICESHIP PROGRAM IN THE VIRGINIA CORRECTIONAL SYSTEM HELPS OFFENDERS EARN WASTEWATER LICENSES AND PREPARE FOR PRODUCTIVE CAREERS

By Ted J. Rulseh

**M**any correctional facilities offer training in water and wastewater treatment to qualified inmates. The Virginia Department of Corrections takes it to the next level with a Wastewater Apprenticeship Program across several of its facilities statewide.

The program offers classroom and computer coursework sanctioned by the Virginia Department of Professional and Occupational Regulation (DPOR). Offenders also receive direct hands-on training and experience by working under the supervision of state-employed operators of prisons' wastewater treatment plants.

As of the end of last year, 11 apprentices had completed the year-long program, and 10 had passed the state's Class 4 (lowest) wastewater certification and received operator's licenses. One has advanced and earned a Class 2 (second highest) certification. Two former offenders now work at municipal wastewater treatment facilities.

The apprenticeship program was the brainchild of Tim Newton, director in the department's Environmental Services Unit, who saw it as a way to help ex-offenders enter a growing professional field and become contributing members of their communities.

The program is limited to offenders deemed low-security risks; violent and sexual offenders are not eligible. Apprenticeships are offered at 15 prison sites. *Treatment Plant Operator* talked about the program with Newton and Robbie Jones, treatment plant operator at the Nottoway Correctional Center in Burkeville, who directly oversees the training.

**tpo:** How did this apprenticeship program come into being?

**Newton:** When our director, Harold Clark, came to Virginia, he wanted to start a big re-entry program. About one-third of the offenders get out every year and go back to the community. We're trying to give them skills so that they can compete for jobs when they are released. We met with the DPOR, which is the state licensing agency for water and wastewater, and partnered with them to start a re-entry program for us. It's hard to find wastewater operators in Virginia now. When we have job openings, we have a hard time finding people qualified for them. We felt wastewater would be a good place to start. We launched the program in 2012.

**tpo:** What kinds of water and wastewater facilities do the Virginia prisons have?

**Jones:** The facility populations run from about 115 to 1,200 offenders. There are several types of systems. We have sequencing batch reactors, extended aeration systems, oxidation ditches and others. They discharge directly to the environment. Other facilities discharge to municipal sewer systems. Some facilities have their own water plants.

**tpo:** How many people are in the apprenticeship program?

**Jones:** At any given time, we have 14 to 18 stretched out across the state. We're trying to expand. We'd like to have 25 to 28 in the program at all times, but it takes time to expand it to all the facilities.

**tpo:** Who can qualify for the program?

**Jones:** These are Level 1 offenders, who would be considered trustees. They're allowed to go outside the fence and can work on several types of jobs throughout the department. It's minimal supervision — we don't have to have somebody constantly checking up on them. We also require them to have a GED or a high school diploma, because it's a pretty intensive program. They need to have comprehension skills and the ability to do basic math.

**tpo:** Beyond those requirements, do candidates receive other screening?

**Jones:** I interview them to make sure their attitude is such that they'll come in and do what they're supposed to do. We have counselors who do background checks. We also check to make sure they don't have any charges for misbehavior in at least six months. If they can't stay out of trouble while they're in the prison system, if they can't get along with other offenders or the staff, we definitely don't need them in our program. We do a thorough job of making sure we get guys who are willing to learn.

**tpo:** Once candidates are accepted, what does the training consist of?

**Jones:** There is classroom instruction. John Hricko, from the Town of Crewe, is certified to teach the program and comes to the Nottoway facility to help us out. Other facilities have different instructors, and the operators, supervisors and managers pitch in. We help the trainees get the books they need. We use Volumes 1 and

“About one-third of the offenders get out every year and go back to the community. We're trying to give them skills so that they can compete for jobs when they are released.”

TIM NEWTON

2 of the Sacramento course — that's what we try to model the program after.

The trainees also have access to laptop computers that are not hooked to the Internet. They use programs we've acquired through Virginia Rural Water Association, the state Department of Health, the Department of Environmental Quality and the Water Environment Federation. It's a comprehensive program.

**tpo:** What basic steps do the offenders go through to complete the apprenticeship?

**Newton:** We try to make sure across the state that we treat them the same way we would treat someone we hired off the street and trained. They follow the same steps as any operator in training at any of our facilities.

**Jones:** From the get-go, we show them around the plant. We show them the processes from the influent to the effluent and explain some of the terminology. We get them acclimated to the system, how it works and what to do and not to do. Then we have them sit down and start studying so they get more familiar with the terminology and we can talk to them on the same level. Once they have enough experience to understand what we're doing, we start showing them how to do some of the basic procedures. As they catch on, we take it further. One of the big issues is the math. We concentrate on that, making sure they understand how to use their formula sheet.

**tpo:** How do you manage to supervise trainees in scattered locations across the system?

**Jones:** It's up to the individual operators and supervisors at each facility. It's not really that difficult. Before we had this program, offenders worked in our treatment facilities. They just didn't get any actual credit. Now they get credit for going through the apprenticeship and hopefully getting their licenses.

**tpo:** How long does it take them to complete the program and be ready for licensing?

**Jones:** It's typically a year. They're required to have a flat six months of hands-on experience, eight hours a day, before they sit for the exam. We go for the lower level license just to get them a professional license. Then if they're going to be here with us awhile longer, we'll help them pursue the next-level license.

**tpo:** As offenders, do they have to go through any extra steps to obtain licenses?

**Jones:** Once they meet the minimum requirement to be able to take the test, we submit their paperwork to the DPOR. They then conduct an informal fact-finding conference. They call and talk to the apprentice, along with me or whichever operator is in responsible charge of that person. Later the DPOR team will vote on whether to have the man sit for the license exam or not. So far, we haven't had anybody denied.

**Newton:** So far, we've only had one apprentice who failed and had to retake the test.

**tpo:** What kind of help do the newly licensed operators receive in applying for and getting jobs in the field?

**Jones:** I help them, as do the other supervisors, the managers and Tim Newton. We go all over the state to different facilities, and we talk to operators and to mayors. If we hear about jobs coming open, we'll try to let the offenders know. I have made several phone calls myself. We talk to the decision-makers and see if they will give our guys a break and interview them. We don't just let them out and leave them to their own devices. We try to help them out even after they are released. When we accept these people for training, we're essentially hiring them just like we would hire anyone applying for a job with us. So we have no hesitancy in giving them recommendations.

**tpo:** Are the hiring agencies still hesitant because of these apprentices' criminal records?

**Jones:** They're a bit reticent at times, but once we explain that we thoroughly vet them and that we're willing to give them a reference, they are much more willing to take a chance. For the most part I've had nothing but good luck with people at least giving them an interview. I had one fellow who had been out for a year and wasn't having a whole lot of luck. But he went to work at a shipyard and just kept plugging. I told him to keep putting in applications, and finally someone went ahead and hired him. Perseverance is the key.

**tpo:** What is the impact of this program on the offenders' lives?

**Jones:** The guys I have experience with, you can see their attitude has changed. They have self-respect. It changes their attitude and outlook.

**Newton:** When they're ready to get out, we no longer call these guys offenders. They're returning citizens. We're giving them a skill that can help them be productive citizens who won't be back in corrections anymore. That's our job. If we can get them a professional license, they've got a big leg up — it's a lot easier for them to get a job. This program is also good for our operators because they see the change in these men. It's really noticeable when you go and talk to them. They look at what they're doing as a good thing, helping someone build a future. They give them a trade, and they feel good about that. We're doing exactly what we're supposed to, and we do it in more than water and wastewater. **tpo**

## Getting a foothold

Jermaine Niblett didn't have a high school diploma when he entered the Virginia correctional system in 2003. Today, he has a GED, a Class 2 (second highest) wastewater operator license and a two-year associate in applied science degree with a major in water and wastewater treatment.

Two years away from his release, he's optimistic about his job prospects because of the licensing and experience he has gained under the Virginia Department of Corrections' Wastewater Apprenticeship Program. "It makes me employable," he says. "Having a felony on your record, it's a stigma. In my case, employers may consider the felony, but the license will make me a better candidate. Having a Class 2 license shows that I'm dedicated to doing what it takes."

In 2011, Niblett started working toward his degree at Mountain Empire Community College in Big Stone Gap, Virginia. He studied by correspondence and completed the degree in 2012. In October of that year, he took a transfer to the Nottoway Correctional Center in Burkeville to enter the apprenticeship program and gain the work experience he needed for licensing.

"As soon as I got there, I started working full time at the wastewater treatment plant," he says. He passed his Class 4 wastewater exam after about a year in the program and ultimately earned his Class 2 license last year. He aspires to become a Class 1 operator and to earn water licensing.

"Having worked alongside other full-time operators, assisting them every day, Monday through Friday, 40 hours a week, that's something you can put on a resumé," Niblett says. "Those blank spots on a resume, when they're filled up, employers like to see that."

"The operators I work with have really helped me learn the profession. They show me everything they know. As long as you're willing to do the work, they're willing to show you how to do it. It's a good quality education, experience being the best teacher. I've benefited from it, and I've seen others benefit from it who are out and working in the field now."

Niblett sees environmental service as a wide-open field. He can envision himself working in the public or private sector and expects ample support from Robbie Jones, treatment plant operator, and the Nottoway facility, and Tim Newton, director of the Department of Corrections' Environmental Services Unit: "They bend over backwards to try and help us get jobs. Even when guys get out, they are still assisting and trying to get them placed. I know with them as references, there's a good chance I'll get the kind of job I'm looking for."



Jermaine Niblett

# HAPPY TO SERVE

PUBLIC SERVICE RUNS IN STEVE WOODWORTH'S FAMILY. HE AND HIS TEAM TAKE PRIDE IN KEEPING THE WATER ON AND THE RIVER CLEAN IN THE WISCONSIN CITY OF OCONTO.

STORY: **Ted J. Rulseh**  
PHOTOGRAPHY: **Cory Dellenbach**

STEVE WOODWORTH WOULD NEVER CLAIM TO BE SOME kind of celebrity, but the fact is most people around the City of Oconto know who he is.

That's largely because he grew up as the son of the police chief and came up through the ranks reading residents' water meters and fixing their water services. Today, as operator-in-charge of water and wastewater with the Oconto (Wisconsin) Department of Public Works, Woodworth appreciates the respect he gets from residents in his home community of 4,700.

He returns the favor with a dedication to quality service. That includes helping to keep costs (and rates) down by conserving potable water and saving energy at the city's 1.81 mgd (design) wastewater treatment plant. His conservation measures were a big reason he won the 2014 Operator of the Year award for the Lake Michigan District from the Wisconsin Wastewater Operators Association.

Jeremy Wusterbarth, public works superintendent, nominated Woodworth for the award. "I've worked with Steve now for 15 years in the city," he says. "He took over an older plant that had deficiencies, as all older plants do. He took charge and immediately started making changes to make it operate more smoothly and efficiently. That's something I always appreciate about him."

## UP THE LADDER

Woodworth, an Oconto High School graduate, started work life as a meat cutter at a local grocery store. At the suggestion of Randy Monette, an uncle of his wife and a member of the utility board, Woodworth applied for and won a



Steve Woodworth, operator-in-charge of water and wastewater with the Oconto Department of Public Works.

half-time job in what was then the water and wastewater utility, separate from Public Works.

He took that job in 1985, working in the lab and helping field crews as needed. As veteran colleagues retired, he steadily earned promotions. Attrition gradually reduced the water and sewer team from seven members to four, and the Public Works team from 15 to nine. Ultimately, city leaders merged the utility team with Public Works.

Woodworth, meanwhile, became a full-time water operator, then lead water operator and, in 2000, superintendent of Public Works. In 2003, he took the position he holds today. His team includes Adam Filz, wastewater operator; Joel Loberger and Matt Beekman, water operators; and Lisa Weigelt, lab director.

The drinking water system consists of three 550-foot-deep wells with pumps set at 350 feet, two water towers and 38 miles of distribution lines. The system distributes 500,000 gpd of chlorinated water. The operators' duties go beyond the water and wastewater systems. "As part of Public Works, all of us do everything," Woodworth says. "We go out and plow snow, work on construction, anything that's needed. It's a group effort."

## PROTECTING THE RIVER

At the top of Woodworth's agenda is the wastewater treatment plant, which discharges to the Oconto River, about a mile upstream from the bay of Green Bay, a prime walleye fishery that each year hosts national fishing tournaments.

"The original plant was a trickling filter facility built in 1948," Woodworth says. "In 1974, they added the activated sludge process with mechani-

“ I grew up knowing what it meant to work for the city. I’m glad to have the opportunity to do so. People know they can call me, and I can usually help them out.”

STEVE WOODWORTH

The Oconto Wastewater Treatment Plant.



## Steve Woodworth, Oconto (Wis.) Wastewater Treatment Plant



POSITION: | **Operator-in-charge, water and wastewater**

EXPERIENCE: | **30 years with the city**

CERTIFICATIONS: | **Grade 4 wastewater operator,  
Grade 1 groundwater and water  
distribution**

EDUCATION: | **Oconto High School**

MEMBERSHIPS: | **Wisconsin Wastewater Operators  
Association, Wisconsin Rural Water  
Association**

GOALS: | **Continue delivering good customer service  
and high-quality effluent at an affordable cost**

GPS COORDINATES: | **Latitude: 44°53'13.56"N;  
Longitude: 87°51'21.12"W**



Woodworth and his team have worked diligently to update and improve an older facility and keep it in consistent compliance.

cal surface aerators, which we still operate. Given the age of the plant, one of our challenges is to maintain it properly and keep it going with the resources we have.”

On that score, the record speaks for itself. Based on a three-year average, plant effluent contains 8 mg/L BOD (permit 30 mg/L), 4 mg/L TSS (30 mg/L) and .3 mg/L phosphorus (1.0 mg/L). The average daily flow of 550,000 gpd includes about 50,000 gpd from three small sanitary districts. The plant takes in about 9 million gallons of septage and holding tank waste per year.

Treatment begins with a fine screen and screen washer (JWC Environmental) installed five years ago. From there the flow goes through a Eutek TeaCup grit removal and washing system (Hydro International) and then into two primary clarifiers. Primary effluent enters a wet well and is pumped up to the trickling filter. The flow then passes through a chemical feed building where alum is added for phosphorus removal. From there the flow is split into four aeration basins (two north and two south tanks) equipped with the mechanical aerators.

To enhance and automate the aeration process, and save energy in the bargain, Woodworth ordered a pair of Aire-O<sub>2</sub> Triton process aerators (Aeration Industries International) for each basin. Mounted to the basin side-walls, they operate on a feedback loop with in-line oxygen sensors. “The mechanical aerators run 24/7,” says Woodworth. “If we get a load that requires more oxygen, the Triton aerators will kick in, too.” Each unit has a blower that delivers air through a tube to a motor-driven impeller, which mixes the air with the water.

Each pair of aeration basins feeds its own final clarifier; the flow is first dosed with polymer to enhance settling. Secondary effluent is chlorinated, dechlorinated with sodium bisulfite and released to the river.

## SOLIDS INNOVATION

The solids side of the process went through a major change 20 years ago. The plant used to surface-apply liquid anaerobically digested biosolids on farmland, but ran into difficulty with a state requirement to provide 180 days’ worth of storage through the winter.

In 1995, the plant discontinued digestion; the digesters now serve as storage tanks for primary and gravity-thickened waste activated sludge. The mixed sludge is dewatered in a belt press (Alfa Laval Ashbrook Simon-Hartley) and lime stabilized. The resulting Class B cake is kept in a storage building, and a contractor spreads it on farm fields in spring and fall.

“Because of the lime, phosphorus and nitrogen in the material, farmers look forward to receiving it,” says Woodworth. “We have no problem finding the fields — we have to spread the wealth. We have about 800 acres of farmland permitted, and we only use 40 to 80 acres in a given year. We rotate among the farms.”

## NEVER SATISFIED

While the biosolids program is a seasonal matter, keeping the plant running is a year-round venture. One of the biggest challenges is finding parts for the equipment. Woodworth looks to Motion Industries in nearby Marinette for replacement parts such as bearings and seals. Beyond that, “Given the size of the city, it can be difficult to maintain a good equipment replacement fund. You have to know your limitations on how much you can repair and when to replace.”

But Woodworth and Filz do more than maintain the status quo — they look for ways to make things run better. For example, four years ago, Woodworth had booster pumps (Dakota Pump) installed to deliver final effluent for reuse in washing the fine screen and the biosolids press. That saves about

2.2 million gallons of potable water a year, worth \$9,000 at residential rates.

The team has tackled energy conservation, too. The Triton aerators replaced older, less efficient models and cut power costs substantially. A \$22,000 grant from Focus on Energy, an energy-saving and renewable energy program sponsored by Wisconsin’s utilities, helped pay for the \$76,000 project.

In addition, last year Woodworth shut down the plant’s north pair of aeration basins and north final clarifier, since the south pair and its clarifier can handle typical loads. “We’re saving electricity, because that’s four aerators

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The staff at the Oconto Wastewater Treatment Plant includes, from left, Jeremy Wusterbarth, public works superintendent; Steve Woodworth, lead operator; Lisa Weigelt, lab director; and Adam Filz, operator.



“As part of Public Works, all of us do everything. We go out and plow snow, work on construction, anything that’s needed. It’s a group effort.”

**STEVE WOODWORTH**

and a final clarifier that we’re not using,” says Woodworth. “We can always fire up the north side if the flow increases.”

An \$8,000 lighting upgrade project replaced incandescent lamps with efficient T-8 fluorescent lighting throughout the treatment plant. The team has also replaced older motors throughout the facility with high-efficiency models.

Outside the treatment plant, Woodworth’s team takes care of 42 miles of collections system and 13 lift stations. Upgrades to the sewers have eliminated most of the original clay pipe; the vast majority now consists of concrete and PVC. The team uses a Vactor combination truck for routine jetting and cleaning.

The water distribution piping is also in generally good condition, consisting of mainly PVC and ductile iron. “Last winter, as cold as it was, we only had one main break caused by frost,” says Woodworth.

## A STRONG TEAM

Woodworth credits much of the water and sewer systems’ success to his



Woodworth spearheaded changes to improve performance and efficiency in the plant's aeration process.



## NOT THE GREATEST TIMING

It wasn't all smiles when Steve Woodworth won a 2014 Operator of the Year award from the Wisconsin Wastewater Operators Association (WWOA).

"The week of the WWOA conference [Oct. 7-10], I wasn't even planning to go," says Woodworth, operator-in-charge of water and wastewater with the City of Oconto. His father, former Oconto police chief Oren Woodworth, died the Saturday before.

On the Monday before the conference, Woodworth went to Jeremy Wusterbarth, superintendent of Public Works. "I told him, 'I'll be taking off this week.' The funeral was scheduled for Wednesday. He asked if I was going to the conference.

"I said, 'No, I'm not going to any of it.' And he said, 'Well, you have to go to the banquet.'

"I asked why. Then he told me he had nominated me and I had won the award. I said, 'OK, I guess.' It was a bittersweet time."

team: "We work very well together. They're all hard-working, very knowledgeable people. After being here so long, I know all the history. They come to me with the 'Do you remember ...' questions. It's good to know that when I retire, I won't have to worry about the place."

Filz, hired three years ago, is a licensed plumber whose family is in the plumbing business. "He handles the dewatering press process," says Woodworth. "He already has almost all his certifications. He's very ambitious."

Weigelt has 25 years of experience and is a certified operator with an advanced lab classification. Loberger brings electrical expertise gained from working with area industries. Beekman, a former summer employee at the plant, owns a mechanical engineering degree from the University of Wisconsin-Platteville.

Wusterbarth praises Woodworth's leadership skills: "He does a tremendous job with his team, talking through issues with them when necessary. He does a terrific job of communicating with the employees, and with me."

Challenges do remain. An engineering study commissioned last year looked at changes the treatment plant may need to operate efficiently for

another 25 years. "Steve has played and will continue to play a big role in that," Wusterbarth says. Further aeration improvements are likely to be on the agenda.

And then there's the challenge of keeping up with regulatory requirements. Woodworth doesn't expect any tightening of the effluent phosphorus limit in a new permit from the state Department of Natural Resources, expected later this year.

He does need to address mercury. "We have asked the DNR for a variance from our mercury limit of 1.6 micrograms/liter," he says. "What we have to do for that variance is create a pollution minimization program."

That means visiting potential mercury sources in the community — dental and medical offices, industrial facilities, heating and air conditioning businesses, automotive shops — to make sure any mercury they handle is disposed of properly. It also means developing a community recycling program for used fluorescent lighting. "Oconto isn't very

big, but it's still a challenge for us to do all that with the manpower we have," Woodworth says.

## COUNTING THE REWARDS

Looking back on his career, Woodworth is grateful for the chance to be of service: "My dad [Oren Woodworth] served the city for years. He was the police chief. I grew up knowing what it meant to work for the city. I'm glad to have the opportunity to do so. People know they can call me, and I can usually help them out.

"A lot of people don't realize there are careers in water and wastewater. The pay is good, and with the state retirement program you can definitely have a good pension by the time you retire. It's also an interesting career because of the way the rules and regulations change, and everything you have to know about the industry.

"Looking back, I don't think I would do things any different. I don't know where I'd be if I had ended up as a meat cutter all these years — a lot more arthritis probably. It's been a rewarding career." **tpo**

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# Beyond the Minimum

VIRGINIA'S TOWN OF WOODSTOCK EXPECTS FAST POPULATION GROWTH AND HAS PREPARED ITS CLEAN-WATER FACILITY THROUGH CAPITAL EXPANSION AND EMPLOYEE DEVELOPMENT

By Ann Stawski

**K**nown as the Star on the Shenandoah, Woodstock is Virginia's fourth oldest town, nestled in the Shenandoah Valley. With a population of 5,200, the town has been challenged to prepare for growth.

Besides building and upgrading facilities and technology, the town has invested substantially in training and developing its staff in all departments, including water and wastewater. It's part of a strategic plan that aims to foster high-quality services.

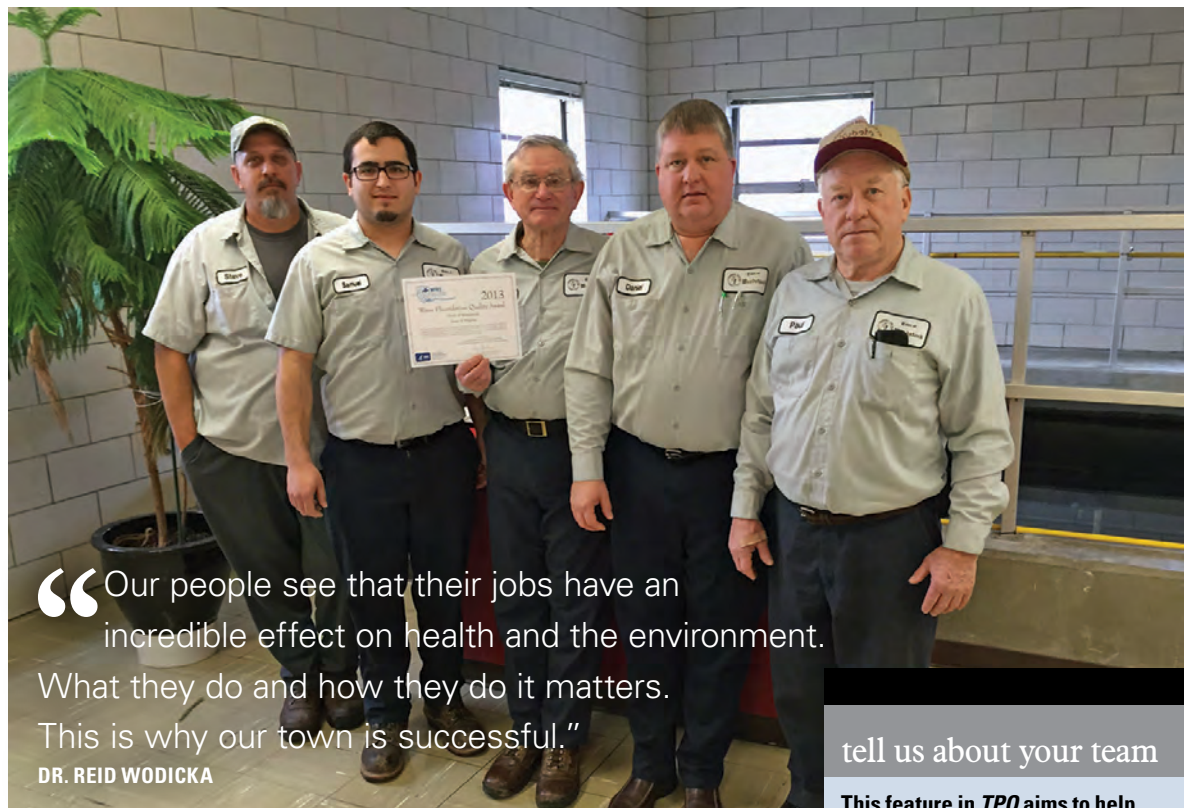
Among the community's investments is a new clean-water plant, built in the mid-2000s to comply with Virginia's tightening nutrient removal standards and an anticipated build-out of 1,800 additional homes. "When we sat down to design the facility, we wanted to meet nutrient removal requirements but have enough capacity for the anticipated growth," says James Didawick, superintendent of Public Works.

The original 20-year-old extended aeration oxidation ditch facility was outdated. Unable to upgrade it to newer technology, the town began engineering a new plant in 2005 and five years later completed a new \$31 million, 2 mgd membrane bioreactor facility, helped by a \$12 million grant from the state Department of Environmental Quality.

## STRATEGIC PLANNING

Dr. Reid Wodicka took over as town manager in 2012 and ordered a complete operations and policy review to identify opportunities for improvement. "We don't look at the town as individual departments but as one entity working toward the goal of providing high quality public service," he says. "This means everyone from police to water to administration needs to operate in the same way with the same goals."

The town enacted a six-year strategic plan based on input from all departments. Each department head presented objectives to the town council. Together the groups identified common themes, established goals, and set standards for a positive economic and work environment.



“Our people see that their jobs have an incredible effect on health and the environment. What they do and how they do it matters. This is why our town is successful.”

DR. REID WODICKA

The Town of Woodstock Water Treatment Plant staff includes, from left, Steve Long, Samuel Dinges, Charles Weaver, Daniel Bailey and Paul Nesselrodt.

“We want to attract and retain the best employees,” says Wodicka. “While this applies to our entire town, each department has accountability to implement training and processes to build its team. This ultimately better serves our residents.”

## UPGRADING THE TEAM

Didawick's role in strategic planning was to define goals for the water and wastewater staff and facilities. While training was not new to his department, Didawick took it a step further, formalizing a weekly wastewater treatment training program on a quarterly schedule. While he keeps the schedule flexible to account for operational issues and weather, the team typically assembles on Wednesday afternoons.

“We train in every aspect of the treatment process, from lockout/tag out to air line inspection, from personal protection to operating machinery,” says Didawick. “With our training, the operators gain better general knowledge

tell us about your team

This feature in *TPO* aims to help clean-water plant leaders develop strong, cohesive operating teams. We welcome your story about team-building at your facility.

Send your ideas to [editor@tpomag.com](mailto:editor@tpomag.com) or call 877/953-3301



ABOVE: Team members like Paul Nesselrodt, water treatment plant operator, benefit from extensive training. BELOW: Operators Ed Presley, left, and Richard “Doc” Lambert have achieved Class 1 (highest) certification, which is the expectation for all Town of Woodstock staff members.



of everything, and then they improve the general knowledge with more specific knowledge.”

The wastewater treatment facility employs a chief operator, an assistant chief, three operators and two maintenance technicians. The 2 mgd conventional surface water treatment plant has a chief operator, an assistant chief and three operators.

A key to Didawick’s program is that the staff does the training. Members rotate through the schedule, each person presenting on one area to the rest of the team. After a year and a half, the results are positive, Wodicka observes: “They’re a knowledgeable staff, and Jim took advantage of what they know. Having the staff conduct the training makes the team stronger.”

### FIRST CLASS ONLY

While overseeing development of his team’s skills and knowledge, Didawick also requires each operator to achieve Class 1 (highest) licensure. The Woodstock facilities are licensed Class 2, but Didawick sees no reason team members should only meet the minimum requirements. “I want our facilities to operate in the best way possible,” he says. “Class 1 licensing helps us produce a higher-quality product.”



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Today, all have achieved Class 1 except the newest hire, who is on his way. Wodicka believes the higher standards make the jobs more interesting: “Our people see that their jobs have an incredible effect on health and the environment. What they do and how they do it matters. This is why our town is successful.”

Another upgrade includes a cloud-based computerized work order system. The team is well satisfied with the system, used at both facilities to track maintenance. “FacilityDude is a great program that’s user-friendly, straightforward and simple, and the data is stable,” Didawick says. “Everyone has access to the same data real-time.”

The facilities also use electronic instruments. Operators pay close attention to flows to monitor inflow and infiltration. “We use the flowmeters to monitor data,” Wodicka says. “By using statistical methods, we immediately identify areas of concern. We have a remediation plan in place and are ready to go when it rains hard and our system reaches or exceeds capacity.”

### LOOKING AHEAD

Staff training and improved systems make Woodstock’s operators better at what they do. Didawick enrolls team members in the California State University water and wastewater training programs. He also sends them to Virginia Tech for weeklong water and wastewater operation courses. “We want to promote from within,” he says. “Using what works well and then tweaking our training helps get our team to the next level.”

Wodicka observes, “Not every town or city has the positive working environment that we do. We’ve been able to implement the strategic plan because we’ve worked hard to enlist the support of the town council and elected officials. We’ll continue to encourage our team members to put their best work forward.” **tpo**

# Water Metering: 4 Trends to Watch

INNOVATIVE TECHNOLOGIES ARE OPENING NEW DOORS FOR WATER UTILITIES LOOKING TO DEPLOY METERING AUTOMATION WHILE LIMITING CAPITAL INVESTMENTS AND SERVING CUSTOMERS BETTER

By Kristie Anderson

In today's water and wastewater industry, water metering technology is important. Recent years have brought many advances in metering that can help water utilities more efficiently measure, monitor and analyze their resources.

As utilities apply technology to their initiatives and improve operations, four key innovations stand out. A managed solution approach plays an integral role in making these technologies accessible, user-friendly and cost-effective.

## 1. MANAGED SOLUTIONS

A study by Zpryme and the Smart Water Summit (*2014 U.S. Smart Water Utility Report*) surveying 75 U.S. utilities found that the most important technologies for smart water systems include smart meters (cited by 76 percent of respondents), data and analytics (69 percent) and meter data management (MDM) systems (55 percent). As shown by this study, utilities continue to adopt advanced metering infrastructure (AMI) and advanced metering analytics (AMA) for improved, data-driven decision-making.



Cloud-based meter data management systems, such as the BEACON AMA managed solution, offer effective yet intuitive software for water utilities.

While this technology evolution can provide great benefits, it has typically presented new operational challenges, especially related to the management of AMI communications infrastructure and analytics software and hardware. Moreover, as documented in the Zpryme study, 56 percent of utilities did not plan to hire new technology personnel in the near future. To address technology skill gaps in these workforces, newer business models and more intuitive technologies are making the step to AMA far easier.

Seeing the need for better customer service, increased analytics reporting and more efficient operations, utilities are turning to end-to-end, managed solutions to help meet their MDM needs. Features of this approach include:

- Built-in infrastructure management services to keep pace with rapid changes in technology
- Hosted cloud-based software suites
- Built-in customer service tools

In a provider-managed, cloud-based system, the solutions provider takes charge of system operation and maintenance beyond the meters and meter communications endpoints. The managed solution model provides a flexible approach that reduces the resources needed to operate and maintain the meter reading system, freeing personnel to support other critical areas of operations. Further, today's systems allow utilities to set alerts that help monitor potential problems and determine, for example, when to roll a truck and when not to, thus optimizing staff time and saving money.

## 2. CLOUD-BASED SOFTWARE

Web-based software services (cloud computing) are a key component of many managed solution models. Known for convenience and efficiency, cloud platforms are being applied globally by nearly all types of organizations, including water utilities. Cloud-based software can bring rapid and diverse changes in how utilities operate and use data. Cloud computing can be a viable alternative to investing in server-based MDM systems. Cloud-based platforms share several characteristics:

- Quick deployment
- Freedom from hardware purchases

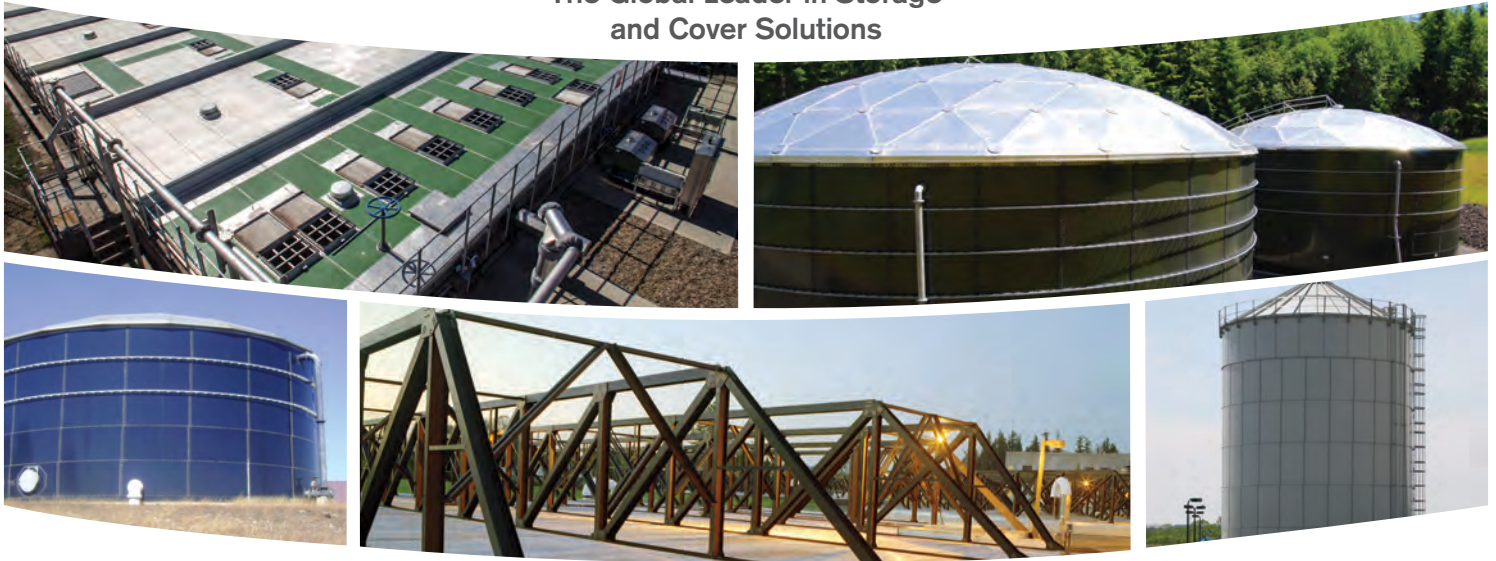
(continued)



The ORION Cellular Endpoint uses cellular network technology so that utility-owned fixed-network infrastructure is not needed. This speeds deployment and limits maintenance.

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- Automatically implemented software updates
- Rapid elasticity or expansion as needs change
- Subscription pricing, providing a pay-as-you-go option
- Expert maintenance of the system, allowing utilities to focus on their core competency

These characteristics allow organizations to build IT resources rapidly, making it easier and less costly to adapt to changing requirements. The software applications are hosted by the solutions vendor in secure data centers. The utility simply uses personal computers to access the software via the Internet. Hosting software and data off site also leaves critical metering data less susceptible to natural disasters.

Historically, MDM systems required software updates and, on occasion, completely new versions. With increased functionality, more users may require access, meaning more licenses to purchase. However, with cloud-based systems, software is automatically updated by the solutions provider, and the costs are included in the base subscription. This means the utility can enjoy the most advanced features without added cost or effort.

### 3. CELLULAR METERING

Another advance in metering technology is the use of cellular metering endpoints for systemwide communications. The use of cellular technology for AMI isn't new but is being used in a new way for water metering.



With management apps such as EyeOnWater, customers can track their usage against other homes, receive personalized tips and a savings calculator, and enable a leak-alert function.

In the past, cellular was used to communicate small amounts of data within AMI systems, typically requiring gateways to communicate the data back to the hosted environment. Thus if a utility wanted to deploy a system immediately, it would have to find locations for gateways, get approval to install them, run electricity to them and clear various other hurdles.

Cellular endpoints erase those concerns. Through reliance on existing cellular networks, cellular endpoints can minimize capital investments by reducing or eliminating reliance on traditional network infrastructure. Especially when included as part of a managed solution, cellular endpoints have become a cost-effective and easy way to take advantage of smart metering.

Because of their flexibility, installations using cellular endpoints can efficiently meet almost any application need, from quick deployment of targeted implementations to full-scale roll-outs. Cellular networks are also proven safe and secure. After a natural disaster, cellular networks are typi-

cally the first to be restored, especially because emergency services need to use them to coordinate responses.

With cost as a top concern, more utilities will capitalize on the benefits of new cellular technology. In fact, a recent IHS Technology report, *Water Meters Report – 2014*, forecasted that cellular-enabled water meter shipments would grow rapidly in North America as utilities look to minimize capital investments. In some cases, the most cost-effective solution is a utility-owned fixed network. In others, cellular endpoints help minimize communications infrastructure and enable the best, most cost-effective AMI solution.

Through reliance on existing cellular networks, cellular endpoints can minimize capital investments by reducing or eliminating reliance on traditional network infrastructure. Especially when included as part of a managed solution, cellular endpoints have become a cost-effective and easy way to take advantage of smart metering.

### 4. PROACTIVE CONSUMER COMMUNICATIONS

Encouraged by an increased focus on customer service and efficiency, consumer engagement websites and smartphone/tablet apps continue to evolve. In today's on-demand world where consumers track nearly every aspect of their lives, water usage data available at the click of a button has proven appealing for customer-focused utilities looking to save money and resources.

In January 2014, one study estimated that 58 percent of American adults owned a smartphone and that 86 percent of the time spent on smartphones was spent on mobile apps. Seeing an opportunity to communicate proactively with customers beyond monthly statements, utilities are expected to explore these platforms. In the Zpryme study, 40 percent of respondents had plans to develop apps for residential and commercial customers. Features typically available through utility apps include:

- Graphics showing recent usage with a comparison against average usage
- Usage trends
- Detailed charting of historical usage
- A leak-alert function
- Recommendations to conserve water, with the ability to set up a customized profile to receive personalized tips and access to a savings calculator

Users can also set up profiles with specific criteria so that they can be alerted if they exceed their allotted monthly usage, or if the system detects a usage spike that could indicate a leak.

### THE FUTURE

Advances in technology mean water utilities can begin to enjoy all the benefits of AMI and AMA without previous operational and technology concerns. With implementation and management barriers removed, utilities can use these advances to provide greater visibility into water usage and better management of the water system, while improving customer service. Most important, today's solutions ensure that the decisions utilities make now will pay dividends well into the future.

#### ABOUT THE AUTHOR

*Kristie Anderson is the product marketing manager for Badger Meter, an innovator in flow measurement and control products based in Milwaukee, Wisconsin. She can be reached at [KAnderson@badgermeter.com](mailto:KAnderson@badgermeter.com). tpo*

### AWWA names president-elect

The American Water Works Association Board of Directors elected Jeanne Bennett-Bailey of Fairfax, Virginia, as the association's president-elect. The board also chose Steve Dennis, Jon Eaton, Martha Segal and Brian Steglitz as vice presidents and named Sally Mills-Wright director-at-large. An AWWA member since 1990, Bailey is the public affairs officer for Fairfax Water and chair of the AWWA Public Affairs Council. She begins her one-year term as president in June.

### Smith & Loveless acquires Schloss Engineered Equipment

Smith & Loveless acquired the assets of headworks equipment designer Schloss Engineered Equipment, of Aurora, Colorado. Schloss products will be incorporated into Smith & Loveless' municipal, industrial, aftermarket and international sales divisions. The company will be relaunched as Schloss Environmental Equipment.

### Sioux Corp. becomes ISO certified

Sioux Corp.'s quality-management system was certified to ISO 9001:2008 standards. The management system includes logging any nonconformance or customer concern and a weekly management team review. Sioux also performs internal audits of all departments, including receiving, fabrication, welding, paint, assembly, testing, packaging, engineering, sales, purchasing, human resources and management.

### APWA names International Fellows

American Public Works Association (APWA), in association with the Eisenhower Institute at Gettysburg College, named Frank Pandullo, public works department utility and technical manager, Charleston, South Carolina, and Tom Jacobs, environmental director for the Mid-America Regional Council, Kansas City, Missouri, 2015 Jennings Randolph International Fellows. Pandullo and Jacobs will conduct public works study tours and make presentations at partner association meetings in the Czech Republic, Slovak Republic and New Zealand.

### Graphic Products offers OSHA safety report

Graphic Products offers a complimentary training guide and report on OSHA's top 10 safety violations. The report is available at [www.graphicproducts.com](http://www.graphicproducts.com) or by calling 877/534-5157.

### Safety Today launches websites

Safety Today launched its website for customers in the United States, [www.safetytoday.com](http://www.safetytoday.com), and sister site for customers in Canada, [www.safetytoday.ca](http://www.safetytoday.ca). Product libraries on each site are presorted in line with relative national standards, including the American National Standards Institute (ANSI) and CSA International (Canadian Standards Association). The site also includes an overview of available safety training initiatives.



### WAMGROUP acquires Enviro-Care

WAMGROUP, headquartered in Modena, Italy, acquired Enviro-Care of Rockford, Illinois, provider of custom engineered screening and grit/solids handling equipment since 1972.

### Grundfos offers wastewater mixing guide

Grundfos offers practical and technical installation tips, use of flow mixers and recommendations for the design of wastewater mixing systems in its 65-page handbook, available from any regional Grundfos office.

### Red Valve renews ISO certification

Red Valve Company of Carnegie, Pennsylvania, renewed its ISO certification. Red Valve has been ISO 9001:2008 certified since 2012. **tpo**

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The renovation of the Dubuque Water & Resource Recovery Center included a new administration and laboratory building with a heating and cooling system that uses effluent heat recovery.

# Built to Be Sustainable

AN IOWA CITY'S \$38 MILLION FACILITY RENOVATION INCLUDES COMBINED HEAT AND POWER, BIOSOLIDS REUSE, EFFLUENT HEAT RECOVERY, WATER-SAVING LANDSCAPING AND MORE

By Doug Day

When leaders in the Iowa city of Dubuque began seeking proposals for a wastewater treatment plant upgrade, they made one thing clear.

“The RFP clearly stated that the facility must meet the city’s sustainability principles,” says Jonathan Brown, plant manager of what is now called the Dubuque Water & Resource Recovery Center. Those 12 principles, adopted in 2006, guided the planning for a 38-month, \$68 million renovation.

The project added biogas recovery and improved biosolids handling by converting from fluidized bed incineration to temperature-phase anaerobic digestion. UV disinfection (OZONIA) replaced chlorine. Work on the 1970s-era, 10 mgd plant was completed in May 2014 using plans developed by Strand Engineers and IIW Engineers.

“Farmers in Iowa have been using biosolids for generations. They understand the value. There are places in Iowa getting 10 to 15 percent increase in yield, and the soil is better at withstanding drought.”

**JONATHAN BROWN**

## COMBINED HEAT AND POWER

The switch to anaerobic digestion enabled the facility to harness biogas for digester heating and electricity generation. The combined heat and power system is from Unison Solutions, headquartered in Dubuque and local dealer for the three 200 kW Capstone microturbines. The draft tube mixers and digester covers were supplied by Ovivo, and the sludge heat exchangers came from CleanTek Water Solutions/Lackeby Products.

“We have good digesters that produce almost 70 percent methane in our biogas, which is higher than normal,” says Brown. There is room for two more turbines in the modular CHP system, which already generates about 80 percent of the plant’s needs — some 530 kW of the 650 kW demand on a typical day. That saves about \$250,000 a year in the plant’s \$3.5 million annual budget and provides long-term cost stability.

The plant added a septage receiving station and is looking at other options to increase biogas production. Two nearby biodiesel plants already deliver high-strength waste, and Brown is negotiating with a food processing plant and a firm that manufactures gelatins. “We’d get a little revenue and produce extra methane, and they would save money on trucking costs,” he says.

Also under consideration is a food scrap program to help keep that material out of landfills, where the methane it creates gets into the atmosphere. “We’ve done some preliminary investigation,” says Brown. “We’re also looking at using methane for biofuel production because the city is considering converting some of the vehicle fleet to biofuel. We already have about 85 percent of the infrastructure needed at the plant.”



PHOTOS COURTESY OF DUBUQUE WATER & RESOURCE RECOVERY CENTER

With headquarters in Dubuque, Unison was a natural choice to supply a biogas recovery system, including this gas conditioning unit and gas holding covers for the digesters. The biogas system generates about 80 percent of the plant’s electricity and heats the digesters.





## MORE THAN A NAME CHANGE

The Dubuque Water & Resource Recovery Center used to be called the Water Pollution Control Plant. As part of its rebuilding, the name was changed to reflect its new focus on sustainability.

Jonathan Brown, plant manager, uses a Latin phrase to explain the name change: “*Aqua est vita*. Water is life. Resources are those other things we need for life. Recovery is bringing those resources back for our use. Center, the place where it all happens.”

The plant’s role in the community goes beyond protecting public health and the environment. “As long as we’re doing that, let’s see if we can extract some more good out of it,” Brown says. “We’re taking material that other people want to get rid of and making something useful out of it. And we’re taking dirty water that people have thrown away and making nice clean water that we can safely return to the environment.”

The city’s 12 sustainability principles fall under three categories:

- **Economic prosperity:** Community design, smart energy use, resource management, regional economy
- **Environmental and ecological integrity:** Clean water, healthy air, native plants and animals, reasonable mobility
- **Social and cultural vibrancy:** Community knowledge, green buildings, healthy local foods, community health and safety

## REUSE OF BIOSOLIDS

Biosolids that used to be incinerated — just over 5 tons per day of Class A material — are now used to fertilize corn and soybean fields. Distribution is contracted to Nutri-Ject Systems. “I didn’t want to get into the biosolid-hauling business,” says Brown. “Having a good company that knows how to talk to the neighbors and keep them informed so they’re not overly concerned goes a long way toward making things simple.

“Farmers in Iowa have been using biosolids for generations. They understand the value. There are places in Iowa getting 10 to 15 percent increase in yield, and the soil is better at withstanding drought. For where we are, a smaller city in a heavy agricultural state, it was the most environmentally sound in the long run.”

## KEEPING IT GREEN

The plant recovers more than biogas and biosolids: An ENERGY STAR

administration and laboratory building includes an effluent heat recovery system for heating and cooling. The effluent, at 50 and 64 degrees F, feeds 17 water source heat pumps (McQuay).

“This was just an addition to the plumbing system,” notes Brown, who is president of the Iowa Water Environment Association. “We had process water pumps throughout the plant for seal water, the accumulators, centrifuge cleaning, rotary drum thickeners, and washing the grit and screening systems.” It did require the addition of a filtering unit.

Other work across the plant included a new SCADA system, a new primary clarifier, grit removal equipment and odor control covers for the four



Biosolids, once incinerated, now serve as a farm soil amendment. Nutri-Ject Systems spreads the material on farm fields that grow corn and soybeans.

primary clarifiers. Landscape features added for sustainability and cost savings include a pair of 2,000-square-foot rain gardens, native plants and flowers, and no-mow grass that needs little, if any, watering.

It was a big change for Brown, who has been plant manager for 10 years after starting his career there as a lab technician on graduation from college in 1972. “I’ve seen what has been accomplished and see the work that needs to be done,” he says. “I’m not sure that if you’re 25 years old you can understand how dirty this world used to be. It’s pretty remarkable how things have changed.” **tpo**

## What’s Your Story?

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



**Like something? Hate something? Agree? Disagree?**

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# Odor Control and Disinfection

By Craig Mandli

## Activated Carbon Systems

### IMTEK ENVIRONMENTAL NOODOR SMELLRID

NoOdor SmellRid reusable activated carbon smell-remover pouches from ImTek Environmental use moso bamboo charcoal to eliminate strong odors at the source. This sustainable highly porous material absorbs harmful odors and indoor air pollutants. It is available in four sizes designed to treat 300-, 150-, 45- and 20-square-foot spaces. Just place the lightweight pouches near the odor. Pouches are portable and need no power source. They are reusable and can be reactivated in direct sunlight, providing years of odor removal. **888/866-6367; [www.noodor.com](http://www.noodor.com)**.



NoOdor SmellRid pouches from ImTek Environmental

### JACOBI CARBONS ADDSORB OX30



AddSorb OX30 from Jacobi Carbons

AddSorb OX30 from Jacobi Carbons can be used for the control of odors such as hydrogen sulfide, mercaptans, methyl sulfides and VOCs from air emissions. Made from a blend of raw materials as an extruded pellet, it is designed as a high H<sub>2</sub>S-capacity product while maintaining ideal VOC adsorption capabilities. The pelletized form affords a low pressure drop and is free of chemical impregnants, ensuring thermal stability in sensitive applications. **215/546-3900; [www.jacobi.net](http://www.jacobi.net)**.

### WESTECH ENGINEERING GAC PRESSURE FILTERS

Granular activated carbon (GAC) pressure filters from WesTech Engineering help remove low-molecular-weight contaminants from aqueous solutions. They help remove dissolved organic compounds responsible for poor taste and odor in drinking water and chlorine from industrial waters. When used as pretreatment equipment, they can prolong the life and efficiency of demineralizing ion-exchange resins and reverse osmosis membranes. They use a pressure vessel, typically with a conical underdrain for GAC media replacement. They are sized according to the contact time required for contaminant removal and desired media replacement frequency. Filter piping and valving for multiple units can be arranged to change flow paths between parallel, series (lead/lag or daisy chain) or single-unit flow patterns. Filters are typically backwashed upon new media installation, and the media usage front is then monitored via sample taps to allow for anticipation of media replacement. **801/265-1000; [www.westech-inc.com](http://www.westech-inc.com)**.



Granular activated carbon (GAC) pressure filters from WesTech Engineering



Turbo X-Treme Magnum floating/surface aerator from Airmaster Aerator

## Aeration Equipment

### AIRMASTER AERATOR TURBO X-TREME MAGNUM

The 50 hp Turbo X-Treme Magnum floating/surface aerator from Airmaster Aerator can pump 12.5 mgd. In operation, it raises the dissolved oxygen level in the water (in ponds, lagoons, etc.) while providing high-capacity water movement. An optional chemical injection port for adding enzymes and defoamers is available. Constructed of stainless steel, the unit is built for reliable, long-term operation. **888/813-3680; [www.airmasteraerator.com](http://www.airmasteraerator.com)**.

## Biofiltration

### DUALL BIO-PRO

The BIO-PRO biological odor control system from DUALL, a CECO Environmental Company, can be used to remove H<sub>2</sub>S and reduce sulfur compound odors. It uses Bio-AirSPHERE media technology, a combination of synthetic and organic medias that provides the proper environment for promoting bacteria growth to eliminate odorous compounds. The system removes more than 99 percent of H<sub>2</sub>S and more than 90 percent of RSC. Available construction materials include PVC, DUALLast FRP and concrete. **989/725-8184; [www.dualldiv.com](http://www.dualldiv.com)**.



BIO-PRO biological odor control system from DUALL, a CECO Environmental Company



ZABOCS Bio-Trickling Filter system from Evoqua Water Technologies

### EVOQUA WATER TECHNOLOGIES ZABOCS BIO-TRICKLING FILTER

The ZABOCS Bio-Trickling Filter system from Evoqua Water Technologies can be designed to treat up to 15,000 cfm of odorous air per tower and to handle high H<sub>2</sub>S concentrations of greater than 500 ppm with better than 9 percent removal. It uses random-packed polyurethane foam cubes as the support for biomass growth. The media bed is continuously irrigated by circulating the sump liquid and nutrients over the media. Makeup water is added to maintain the pH of recirculating liquid, providing an optimum environment for the preferential growth of sulfur-oxidizing bacteria. The towers are fabricated from vinylester FRP, and each unit is equipped with a custom biofilter process controller and optional variable-speed drive for the fan. The optional two-stage system provides a neutral pH stage to promote better oxidation of VOCs and organic odors. **866/926-8420; [www.evoqua.com](http://www.evoqua.com)**.

## Chemicals

### BIO-MICROBICS MIGHTY MIKE BOND-SORB

Environmentally responsible, nontoxic, biodegradable and water-soluble Mighty Mike Bond-SORB Odor Eliminator from Bio-Microbics absorbs and destroys odors on contact. The industrial-strength, concentrated formula can be diluted a little or a lot depending on the severity of the malodor. It bonds and absorbs the malodor molecules with a natural biodegradation process that permanently neutralizes the odor and will not corrode, pit, oxidize or have harmful effects on any



Mighty Mike Bond-SORB Odor Eliminator from Bio-Microbics

surface of equipment or system. Ideal to eliminate unwanted odors from commercial processes, headworks screening, solid waste disposal, industrial processes and sludge process equipment, it can be used during maintenance procedures. **800/753-3278; [www.biomicrobics.com](http://www.biomicrobics.com)**



### BIOSCIENCE MICROCAT-ANL

MICROCAT-ANL odor-control bioformula, a liquid blend of preselected, adapted microorganisms for use under microaerophilic, anoxic or anaerobic conditions from Bioscience, has specialized microbes that reduce sulfides under anaerobic or anoxic conditions to elemental sulfur, which is occluded

**MICROCAT-ANL odor-control bioformula from Bioscience**

by the cells thus suppressing odors. It is formulated for use in sludge, compost, contaminated soils and wastewater to suppress H<sub>2</sub>S odors and enhance biodegradation and contaminant removal where oxygen is of limited availability. **800/627-3069; [www.bioscienceinc.com](http://www.bioscienceinc.com)**

### CHEMTRON SEWER FRESH

Sewer Fresh liquid odor neutralizer from Chemtron eliminates organic odors from waste residues. A special molecule selectively captures malodor molecules at contact and acts on organic aromatic and cyclic molecules like mercaptans, terpenes, amines, sulfides and ammonium. It can be used in combination with enzymes, is environmentally safe and leaves a pleasant fragrance. To apply, spray a fine mist over the whole surface exposed to undesired odors. It can be fogged on maceration ponds, lift stations, manholes, drains, sewer collector trucks, garbage containers, walls and soft surfaces, including carpets and fabrics. It can be used by metering a set amount of 8 ounces per 100 gallons of water to flowing waste sludge. **954/584-4530; [www.chemtron.com](http://www.chemtron.com)**



**Sewer Fresh liquid odor neutralizer from Chemtron**

## Chlorination/Dechlorination



### CHLORINATORS INCORPORATED REGAL GAS CHLORINATOR

The REGAL Gas Chlorinator from Chlorinators Incorporated uses 100 percent chlorine, providing a consistent chlorine residual without creating bromates, chlorates and perchlorates. It is directly mounted on a cylinder or ton container with a strong yoke. It is assembled by hand, thoroughly tested, and is easy to maintain and clean. It uses 100 percent gas chlorine and lowers energy and chemical costs. **772/288-4854; [www.regalchlorinators.com](http://www.regalchlorinators.com)**

**REGAL Gas Chlorinator from Chlorinators Incorporated**

It uses 100 percent gas chlorine and lowers energy and chemical costs. **772/288-4854; [www.regalchlorinators.com](http://www.regalchlorinators.com)**

### ELECTRO-CHEMICAL DEVICES DC80

The plug-n-play DC80 dechlorination analyzer from Electro-Chemical Devices uses a zero-shift method to provide accurate measurement and protect total chlorine sensors from damage. It monitors chlorine from 0.05 to 20 ppm and includes built-in flow control. Automatic pH compensation for samples between 4 and 12 pH eliminates the need for reagents. It has a three-electrode amperometric sensor with a gold cathode, silver halide anode and 304 stainless steel counter electrode. The counter electrode provides a stable base potential that minimizes drift. The total chlorine sensor



**DC80 dechlorination analyzer from Electro-Chemical Devices**

The counter electrode provides a stable base potential that minimizes drift. The total chlorine sensor

has a microporous membrane that allows ions to diffuse in and out of the sensor, and graphically displays both the total chlorine and pH levels for easy trend analysis. It is available with either 110-240 VAC or 24 VDC power. **800/729-1333; [www.ecdi.com](http://www.ecdi.com)**



### FORCE FLOW/HALOGEN CHLOR-SCALE

**Chlor-Scale ton container scale from Force Flow/Halogen**

The Chlor-Scale ton container scale from Force Flow/Halogen safely cradles a chlorine ton container while providing feed and chemical inventory information. It enables operators to know in

real time exactly how much chlorine has been fed and how much remains in the tank. It warns of excessive or insufficient feed rates and remotely monitors from a PLC or SCADA system. Its Eclipse emergency valve shut-off system instantly closes the container valve when a signal is received from a leak detector, panic button or from SCADA. The actuator quickly installs on the tank without the use of any tools and allows manual operation of the valve while in place. **925/893-6723; [www.forceflow.com](http://www.forceflow.com)**

### HF SCIENTIFIC CLX

The low-maintenance CLX online residual chlorine monitor from HF scientific is ideal for municipal, chemical or industrial processes that require continuous monitoring and control of residual



**CLX online residual chlorine monitor from HF scientific**

free or total chlorine levels. It has user-selectable cycle times, 4-20mA and RS-485 with Modbus output that can be used to control feed pumps, and user selectable alarms that allow complete manual or automatic control of chlorine dosing. It is housed in a strong, shatterproof case with easy access to all service functions and reagents. It allows for unattended operation and low chemical usage. **239/337-2116; [www.hfscientific.com](http://www.hfscientific.com)**



**Winklepress WPN belt filter press from Alfa Laval Ashbrook Simon-Hartley**

## Covers/Domes

### ALFA LAVAL ASHBROOK SIMON-HARTLEY WINKLEPRESS WPN

The Winklepress WPN belt filter press for wastewater sludge dewatering from Alfa Laval Ashbrook Simon-Hartley has an enclosed frame design that reduces odor emissions, making it a popular choice among wastewater plants in more heavily populated areas. It improves performance and lowers energy consumption and polymer costs. Three model sizes are available, with optional extended zones. **866/253-2528; [www.alfalaval.us/wastewater](http://www.alfalaval.us/wastewater)**

### CLEARSPAN FABRIC STRUCTURES HD BUILDING

HD Buildings from ClearSpan Fabric Structures are available in gable- and round-style designs. They can be mounted as a freestanding structure or affixed to other foundations. The buildings, beginning at 25 feet wide, have a triple-galvanized structural steel tubing frame and 12.5-ounce high-density polyethylene rip-stop fabric cover. **866/643-1010; [www.clearspan.com](http://www.clearspan.com)**

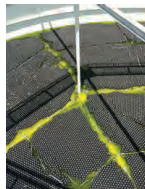


**HD Buildings from ClearSpan Fabric Structures**

(continued)

### ECC FLOATING BIRD BALL BLANKET

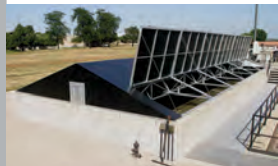
Floating bird ball blankets from Environmental Controls Company (ECC) help solve difficult liquid storage problems. Hollow plastic balls placed on the surface of a liquid automatically arrange themselves into a close-packed formation to cover 91 percent of the surface area. **910/245-2241; www.eccllc.us.**



**Floating bird ball blankets from Environmental Controls Company (ECC)**

### ENVIRONETICS DEFENDER TANK COVERS

Defender Tank Covers from Environetics are constructed from structural aluminum frames with integrated reinforced geomembrane cover panels custom manufactured from industrial-grade materials to fit the profile of new or existing wastewater treatment or pota-



**Defender Tank Covers from Environetics**

ble water tanks. The covers contain volatile organic compounds at their source. Low-profile structurally supported covers minimize emission treatment volume to reduce the cost of air filtration equipment and eliminate UV light penetration to prohibit algae growth. They eliminate the ongoing expense of applying costly odor control chemicals through atomizer and misters. They install quickly and easily. **815/838-8331; www.environeticsinc.com.**

### FIBERGRATE COMPOSITE STRUCTURES COVERED GRATING

Fiberglass reinforced plastic (FRP)-covered molded grating from Fibergrate Composite Structures is used for walkways over tank tops and vats, providing an odor control solution for water and wastewater treatment facilities. It offers a long service life through a combination of corrosion resistance, worker safety and low maintenance. It consists of a gritted FRP plate cover secondarily affixed to a molded grating panel. It has UV resistance, non-conductivity and impact absorption. The lightweight properties also allow for easier, more efficient installation. **800/527-4043; www.fibergrate.com.**



**Fiberglass reinforced plastic covered molded grating from Fibergrate Composite Structures**

### JDV EQUIPMENT LEVEL LODER

The LEVEL LODOR cover system from JDV Equipment Corporation helps contain odors by covering standard dump containers used for hauling processed material. The design allows for even distribution, increasing the fill percentage without manually evening out material. Enclosing containers allows outdoor



**LEVEL LODOR cover system from JDV Equipment Corporation**

installation without exposing material to the environment or pests. **973/366-6556; www.jdvequipment.com.**

### MPC CONTAINMENT PETROGARD VI

PetroGard VI geomembrane odor-control floating covers from MPC Containment help control odor produced by methane gases, reduce or eliminate algae, and allow for temperature control and sta-



**PetroGard VI geomembrane odor-control floating covers from MPC Containment**

bility. They have a base fabric weight of 7.5 ounces, giving it a high puncture resistance and allowing it to withstand harsh environments. All floating covers are custom designed to meet individual facility needs. **800/621-0146; www.mpccontainment.com.**

### PAXXO LONGOFILL

The Longofill continuous bag system from Paxxo can connect to the discharge point of machines used to move, dewater or compact screenings, grit and biosolids. Material is then deposited in a 90-meter-long continuous bag for odor containment and spillage control. The cassette bag is easy to seal, and the material and odors are trapped inside, cutting down development of bacteria and fungus spores. **770/502-0055; www.paxxo.us.**



**Longofill continuous bag system from Paxxo**

### SIMPLE SOLUTIONS WOLVERINE MEGA T

The Wolverine Mega T (MT-20) odor filter from Simple Solutions Distributing provides odor control for air flows up to 20 cfm and can be used on lift station wet wells, sewer line vents or anywhere a vented air stream is present. Its cross-flow design and catalytic-activated carbon media provide years of trouble-free operation. It is available with an optional saturation indicator to let a maintenance crew know when it is time to service the filter before odor complaints begin.



**Wolverine Mega T (MT-20) odor filter from Simple Solutions Distributing**

**866/667-8465; www.industrialodorcontrol.com.**

### Detection Equipment

#### ARIZONA INSTRUMENT JEROME 651

The Jerome 651 fixed hydrogen sulfide detection system from Arizona Instrument is capable of reading hydrogen sulfide levels as low as 3 ppb and reports all data to a centralized monitoring location. To pinpoint the source of hydrogen sulfide emissions, just remove the Jerome 631-X from the 651 housing and investigate. **800/528-7411; www.azic.com.**



**Jerome 651 fixed hydrogen sulfide detection system from Arizona Instrument**

#### EAGLE MICROSYSTEMS GD-1000 PREMIER SERIES

The Model GD-1000 Premier Series gas detector from Eagle Microsystems can detect a range of gases, including chlorine, ammonia, sulfur dioxide, ozone and methane. It is capable of responding to levels of gas in air over a multitude of ranges. The unit consists of an electrochemical gas sensor and a microprocessor-based alarm indicator unit. The sensor can be mounted in the area of potential leakage while the monitor remains in a safe area, protecting the operator from exposure to the gas leak. The operator is alerted to a leak by an audible alarm and flashing display on the indicator. The alarm-indicating unit can interface with up to two sensors, each of which can monitor the same or a different gas. It provides an isolated 4-20 mA dc output signal for recording or transmission to remote instrumentation or a computer. RS232 (std) and RS485 (opt) digital serial ports are available. **610/323-2250; www.eaglemicrosystems.com.**



**Model GD-1000 Premier Series gas detector from Eagle Microsystems**

## Distillation/Fluoridation Equipment

### BLUE-WHITE INDUSTRIES PROSERIES-M M-3

The ProSeries-M M-3 peristaltic metering injector pump from Blue-White Industries is designed for use in mid- to high-volume treatment applications. It can be used for metering chemicals that can vapor lock a pump with conventional check valves, such as sodium hypochlorite and hydrogen peroxide. It has a no-maintenance, brushless variable-speed motor and a 10,000-to-1 turndown ratio, with high-resolution motor speed adjustment. It has an operator-friendly digital touch pad, high-contrast backlit LCD, NEMA 4X IP 66 for washdown, and a built-in tube-failure detection system. Its single-piece heavy-duty rotor means no flexing and increased accuracy with no metal springs or hinges to corrode. It injects at maximum pressure clockwise and counterclockwise. It offers feed rates from .0002 to 158.5 gph, and pressures to 125 psi. **714/893-8529; www.blue-white.com.**



**ProSeries-M M-3 peristaltic metering injector pump from Blue-White Industries**



**MEC-O-MATIC T-2000 rapid-pulsing diaphragm metering pump from Pulsafeeder**

### PULSAFEEDER MEC-O-MATIC T-2000

The MEC-O-MATIC T-2000 rapid-pulsing diaphragm metering pump from Pulsafeeder provides a powerful misting system that delivers consistent doses of deodorizers and other solutions. It is designed with a stainless steel atomizing tip and solid brass body built in a durable, corrosion-resistant housing with a lockable latch, and is ready for easy wall or shelf mounting. It has a Stingray Series 275 diaphragm metering pump that provides positive displacement and adjustable feed rates with a capacity of 6 ounces per minute at 100 psi. It is powered by a lifetime lubricated, continuous-rated, heavy-duty motor. The 24-hour programmable day timer allows up to 48 settings per day. Doses can be adjusted from six seconds to nine minutes 54 seconds within each setting. **800/333-6677; www.pulsatron.com.**

### SEEPEX INTELLIGENT METERING PUMP

The programmable, precise, pulsation-free Intelligent Metering Pump (IMP) cavity-dosing pump from SEEPEX incorporates an electronic programming memory chip on which parameters can be preconfigured for simple plug-and-play installation. An operator can program an entire line of pumps within minutes without starting issues. Duplication of drive settings is quick and accurate. **877/806-4152; www.seepex.net.**



**Intelligent Metering Pump (IMP) cavity-dosing pump from SEEPEX**

## Microbiological Control



**BCP85 Compost Accelerator from Bionetix International**

### BIONETIX INTERNATIONAL BCP85 COMPOST ACCELERATOR

BCP85 Compost Accelerator from Bionetix International is a blend of bacteria, yeast, enzymes and nutrients to accelerate and optimize degradation of organic wastes. Microorganisms and nutrients enrich the material to be degraded and yield an enriched fertilizer. The prod-

uct provides microbial diversity for maturation and degradation of compost. It contains minerals, amino acids, peptides and vitamins for growth and metabolic activity of microorganisms, including bacteria, yeast and fungi, providing basic element nutrients often missing in organic waste. **514/457-2914; www.bionetix-international.com.**

## Ozonation Equipment/Systems

### BLUEINGREEN SDOX-CS

The SDOX-CS from BlueInGreen is used to supersaturate lines (both gravity and force main) with oxygen. Keeping a sufficient amount of oxygen in the line keeps sulfides from coming out of the solution. Oxygenating a line reduces odor and corrosion, and the wastewater receives pretreatment before entering the treatment facility. It is skid mounted, factory tested and ready for piping in and out. It can run off of liquid oxygen dewars or be used with oxygen generators. **479/527-6378; www.blueingreen.com.**



**SDOX-CS from BlueInGreen**



### FOX-CROFT EQUIPMENT & SERVICE CO. FX-CL-O

The FX-CL-O reagentless ozone analyzer from Foxcroft Equipment & Service Co. helps monitor and control dissolved ozone in real time. It is available with temperature-compensated sensors impervious to detergents and chemicals, or with sensors for potable water. No zero-point calibration is required. The low-maintenance unit includes 4.3-inch color touch-screen display and interface, configurable high/low alarm levels and delays, dry contact alarm relays, one 4-20mA output (up to four available), an RS485 serial port and microprocessor electronics with expansion capability. **800/874-0590; www.foxcroft.com.**

**FX-CL-O reagentless ozone analyzer from Foxcroft Equipment & Service Co.**

### KUSTERS WATER CSO TECHNIK TERMINODOUR

The Terminodour odor control system from CSO Technik, distributed in North America by Kusters Water, a division of Kusters Zima Corporation, effectively neutralizes odors in situ by supplying ionized air into the building, where it reacts and oxidizes odors while maintaining a healthy working environment for operators and reducing corrosion. It uses no water, chemical or media, which minimizes capital and operational costs in dealing with spent media or consumables. **864/576-0660; www.kusterswater.com.**



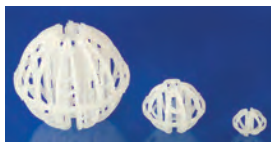
**Terminodour odor control system from CSO Technik, distributed by Kusters Water**

## Scrubbers

### RASCHIG USA JAEGER TRI-PACKS

Jaeger Tri-Packs from Raschig USA are widely used as the packing in odor-control scrubbers. This packing, being almost spherical in shape, forms a random-packed bed. As a result, both the mass transfer and the chemistry used in the scrubber to absorb and destroy

odors such as sewer gas are optimized. The odors are scrubbed in two stages — caustic only at a high pH to solubilize the H<sub>2</sub>S, then using caustic with bleach at a pH of approximately 9.5 to oxidize the H<sub>2</sub>S to sulfate. Typically in a two-stage system, the blowdown from the second stage is directed into the first stage sump in order to fully utilize the oxidizing chemical. The packs are NSF approved for potable water. **800/678-0345; www.raschig-usa.com.**



Jaeger Tri-Packs from Raschig USA



3G UV Wastewater Disinfection Unit from Salcor Inc.

## UV Disinfection

### SALCOR INC. 3G UV WASTEWATER DISINFECTION UNIT

The 3G UV Wastewater Disinfection Unit from Salcor Inc. is proven for residential, commercial and municipal uses. It is UL certified NEMA 6P “flood-proof,” and NSF/Washington State Protocol pathogen six-month tested

(with 20 different upstream treatment units). Rated to 9,000 gpd gravity flow makes it a reliable building block for larger water recovery/reuse systems. Installed 12-unit parallel/series arrays, assembled with readily available ABS pipe fittings, are disinfecting more than 100,000 gpd systems. Gravity flow is equalized without distribution boxes. Identical modular units increase plant reliability and reduce spare parts inventory, facilitating expansion. Each unit has a foul-resistant Teflon lamp covering, two-year lamp, easy installation and minimal annual maintenance. **760/731-0745.**

## WEDECO DURON UV SYSTEM

The DURON UV system from WEDECO - a Xylem Brand is designed to meet the disinfection needs of mid-sized to large wastewater treatment sites. To maximize disinfection efficiency and hydraulic performance, it uses staggered 600-watt ECORAY lamps at a 45-degree angle. It is simple to install and operate, validated for a diverse range of water characters, and can be designed to meet specific disinfection requirements. **855/995-4261; www.wedeco.com.**



DURON UV system from WEDECO - a Xylem Brand

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- Airmaster Aerator Turbo X-Treme Magnum floating/surface aerator

### Biofiltration

- DUALL, a CECO Environmental Company, BIO-PRO biological odor control system
- Evoqua Water Technologies ZABOCS Bio-Trickling Filter system

### Chemicals

- Bio-Microbics Mighty Mike Bond-SORB Odor Eliminator
- Bioscience MICROCAT-ANL microorganisms
- Chemtron Sewer Fresh liquid odor neutralizer

### Chlorination/Dechlorination

- Chlorinators Incorporated REGAL Gas Chlorinator
- Electro-Chemical Devices DC80 dechlorination analyzer
- Force Flow/Halogen Chlor-Scale ton container scale
- HF scientific CLX online residual chlorine monitor

### Covers/Domes

- Alfa Laval Ashbrook Simon-Hartley Winklepress WPN belt filter press
- ClearSpan Fabric Structures HD Buildings
- Environmental Controls Company (ECC) floating bird ball blanket
- Environetics Defender Tank Covers
- Fibergate Composite Structures fiberglass reinforced plastic (FRP)-covered molded grating

- JDV Equipment Corporation LEVEL LODER cover system
- MPC Containment PetroGard VI geomembrane odor-control floating covers
- Paxxo Longofill continuous bag system
- Simple Solutions Distributing Wolverine Mega T (MT-20) odor filter

### Detection Equipment

- Arizona Instrument Jerome 651 fixed hydrogen sulfide detection system
- Eagle Microsystems Model GD-1000 Premier Series gas detector

### Distillation/Fluoridation Equipment

- Blue-White Industries ProSeries-M M-3 peristaltic metering injector pump
- Pulsafeeder MEC-O-MATIC T-2000 diaphragm metering pump
- SEEPEX Intelligent Metering Pump (IMP) cavity-dosing pump

### Microbiological Control

- Bionetix International BCP85 Compost Accelerator

### Ozonation Equipment/Systems

- BlueInGreen SDOX-CS
- Foxcroft Equipment & Service Co. FX-CL-O reagentless ozone analyzer
- CSO Technik, distributed in No. America by Kusters Water, a div. of Kusters Zima Corp., Terminodour odor control system

### Scrubbers

- Raschig USA Jaeger Tri-Packs

### UV Disinfection

- Salcor Inc. 3G UV Wastewater Disinfection Unit
- WEDECO - a Xylem Brand, DURON UV system

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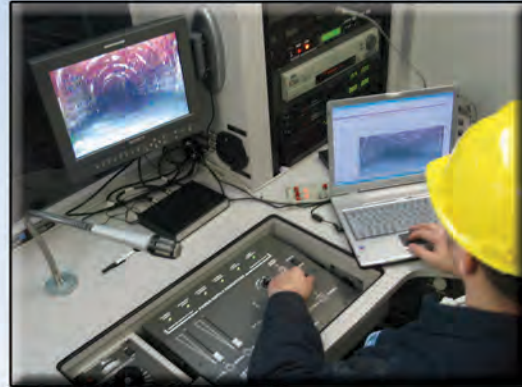
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By Craig Mandli

## Digester and cogeneration system combine to eliminate odor, create energy

### Problem

ECB Enviro North America, a bioenergy startup, needed to control odor from manure produced by intensive livestock operations in Lethbridge, Alberta, Canada, home to nearly 100,000 residents.

### Solution

The company installed a PlanET anaerobic digester and efficient combined heat and power system. For an anaerobic digestion facility close to city limits, regulatory authorities required a state-of-the-art odor control system. The digester eliminates odors and produces stable biogas. Its biological filtering system uses tree bark to filter 17,657 cfm of contaminated air. Two **Avus cogeneration systems** from **2G – CENERGY Power System Technologies**, with a capacity of 1,426 kW, convert the biogas to energy.



### RESULT

The operation now uses manure and food processing waste to produce 388.5 million cubic feet of biogas annually, yielding 23.5 million kWh of electricity and 100,000 GJ of thermal energy per year. The stable electricity powers 2,500 homes. Odors and 45,000 tons of emissions are eliminated annually. **904/579-3217; www.2g-cenergy.com.**

## UV system helps city reclaim wetlands

### Problem

Carnation, a city of about 1,900 residents in King County, Washington, had relied on septic systems for wastewater treatment. However, soil surveys in 1987 revealed that the septic systems had become insufficient for the growing population and threatened to contaminate the local aquifer.

### Solution

Officials installed a membrane bioreactor system with UV disinfection. Reclaimed water is discharged to the 59-acre Chinook Bend Natural Area to foster wildlife and restore wetlands. **Aquionics** installed two parallel trains of **InLine 7500+ UV units** after the MBR system. The closed-vessel units flange directly to the MBR piping. The system uses medium-pressure, high-intensity lamps and has a compact footprint.



### RESULT

One UV train treats up to 1.4 mgd and the second provides backup capacity. The low-maintenance units have automatic mechanical cleaning to keep quartz sleeves surrounding the UV lamps deposit-free. They continue to perform without failure. **859/341-0710, www.aquionics.com.**

## Biostimulant used to resolve odor problem

### Problem

Homeowners in a neighborhood in Talbotton, Georgia, had experienced significant hydrogen sulfide odors for years. The source was a manhole where all four homes discharged, as well as an upstream pump station.

### Solution

Each homeowner received a small metering pump and began to feed **Byo-Gon PX-109 biostimulant** into drainlines below bathroom sinks. The OMRI-certified organic product increases microbial respiration and eliminates the source of odors naturally.

### RESULT

In less than a month, odors were under control. The city then began treatment of the upstream lift station and has now greatly reduced biostimulant feed rates at the homes. The addition of less than 1 ppm of biostimulant virtually eliminated the odor. **800/580-5509; www.byogon.com.**

## Microbes clean food-process wastewater

### Problem

A premium U.S. ice cream company was seeing high TSS and BOD in process wastewater and therefore was paying surcharges for discharge to the municipal treatment plant. The company could not change the ingredients or the production process.

### Solution

**CoreBiologic** created a scalable treatment system consisting of batch processing with pH adjustment and the addition of **FogPro microbial blend**, mineral nutrients and aeration. Samples were taken after 12 and 24 hours.



### RESULT

The microbes effectively consumed the wastewater material, significantly reducing TSS, BOD and odor. After 12 hours, BOD was reduced by 37 percent and TSS by 46 percent. After 24 hours, BOD was further reduced by 57 percent and TSS by 76 percent. Waste byproducts of the process are being used for agricultural fertilizer. **888/390-8838; www.corebiologic.com.**

## Solution eliminates odors from stored biosolids

### Problem

The Solon, Ohio, water reclamation facility processes approximately 5.8 mgd. As a good neighbor, the Solon Water Reclamation Department wanted to ensure that H<sub>2</sub>S and other mercaptan odors from stored biosolids wouldn't impact the community.

### Solution

Solon's staff, working with Jack Doheny Companies, reached out to **D3W Industries** to help mitigate potential odor issues. Using a U.S. EPA-



approved **Planet Breeze solution**, the product was dosed at a rate of 37.15 mg/L into the sludge feed line prior to the belt filter presses and polymer addition, targeting the sulfate-reducing bacteria that were plaguing the facility's biosolids.



### RESULT

The cake solids remained odor free after treatment, saving the workers and surrounding community from the toxic smells. 248/465-9841; [www.planetbreeze.com](http://www.planetbreeze.com).

## Valveless piston pump cures priming issues for methanol metering

### Problem

A suburban college wastewater treatment plant in New York needed a cost-effective method to remove nitrate from wastewater effluent. The denitrification process required the low-rate addition of methanol.

### Solution

The college installed a **QDX valveless ceramic piston pump** from **Fluid Metering**. The CeramPump technology relies on only one moving part, a rotating and reciprocation ceramic piston, to accomplish pumping and valving functions. For metering methanol, the pump head is close-coupled to a QDX hazardous-duty drive.



### RESULT

The pump eliminated low-flow priming issues and self-primed even between long periods of downtime. Sapphire-hard ceramic internals are chemically inert and wear-resistant for long-term drift-free accuracy without calibration. 800/223-3388; [www.fmipump.com](http://www.fmipump.com).

## Covers help treatment plant meet odor control commitments

### Problem

The James River Treatment Plant in Newport News, Virginia, is bordered on one side by the James River and on the other by houses and a park. Although it had installed odor control systems, the plant's conventional aeration tanks were producing low-level odors that required additional control.

### Solution

Plant management decided to capture the foul air under a cover system and feed it to a carbon treatment system. The team chose **Geomembrane Technologies (GTI)** retractable, structurally supported covers, tensioned over low-profile, arched aluminum frames and custom designed for the plant.



### RESULT

"The covers provided access and odor control so well on the IFAS tanks that we chose them for the ANITA Mox tank too," says Bob Rutherford, plant manager. The structurally supported covers have helped the plant reliably control odors, while retracting easily for access to tank internals. 506/449-0993; [www.gticovers.com](http://www.gticovers.com).

## Chemical treatment reduces hydrogen sulfide

### Problem

A 30 mgd municipal wastewater treatment plant in northern California was experiencing elevated H<sub>2</sub>S in its wastewater stream (average 7.7 ppm). This resulted in unacceptable atmospheric H<sub>2</sub>S (average 123 ppm) and a strong odor. The plant needed to reduce H<sub>2</sub>S in the waste stream to reduce odor and achieve an atmospheric H<sub>2</sub>S level of less than 10 ppm.

### Solution

**Hydritreat HS** chemical treatment from **Hydrite Chemical Co.** was used upstream of the bar screens. It was metered into the wastewater pipe for proper mixing before exiting the headworks. The chemical injection point allowed for approximately three minutes of contact time.

### RESULT

H<sub>2</sub>S in the wastewater stream was reduced to 3 ppm when measured at the bar screen, corresponding to a mass reduction of 1,200 pounds. The resulting atmospheric H<sub>2</sub>S level was reduced to an acceptable 4 ppm. 262/792-1450; [www.hydrite.com](http://www.hydrite.com).

## Vacuum feed system eases maintenance burden

### Problem

The 150 mgd Back River Wastewater Treatment Plant in Baltimore, Maryland, sought to replace its vacuum feeders with more advanced vacuum feed units for sodium hypochlorite treatment of plant effluent. "There were too many pieces that could go wrong and we had to redo the piping to the contact chamber," says operator Prim Rambissoon. "There were certain eductors for certain feeders, so we had to go through a whole process of re-educting. That could take an hour or two for each occurrence, depending on operator availability."

### Solution

Plant operators chose **chemical feeders** from **JCS Industries**. With a capacity of 10,000 gpd each, they use real-time feed information via electronic flow sensors that allow for continuous monitoring and control of the chemical feed rates. Each feeder automatically regulates in both fixed and variable control modes, including fixed feed rate, flow-paced, residual control and compound loop. A vacuum injector safely introduces the liquid into the feedwater stream. A reversing servo motor coupled with a V-notch valve regulates the chemical feed rate, an electronic flow sensor monitors and regulates the feed rate, and a control module provides complete electronic control and communications.



### RESULT

"Installation was easy, taking only a day for each unit," says Rambissoon. "The units have a built-in electronic flowmeter with digital display that makes operation so much easier than before." 281/353-2100; [www.jcsindustries.us.com](http://www.jcsindustries.us.com).

(continued)

## Treatment plant employs peracetic acid for effective disinfectant

### Problem

A municipal wastewater treatment plant in Kentucky needed a disinfectant that was effective and highly reactive.

### Solution

**Solvay Chemicals** conducted independent laboratory tests at the plant site using **Proxitane WW-12 peracetic acid**. It demonstrated rapid and effective disinfection, does not generate harmful DBPs even if overdosed and can be economically retrofitted or work in series with an existing disinfection system. The fast-acting disinfectant has a minimal effect on pH, its biodegradable residuals are non-toxic, it is stable under ambient conditions and it is not capital intensive.



### RESULT

Final total fecal coliform numbers were all less than 21 CFU/100 mL, and no dechlorination step was necessary. **800/765-8292; www.solvaychemicals.us.**

## Bio-activator reduces odors at municipal wastewater lagoon

### Problem

Two cheese plants and domestic wastewater from a Californian municipality (population 32,000) discharge into a 570-acre lagoon system. During a few weeks, the lagoons turned from a normal healthy emerald-green to gray, then black and red. Once this occurred, neighbors complained of an odor like rotten eggs from the lagoons. The speculation was that cleaning-in-place disinfectants and cleaners were entering the system in large quantities, upsetting the lagoon microbiology.

### Solution

The plant supervisor began regular daily dosing of **Bio Energizer** and **SuperPhos** from **Probiotic Solutions** to control odors and re-establish a healthy microbial population. The broad-spectrum bio-activator contains over 30 microbial growth-promoting factors delivered by Micro Carbon Technology. It is a balanced formulation of vitamins, trace nutrients, organic acids and bio-stimulants that foster greater metabolic capacity and efficiency in the microbial community.



### RESULT

Within two weeks, the lagoons began to turn green, and after three weeks the odors were gone. At four weeks, the lagoons were back to their usual emerald-green color. **800/961-1220; www.probiotic.com.**

## System clears the air at municipal pumping station

### Problem

Foul odors from the neighborhoods surrounding two municipal pumping stations in L'Assomption, Quebec, Canada, were compromising quality of life for residents. H<sub>2</sub>S and mercaptan-type odors were concentrated at times throughout the day. Due to the turbulence in the pumping stations' wet wells, it was also apparent that oils and grease in the foul air stream had to be removed along with the odors.

### Solution

**Newterra** supplied two **deep-bed scrubber systems** with properly sized fans and prefiltration units for mist and grease removal. Each vessel was filled with high-yield carbon to target the odors.



### RESULT

Removal of all odors was greater than 99.95 percent, with an undetectable level at the outlet side of the units. The air phase scrubber systems were quickly installed within a few hours and have required minimal maintenance. **800/420-4056; www.newterra.com.**

## Town installs chemical-free wastewater disinfection system that also creates energy

### Problem

The northern California town of Graton in Sonoma County needed a new wastewater disinfection system that would reduce energy costs.

### Solution

Town leaders purchased an **M-500 system** from **Pasteurization Technology Group (PTG)**. The chemical-free disinfection system generates on-site electricity and can process almost 600,000 gpd, sufficient for Graton's 1,700 residents.



### RESULT

The system uses natural gas to generate electricity at half the cost of grid power for use in the plant and associated buildings. It also eliminated the costs of purchasing and storing chlorine. **510/357-0562; www.pastechgroup.com.**

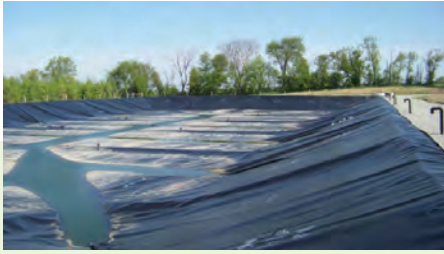
## Covering lagoon stops odor complaints

### Problem

United Liquid Waste Recycling of Watertown, Wisconsin, recycles food and beverage waste into valuable byproducts such as fertilizer. Odors from the anaerobic treatment process needed to be stopped to enable the company to expand. Two lagoon anaerobic digesters needed an affordable odor control system, which had to function whether the lagoons were full or empty.

## Solution

The owners selected **Industrial and Environmental Concepts** to cover the two 3.5-million-gallon lagoons. The 57,600- square-foot membrane covers collect the biogas and channel it to a draw-off location where it can be effectively controlled. The covers function at any water depth.



### RESULT

The cover system has operated for three years with no problems, allowing the company to grow and expand into Illinois, Iowa, Michigan and Indiana. **952/829-0731; www.ieccovers.com.**

## Treatment plant uses photoionization to exceed odor control expectations

### Problem

The Missoula (Montana) Wastewater Treatment Plant faced numerous complaints and a Corrective Action Order from the Department of Health for its ineffective odor control measures.

### Solution

AMBIO Biofiltration installed a **Neutralox photoionization system** to decrease elevated concentrations of H<sub>2</sub>S and other odor-causing agents in its air emissions. Photoionization systems eliminate sulfide compounds through application of UV light in the presence of catalysts.



### RESULT

The plant eliminated more than 99.8 percent of odor-causing contaminants. The technology reduced high concentrations of odorous compounds, especially sulfurous compounds, while having low maintenance requirements and a small environmental footprint. **312/377-6116; www.neutralox-inc.com.**

## Self-cleaning mixed oxidant on-site generation system replaces aging sodium hypochlorite system

### Problem

To use a safer disinfectant and identify areas to reduce operational chemical costs and improve water quality, the Paducah (Kentucky) Water Works needed to upgrade its disinfectant system from a 12 percent bulk sodium hypochlorite system in its downtown water treatment plant.

### Solution

A self-cleaning 900-pound-per-day **MaximOS on-site-generated mixed oxidant generation system** from **Parkson Corporation** was selected based on lab testing that showed, among other benefits, a 25 to 30 percent reduction in alum usage to achieve a better settling floc particle.



### RESULT

The advanced on-site generation system uses a self-cleaning technology with a polarity reversal cycle so that calcium and magnesium particles are flushed from the cell automatically. The mixed oxidant chemistry improves overall water quality. **888/727-5766; www.parkson.com.**

## UV system allows plant to handle additional flow

### Problem

To comply with a total maximum daily load set by the U.S. EPA and the Alabama Department of Environmental Management, the City of Auburn ceased discharge at its Northside Water Pollution Control Facility and transferred the discharge to the H.C. Morgan Water Pollution Control Facility, which treats the majority of the city's wastewater. The decision required upgrading the plant to handle the additional flow.



### Solution

Facility management converted the chlorine disinfection system to UV and chose the **TrojanUVSigna** for its suitability for seasonal operation, the low number of UV lamps required, the low capital and long-term operating costs, ease of retrofit and simplicity of operation.

### RESULT

The system has consistently performed under the monthly average and daily maximum colony-forming units (CFU) limits. The monthly average for 2014 was 42 CFU/100 mL, with a daily maximum of 194 CFU/100 mL. **519/457-3400; www.trojanuv.com.**

## Auto-optimized dosing system used for odor control

### Problem

The Town of Palm Beach, Florida, needed an optimized treatment system for fluctuating force main flows and dissolved sulfide levels at one of its lift stations.

### Solution

Town leaders selected the **Kemira S-Guard advanced remote contaminant control and monitoring technology**, which uses real-time influent dissolved sulfide data to consistently auto-optimize a correct chemical dosage on a weight for weight basis, taking into account wastewater flow, temperature, and pH.



### RESULT

The remotely operated system has lowered the site's overall chemical usage, increased response time, and maintained a consistent level of <5mg/L total dissolved sulfides leaving the injection site. **480/227-4848; www.kemira.com. tpo**



# Doing It Naturally

A MAN-MADE WETLAND COMPLEX PROVIDES HIGH-QUALITY WATER AND EXCELLENT RECREATION OPPORTUNITIES FOR RESIDENTS OF THE DALLAS-FORT WORTH AREA

By Jeff Smith

“The really good thing about it is that it works,” says Darrel Andrews, assistant director of the Environmental Division of the Tarrant Regional Water District in Fort Worth, Texas.

He means the nearly 2,100-acre man-made wetland that filters drinking water for 1.8 million customers in the Dallas-Fort Worth metroplex. Through a partnership with the Texas Parks and Wildlife Department that began in 1997, the wetland was built on the north unit of the wildlife department’s Richland Creek Wildlife Management Area, about 80 miles southeast of Dallas between the Richland-Chambers Reservoir and the Trinity River.

Each day, up to 90 mgd (permitted) of water is pumped from the Trinity River a little more than a mile to five sedimentation basins at the head of the wetlands. With surface areas up to 80 acres, the 6- to 8-foot-deep sedimentation basins retain the river water about 24 hours to remove suspended solids and nutrients.

Over the next seven days, gravity moves the flow from the basins through 20 wetland cells for natural processing and final nutrient removal. “Detention time in the wetland is critical to us,” says Andrews. “That is why we built the project in the first place.”

## THE NATIVE WAY

The cells vary in size and follow the land formation to increase contact time. Cells are organized in trains of three to five, handling flow variations and downtime. Clarified water from the cells flows through a canal and is lifted into the nearby Richland-Chambers Reservoir before being pumped

ABOVE: An intent egret sizes up a meal in the 2,100-acre wetland complex.

to Dallas-Fort Worth customers.

Native vegetation, such as cattails, smartweed, arrowhead and varieties of rushes, sedges and millets, thrive in the wetlands. Not all had to be planted because of existing seed sources in the native soil. “We provided the moisture and they grew,” Andrews says. The soil, the plants and the plants’ associated biofilm work to remove nutrients, mainly nitrogen and phosphorus.

“Our thought was that if we could find a way to treat the river water and get it to the existing reservoir, we could delay construction of a new reservoir for many years.”

**DARREL ANDREWS**

Plant selection and other design parameters were based on results of an eight-year study of a 2 1/2-acre pilot wetland that began in 1992. The study showed that certain plants could remove nutrients and that some plants could outperform others. Determining the optimal water level in which plants could thrive and survive was critical. The wetland was built in a flood plain, and the impact of seasonal flooding needed to be known.

“We had a lot of questions to answer in those early years, and we used that time to determine whether these things were even going to work for our purpose,” says Andrews. *(continued)*



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The Richland-Chambers Wetlands under construction (left) and after completion.



## GOING TO SCALE

The pilot project's success led to the first phase of field-scale construction of 250 acres, which began in 2002. After several years of successful operation, the second phase of 200 acres was completed in 2009. The final 1,600-acre expansion was completed in 2013. The entire raw water filtering area is named the George W. Shannon Wetlands.

As part of the parks department's Richland Creek area, the wetland vegetation provides habitat for songbirds, shorebirds, wading birds and raptors. Residents include egrets, herons, blackbirds, warblers, hawks and bald eagles. Migrating ducks and geese are frequent visitors. Larger wildlife include deer, feral hogs and alligators. Recreational uses include hiking, camping, bird watching and hunting.

Created as mitigation for construction of the reservoir, the Richland Creek area has many marshes and sloughs and vast bottomland forests of cedar, elm, oak, willow, ash and box elder that also serve as breeding and nesting grounds for resident and migratory birds.

The Shannon Wetland filtering concept came out of a long-range plan developed by the water district's staff in the late 1980s. Projected population growth showed the need for additional raw water supply by 2017. Traditionally, a new reservoir would have been the solution, Andrews says. But the close proximity of the Trinity River to the Richland-Chambers Reservoir provided another option.

## MORE ON THE WAY

However, during dry months with little runoff, 95 percent of the Trinity River is treated wastewater effluent. Without some pretreatment or filtering, its impact on the reservoir's water quality would be detrimental. "Our thought was that if we could find a way to treat the river water and get it to the existing reservoir, we could delay construction of a new reservoir for many years," says Andrews.

Successful operation of the Shannon Wetland has paved the way for another 2,000-acre wetland to be built in 10 to 15 years. Andrews says the cost will be about half that of a reservoir, and instead of two decades it will take two or three years to construct. "Overall, it is cheaper water and more environmentally friendly," Andrews says.

The award-winning George W. Shannon Wetlands Water Reuse Project was the first of its kind in the United States. In 2004, it received the Engi-



Members of a high school group at the finished water discharge into Richland-Chambers Reservoir.

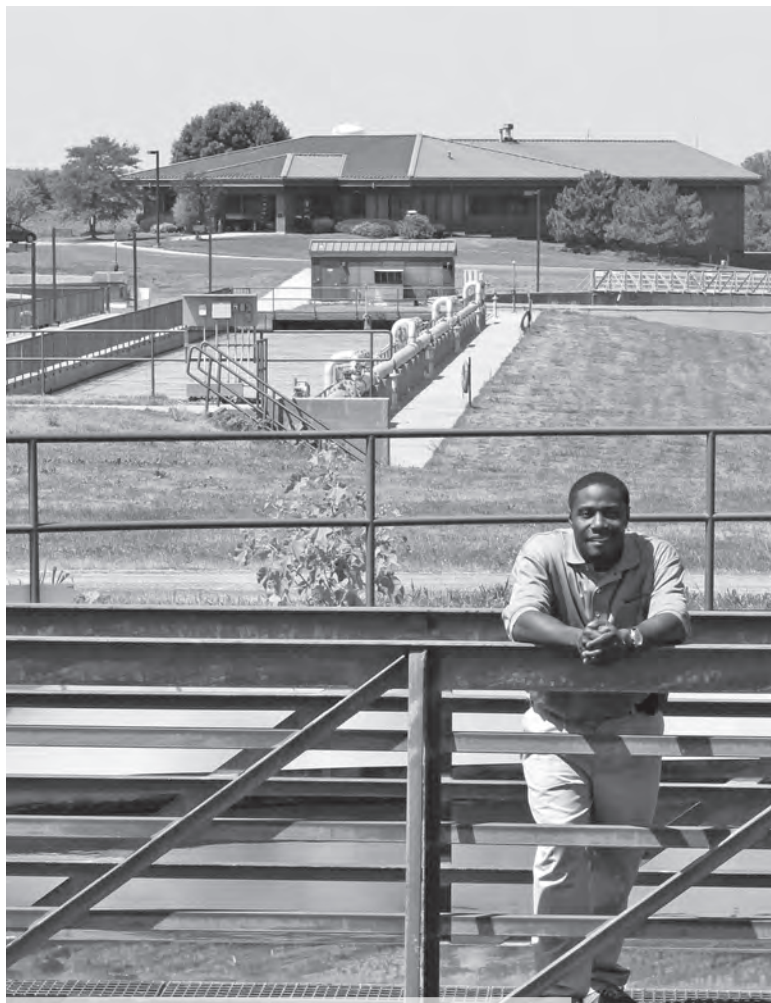
## Share Your Ideas

**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.**

neering Excellence Grand Award from the American Council of Engineering Companies (ACEC).

In 2009, the WaterReuse Association named it Large Project of the Year. In 2014 it was selected by *Engineering News-Record* as the Best of the Best in the water/environment category. In 2015, it was the winner of the National Association of Environmental Professionals' award for excellence in environmental management.

"The ultimate goal of the project was to produce water for delivery into the Richland-Chambers Reservoir that was as good as or better than the water that flows to it naturally from the creeks upstream of the reservoir," Andrews says. "I am proud to say that it meets that goal for nutrients and far exceeds it for sediment." **tpo**



// The team members are the greatest resource at this plant. They know it. They've been here forever. They do the work. I'm support staff. I coordinate what they do, and the best way for me to do that is to listen to what they have to say."

**Nate Tillis**  
 Operations and maintenance supervisor  
 Beloit (Wis.) Water Pollution Control  
 Treatment Facility

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3



5



7



2



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8

### 1. TURNER DESIGNS C-SENSE SUBMERSIBLE LOGGER

The submersible logger from Turner Designs, in partnership with Precision Measurement Engineering, works with the C-Sense pCO<sub>2</sub> sensor. The C-Sense logger package records time, date, internal temperature and the partial pressure of gas in liquids. **877/316-8049; www.turnerdesigns.com.**

### 2. FLOWROX PULSATION DAMPENERS

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### 3. YASKAWA HVAC MATRIX DRIVE

The HVAC Matrix drive (Z1000U) from the Drives and Motion Division of Yaskawa America provides low harmonic distortion in a space-saving design. Matrix technology features nine bidirectional switches that convert three-phase AC input into three-phase AC output, eliminating the need for a rectifying circuit card and DC bus. **800/927-5292; www.yaskawa.com.**

### 4. SINGER PRESSURE MANAGEMENT VALVE

The 106/206-2PR-630 pressure management valve from Singer is a flow-based pressure control system that provides high pressure as needed, automatically switches to lower pressure to reduce water loss due to leakage, and alleviates pressures that cause downstream pipe bursts. No electrical power is required, making the valve completely submersible. **604/594-5404; www.singervalve.com.**

### 5. FCI IN-LINE THERMAL MASS FLOWMETER

The ST100L air/gas in-line thermal mass flowmeter from Fluid Components International is suitable for chlorine gas service and available with a built-in Vortab Flow Conditioner that overcomes the lack of straight-run pipe. The flowmeter is designed for 1-, 1.5- or 2-inch lines and features a graphical, multivariable backlit LCD display. **800/854-1993; www.fluidcomponents.com.**

### 6. WAHL INSTRUMENTS THERMAL-IMAGING CAMERA

The Heat Spy 150 Series thermal-imaging camera from Wahl Instruments has a 160 by 120 detector for 19,200 individually calibrated pixels. Model Z features a 60 Hz frame rate while Model A has a 9 Hz rate for use in restricted countries. The images have a 25- by 19-degree field of view with a 3.2 megapixel CMOS image sensor for visible light images. Dual LED bulbs integrated above the lens act as headlights for clear, crisp visible light images even in low-light conditions. **800/421-2853; www.palmerwahl.com.**

### 7. PCVUE SCADA SOFTWARE WITH GEO MAP CONTROL

PcVue 11.1 SCADA software from ARC Informatique features the monitoring of geographically distributed assets and IP (Internet protocol) network devices. GEO Map Control, a built-in component for GIS (geographic information system) decision-making, provides live interactive maps from Google, Microsoft and other popular services. **913/827-3816; www.arcinfo.com.**

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## water: product spotlight

### Stainless steel disk filter offers longer lifespan in smaller footprint

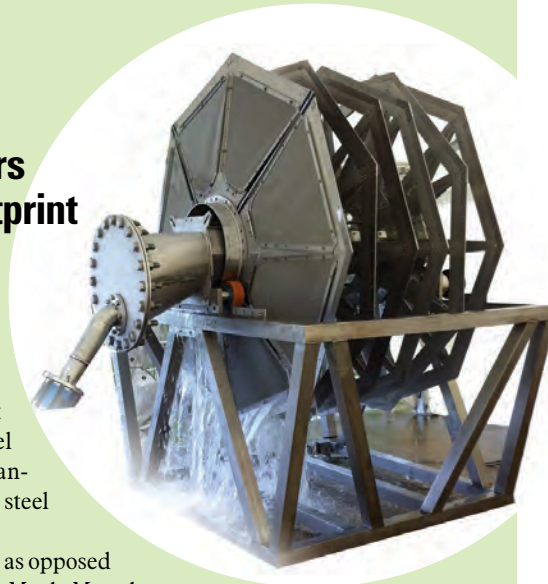
By Ed Wodalski

The **Quantum Disk Filter** from **Nova Water Technologies** is designed for Title 22 water reuse, tertiary total suspended solids and phosphorus removal with less than 1 percent reject. Features include Title 22 stainless steel filtration media for a longer lifespan, dynamic tangential filtration, variable speed and all stainless steel construction.

“The new version is offered in concrete tanks as opposed to just the stainless steel we had before,” says Mark Murphy, director of sales for Nova Water Technologies. “It uses 75 percent less power and reduces wash water volume by 30 percent.”

The new model eliminates rubber seals, roller chain and sprockets, internal bushings and bearings for less maintenance. It also offers the same flow capacity in half the footprint.

“The fact that it’s a much smaller footprint allows the filter to retrofit easier,” he says. **813/288-0533; www.novawt.com.**



Quantum Disk Filter from Nova Water Technologies

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## wastewater: product spotlight

### Electrically actuated pinch valves offer precise flow control

By Ed Wodalski

The **Series 5200E electrically actuated control pinch valve** from the **Red Valve Company** combines durability, precise control and low maintenance. Designed for tough slurry and abrasive applications, the self-cleaning elastomer sleeve is the only wetted part, so breakaway torques remain constant. AUMA, Limitorque or Rotork electric operators are standard and include heaters, thermostats, position indicators and indication lights. Other electric motor operators are available. Declutch and override components are standard.

Controls can be an integral part of the electric operator or furnished as a separate unit for a remote station. Options include NEMA 7 explosion-proof construction, proportioning control from a 4-20 mA instrument signal and 4-20 mA output transmitter.

Series 5200 pinch valves have a ductile iron body with sleeves available in pure gum rubber, neoprene, Hypalon, chlorobutyl, Buna-N, EPDM and Vitron. Valves are drilled and tapped to mate with ANSI B16.5 Class 150 flanges. Electrically actuated control valves range from 1 through 42 inches in diameter (up to 54 inches available custom order).

The 1-inch valve is 7 1/4 inches long, 6 inches wide, weighs 87 pounds and has a working pressure of 150 psi. The 42-inch valve is 84 inches long, 101 inches wide and weighs 19,000 pounds with a working pressure of 35 psi.



Series 5200E valve from the Red Valve Company

“The electrically actuated 5200E pinch valve can be used for flow control applications inside and outside the fence of a wastewater treatment plant,” says Benny Lonchar, national sales manager for Red Valve. “One

of our largest applications outside the fence is flow control and flow equalization of stormwater in a CSO community, while RAS and WAS is one of our largest applications inside the plant.”

The maintenance-free valve has no seats to grind, no stuffing boxes to repack and no packing glands to adjust. The full-port opening allows raw sewage and debris such as twigs, rags and plastic bottles to easily pass without clogging, while the elastomer sleeve eliminates dead spaces where debris can build up and hinder performance.

“The suspended solids tend to gather in crevices and seat areas and ultimately change the flow pattern and/or the ability of the valve to close and increase torques,” Lonchar says. “With no packing, all the process runs through the sleeve of the valve. There’s no maintenance to the valve at all.”

Cone sleeves further enhance performance, enabling the valve to control a range of flows without cavitating. **412/279-0044; www.redvalve.com.**

Alex Roorda, left, a salesman for Greener Planet Solutions, explains the technology behind his company's Pro2 dissolved oxygen bioremediation technology to a 2015 WWETT Show attendee. The units supply oxygen to waste streams, creating supercharged waste-consuming microbes. A horizontal solid-wall bowl is used to dewater biosolids and manure.



PHOTO BY CRAIG MANDLI

# The Power of Oxygen

COMPACT BIOREMEDIATION UNIT PROVIDES DISSOLVED OXYGEN TO FEED WASTE-CONSUMING MICROBES

By Craig Mandli

Wastewater treatment facilities use aerobic bacteria to consume organic wastes in ponds and holding tanks. However, the naturally occurring microbes need a high level of dissolved oxygen to multiply and effectively consume organic material. Supplying that oxygen is not always efficient, leading to high electricity costs and a large carbon footprint. A new product making its debut at the 2015 Water & Wastewater Equipment, Treatment & Transport (WWETT) Show, the **Pro2 Series Bio Accelerator** from **Greener Planet Solutions**, attempts to resolve that issue.

“Because we can hold oxygen in a solution, the Pro2 essentially creates super-charged microbes.”

RANDY REDMER

The Pro2 Series can deliver oxygen in three states — full nucleation, nanobubble or microbubble. A small slipstream of water, supersaturated with oxygen, reintroduces oxygenated fluid back into the water using precision applicators.

“Because we can hold oxygen in a solution, the Pro2 essentially creates super-charged microbes,” says Randy Redmer, sales manager for Greener Planet Solutions. “It provides a highly oxygenated waste stream for the microbes to feed off. Because the oxygen is efficiently injected directly into the waste stream, there is none gassed off.”

The Pro2 can be permanently installed, or is small enough to mount in the back of a pickup truck for portable use at 26 inches square and 59 inches high. It can inject up to 6 pounds of oxygen per hour and can deliver the dissolved oxygen stream at a rate of 15 gpm. Redmer says the unit is adapted from high-flow supplemental oxygen therapy used in the medical field.

“It actually creates more oxygen surface area because the oxygen isn’t being injected directly on the surface,” says Redmer. “If you actually look at a cross section as a waste stream is being treated, it looks like a layered structure, almost like layered Jello.”

The unit is designed for municipal, industrial and commercial applications. The company has sold several to medium-sized municipal wastewater treatment facilities but also sees it as a potential added service for waste and septic pumps and even landscape architects.

“This is a unit that is easy to set up, as full systems can be installed in a trailer unit,” Redmer says. “It can eliminate algae and bacteria in a holding pond or decorative pond in three days or less. Running the unit costs less than \$1 per hour in electricity and oxygen combined.”

The 2015 WWETT Show was the first for Greener Planet Solutions, and Redmer says the reaction exceeded expectations. Staff members answered several questions about applications of the technology that they hadn’t even thought of.

“This is really only the second trade show where we’ve had our technology, so we’re learning as much about the industry as the attendees are learning about us,” says Redmer. “We’ve talked to onsite system installers who see this as an alternative to aeration, and septic pumpers see it as an efficient alternative for treating their own effluent. We learn more applications with each person we talk with.” 517/682-0090; [www.gps-na.com](http://www.gps-na.com). tpo



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## people/awards

**Rick Cantu**, superintendent of the **Manchester (New Hampshire) Wastewater Treatment Plant**, received the 2014 Regional Wastewater Treatment Plant Operator of the Year Excellence Award from the U.S. EPA.

The **City of Prescott** received the 2014 Clean Water Project of the Year award from the Water Infrastructure Finance Authority of Arizona for the Airport Water Reclamation Facility Expansion. The city can now produce more Class A+ reclaimed water.

The CH2M HILL-operated **Key West Richard A. Heyman Wastewater Treatment Plant** received the Florida Department of Environmental Protection's 2014 Plant Operations Excellence Award.

**Jeff Leffel** accepted a position as an apprentice plant operator at the **Greenfield (Indiana) Wastewater Plant**.

**Derek Albertson** was named operations supervisor for the **Town of Groton (Connecticut) Water Pollution Control Facility**.

**Dennis Holtz**, wastewater superintendent for **New Richmond, Wisconsin**, retired last February. He spent 14-plus years with New Richmond and devoted his entire career to wastewater treatment.

**Guy Gladwin**, an inmate at Charlotte Correctional Institution in Punta Gorda, Florida, became a dual state-licensed operator. He is qualified to rebuild lift station pumps and troubleshoot mechanical and electrical issues on wastewater and water plants.

These sites received 2014 Regional Wastewater Treatment Plant Excellence Awards from the U.S. EPA:

- **Medfield (Massachusetts) Wastewater Treatment Plant**
- **New Shoreham (Rhode Island) Water and Sewer Commission**
- **East Providence (Rhode Island) Water Pollution Control Plant**
- **Hampton (New Hampshire) Wastewater Treatment Plant**
- **Penacook (New Hampshire) Wastewater Treatment Plant**

These sites received 2014 Regional Industrial Pretreatment Program Excellence Awards from the U.S. EPA:

- **Attleboro (Massachusetts) Water Pollution Control Facility**
- **Newport (Rhode Island) Water Pollution Control Plant**
- **East Providence (Rhode Island) Water Pollution Control Plant**
- **Hanover (New Hampshire) Water Reclamation Facility**

The **Pueblo of Laguna Utility Authority** water system won the 2014 New Mexico Best Tasting Rural Water award for its Encinal Spring water sample in a contest sponsored by the New Mexico Rural Water Association and the Bohannon Huston civil engineering firm.

**Lance Webb**, manager of the **Natchez (Mississippi) Water Works**, received the 2014 Operator of the Year award from the Alabama-Mississippi Section of AWWA. The award coincides with the period in which the Mississippi Rural Water Association recognized the plant as having the best water in the state.

The **Village of Van Etten** received the 2015 Water System of the Year award from the New York Rural Water Association.

**Missouri American Water** was a finalist for the St. Louis Regional Chamber's Ameren Corporate Citizenship Award, recognizing the company's AmerICANs volunteerism program in which employees volunteer for causes with a focus on improving the water environment.

**Dr. Mark LeChevallier**, director of innovation and environmental stewardship with **American Water**, received the AWWA's 2015 A.P. Black Research Award for outstanding research contributions to water science and water supply.

The **Hendersonville Utility District Water Treatment Plant** received a grand award in the water resources category in the 2015 Engineering Excellence awards competition presented by the American Council of Engineering Companies of Tennessee.

*TPO welcomes your contributions 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](mailto:editor@tpomag.com).*

## education

### Alaska

The Alaska Department of Environmental Conservation Division of Water is offering these courses:

- June 1-2 – PLCs for Non-Programmers, Anchorage
- June 1-4 – PLC Workshop: From Introduction to Application, Anchorage
- June 3-4 – PLC Programming, Anchorage
- June 24-26 – Arc Flash Electrical Safety NFPA 70E with Skills and Certification, Anchorage

Visit [www.dec.alaska.gov](http://www.dec.alaska.gov).

### Arkansas

The Arkansas Environmental Training Academy is offering these courses:

- June 1-5 – Water Supply Protection Specialist, Lafayette
- June 2 – Basic Water Math, Fayetteville
- June 2 – WSPS Refresher, Lafayette
- June 3 – Applied Water Math, Fayetteville
- June 4 – PWS Compliance, Fayetteville
- June 8-12 – Backflow Assembly Tester, Camden
- June 9 – Backflow Assembly Tester Recertification, Camden
- June 9-11 – Intermediate Water Treatment, Camden
- June 16-18 – Advanced Water Treatment, North Little Rock
- June 23-25 – Backflow Assembly Repair (Large Series), Camden
- June 24 – Backflow Assembly Tester Recertification, Camden
- June 29-July 1 – Basic Water Distribution, Camden

Visit [www.sautech.edu/aeta](http://www.sautech.edu/aeta).

The Arkansas Rural Water Association is offering these courses:

- June 3-4 – Exam Review, Lonoke
- June 9-11 – Basic Treatment Class, Mt. Home
- June 17-18 – Water License Renewal Class, Piggott

Visit [www.arkansasruralwater.org](http://www.arkansasruralwater.org).

### British Columbia

The British Columbia Water and Waste Association is offering a Hydro-technical Design of Tunnels Seminar on June 16-17 in Vancouver. Visit [www.bcwwa.org](http://www.bcwwa.org).

### California

The California-Nevada Section of AWWA is offering these courses:

- June 1 – Water Use Efficiency Grade I Workshop, Sun Valley, Nevada

- June 3 – Water Use Efficiency Grade 2 Workshop, Rancho Cucamonga, California
  - June 9 – Backflow Exam, Watsonville, California
  - June 12 – Backflow Refresher, West Sacramento, California
  - June 13 – Backflow Exam, West Sacramento
  - June 15 – Introduction Water Distribution Course, Rancho Cucamonga
  - June 22 – Backflow Tester Course, Rancho Cucamonga
  - June 26 – Backflow Exam, Las Vegas, Nevada
  - June 27 – Backflow Exam, Rancho Cucamonga
  - June 27 – Backflow Exam, Santa Rosa, California
  - June 27 – Backflow Exam, Sunnyvale, California
- Visit [www.ca-nv-awwa.org](http://www.ca-nv-awwa.org).

## Idaho

The Intermountain Section of AWWA is offering a Small System Operator Training to Achieve/Maintain Compliance with the Safe Drinking Water Act June 17 in Pocatello. Visit [www.ims-awwa.org](http://www.ims-awwa.org).

## Illinois

The Illinois Section of AWWA is offering these courses:

- June 2 – Distribution System O&M – Hydrants, Valves, Water Service Lines, Mt. Prospect
- June 10 – Backflow Codes, Installation and Repair, Elgin
- June 16 – Effective Backflow Programs, Benton
- June 17 – Water Loss Audit Seminar, St. Charles
- June 18 – Water Loss Audit Seminar, Rockford
- June 18 – Generators: Increasing Reliability Through Proper Maintenance, St. Charles
- June 22 – Putting a Charge in the Coagulation Process Webinar, online

Visit [www.isawwa.org](http://www.isawwa.org).

The Illinois Section of the Central States Water Environment Association is offering a Collection Systems seminar on June 18 in Aurora. Visit [www.cswea.org](http://www.cswea.org).

The Environmental Resources Training Center at Southern Illinois University - Edwardsville is offering these courses:

- June 2-5 – Cross Connection Control, DeKalb
- June 17 – Backflow Testing Update, Joliet
- June 17-18 – Class 3 Wastewater Operations, DuQuoin

Visit [www.siue.edu](http://www.siue.edu).

## Michigan

The Michigan Water Environment Association is offering a Fundamentals of Activated Sludge II course June 4 in Manistee. Visit [www.mi-wea.org](http://www.mi-wea.org).

The Michigan Section of AWWA is offering these courses:

- June 2 – Michigan Water Security Summit, Bath
- June 3-4 – Ground Water Conference, East Lansing

Visit [www.mi-water.org](http://www.mi-water.org).

## New Jersey

The New Jersey Agricultural Experiment Station Office of Continuing Professional Education is offering these courses:

- June 2 – Alternative Energy for Water and Wastewater Operations, New Brunswick
- June 4 – Human Error Reduction Training, New Brunswick
- June 11-12 – Introduction to Hazardous Waste Management, New Brunswick
- June 16 – Rigging and Hoisting Safety, New Brunswick
- June 16 – Study and Exam Skills for Licensing and Professional Certification Testing, New Brunswick

## events

### May 31-June 3

Pennsylvania Water Environment Association Annual Technical Conference, Lancaster County Convention Center. Visit [www.pwea.org](http://www.pwea.org).

### June 1-3

New York Water Environment Association Spring Technical Conference and Exhibition, The Sagamore Hotel, Bolton Landing. Visit [www.nywea.org](http://www.nywea.org).

### June 2-3

The Water Expo, Spring Edition, Miami (Florida) Airport Convention Center. Visit [www.thewaterexpo.com](http://www.thewaterexpo.com).

### June 4

Illinois Section of AWWA T-CON: Midwest Water & Wastewater Technology Conference, College of Lake County, Grayslake, Illinois. Visit [www.isawwa.org](http://www.isawwa.org).

### June 7-10

AWWA Annual Conference and Exposition, Anaheim (California) Convention Center. Visit [www.awwa.org](http://www.awwa.org).

### June 7-10

New England Water Environment Association Spring Meeting and Exhibit, Omni Mount Washington Resort, Bretton Woods, New Hampshire. Visit [springmeeting.newea.org](http://springmeeting.newea.org).

### June 7-10

Water Environment Federation/International Water Association Residuals and Biosolids Conference 2015: The Next Generation of Science, Technology and Management, Walter E. Washington Convention Center, Washington, D.C. Call 703/684-2441 or visit [www.wef.org](http://www.wef.org).

### June 21-24

Michigan Water Environment Association Annual Conference, Boyne Mountain Resort, Boyne Falls. Visit [www.mi-wea.org](http://www.mi-wea.org).

### June 22-25

Ohio Water Environment Association Technical Conference and Exhibition, Kalahari Resort and Convention Center, Sandusky. Visit [www.ohiowea.org](http://www.ohiowea.org).

- June 23 – Water Sampling and Laboratory Procedures, Dover
  - June 23 – Discharge Monitoring Reports, New Brunswick
- Visit [www.cpe.rutgers.edu](http://www.cpe.rutgers.edu).

## New York

The New York Section of AWWA is offering these courses:

- June 1 – Basic Laboratory Skills, Troy
- June 2 – Fundamentals of Occupational Chemical Exposure, Utica
- June 2 – Dam Safety, Ballston
- June 3 – Basic Laboratory Skills, Owego
- June 5 – Basic Laboratory Skills, Canastota
- June 24 – Emergency Planning and Water System Security, Melville
- June 24 – Guidance in Meeting the Revised Total Coliform Rule/Harmful Algae/UCMR, Troy

Visit [www.nysawwa.org](http://www.nysawwa.org).

The New York Water Environment Association is offering a Blower Technologies, Selection and Energy Evaluation seminar on June 17 in Monticello. Visit [www.nywea.org](http://www.nywea.org).

(continued)

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**North Carolina**

The North Carolina Section of AWWA-WEA is offering these courses in Morganton:

- June 15 – Western Maintenance Technologist School and Exam
- June 15 – Western Biological Wastewater Operators School

Visit [www.ncsafewater.org](http://www.ncsafewater.org).

**Oklahoma**

The Oklahoma Environmental Training Center in Midwest City is offering these courses:

- June 8 – Renewal Training
- June 8 – OSHA Eight-Hour Refresher HAZWOPER
- June 12 – Renewal Training
- June 15 – Renewal Training
- June 26 – Renewal Training
- June 29 – Renewal Training

Visit [www.rose.edu](http://www.rose.edu).

Accurate Environmental in Oklahoma is offering these courses:

- June 2 – Biological Processes, Tulsa
- June 4 – Operator Math, Stillwater
- June 9 – Quality Assurance and Quality Control, Tulsa
- June 11 – DW Sampling/WW Sampling, Stillwater
- June 16 – Operator Math, Tulsa
- June 18 – Biological Processes, Stillwater
- June 23 – WW Sampling/DW Sampling, Tulsa
- June 25 – Quality Assurance and Quality Control, Stillwater

Visit [www accuratelabs.com/classschedule.php](http://www accuratelabs.com/classschedule.php).

**Texas**

The Texas Water Utilities Association is offering an Effective Instructional Techniques course June 8-12 in Austin. Visit [www.twua.org](http://www.twua.org).

**Wisconsin**

The University of Wisconsin Department of Engineering Professional Development is offering a Fundamentals of Drinking Water Treatment course June 15-17 in Madison. Visit [www.epdweb.engr.wisc.edu](http://www.epdweb.engr.wisc.edu).

The Wisconsin Rural Water Association is offering these courses:

- June 9 – Sanitary Surveys/Capacity Development, Clintonville
- June 9 – Small Water System Operator Basics, Clintonville
- June 11 – Sanitary Surveys/Capacity Development, West Salem
- June 11 – Winter Operations, West Salem
- June 16-18 – Cross Connection Control Surveying, Plover

Visit [www.wrwa.org](http://www.wrwa.org).

The Wisconsin Section of the Central States Water Environment Association is offering a Collection Systems seminar on June 4 in Watertown. Visit [www.cswea.org](http://www.cswea.org). **tpo**

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

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**Bob Gentile**  
Superintendent  
Struthers WWTP  
Struthers, OH

Struthers Wastewater Treatment Plant in Ohio is making tremendous strides toward going green. Through their installation of a methane-powered generator system that uses methane collected from their anaerobic digesters, they've increased the efficiency of their plant, while committing to saving hundreds of thousands of dollars on utility costs in future years.

Since the completion of the generator system, funded by \$5.4 million stimulus dollars from the Ohio EPA through the federal American Recovery and Reinvestment Act, Struthers has seen big savings on energy costs. Superintendent Bob Gentile shared, "Our electrical costs are down from about \$25,000 monthly to only \$13,000 or \$14,000. Plus... our gas bills have dropped from about \$1,700 per month to around \$500."

**"We rely on USABlueBook for all of our MRO supplies."**

In order to ensure their system's continued success, proper maintenance will be crucial. "While the installation of the generator system was handled by contractors, we rely on USABlueBook for all of our MRO supplies. We recently changed out a motor on one of our recirculation pumps, and you guys were able to help us out. USABlueBook is great. Your book has everything we need, and our orders are always shipped very nicely. We buy everything we can from you guys," said Bob.

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