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on the cover

Mike Gill, lead operator of the Big Cottonwood Water Treatment Plant in Salt Lake City, oversees a process that yields extremely high-quality water from Big Cottonwood Creek. Built in 1957, the plant is one of the city's three conventional treatment facilities.

(Photography by Sallie Shatz)

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By Jim Force

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let's be clear

Of Taxis, Drones and Aeration Tanks

INNOVATION NO LONGER MEANS INCREMENTAL ADVANCES. IT MEANS WHOLE NEW WAYS OF DOING THINGS. IT'S HAPPENING IN THE WATER AND WASTEWATER SECTORS.

By Ted J. Rulseh, Editor



In 1995, Nicholas Negroponte's book, *Being Digital*, explored what back then was the emerging power of technology.

In many ways it was prophetic. My analog brain fixated on the idea in the book that the world was no longer driven by, or especially interested in, incremental changes. In other words, progress wasn't about a car engine 2 percent more efficient, or a computer processor 5 percent faster.

No, in the digital world, progress was about revolutionary change — entirely new ways to do things. And look at what we have today versus 20 years ago. Instead of postal service trucks we talk of drones delivering packages.

Instead of hailing a cab, we can hire a ride with a smartphone app. Instead of going to a video store, we stream movies online. We can use a website to turn our homes into bed and breakfast inns. Driverless cars seem to be on the horizon.

WHAT ABOUT WATER?

Are revolutionary things happening in the water and wastewater sector? Yes, they are. For one thing, on the wastewater side, the entire mindset is changing. What we have long called wastewater treatment plants are now becoming water resource recovery facilities. The Water Environment Federation officially endorses that terminology.

So it's no longer simply about getting the water clean. It's about taking in wastewater and extracting the resources it contains: clean water, nutrients (mainly as biosolids) and energy (biogas). At the same time, there are big advances in the processes involved.

There's no digital magic here. It still takes gravity to settle waste material out of the water. It still takes microorganisms, properly fed and aerated, to consume the suspended organic matter. It still takes bacteria to digest and stabilize the solids stream. None of that will change. But consider a few of the big innovations announced in recent months.

AIR EFFICIENCY

Traditionally, the secondary treatment (aeration) process is about more energy-efficient blowers and finer air bubbles to increase the surface area for oxygen exchange. But of

course, whatever their size, those bubbles ultimately rise to the surface and escape. So up to 70 percent of the energy to pump air into the aeration basins essentially goes to waste.

Enter ZeeLung technology from GE Water & Process Technologies. Instead of relying on bubbles to carry oxygen to microorganisms suspended in water, this technology transfers oxygen by diffusion through a membrane to a biofilm that grows on the outside membrane surface. Air is pushed through bundles of membrane fibers and oxygen diffuses from the inside of the membrane through to the biofilm on the outside. Thus the bacteria are in direct contact with the medium that provides the oxygen they need.

GE says the process uses one-fourth the energy required for fine-bubble aeration, which typically accounts for about 60 percent of a treatment facility's electricity usage. The technology can be retrofitted to existing basins.

THE SOLIDS SIDE

There have been leaps forward in biosolids digestion, too. The PONDUS thermochemical hydrolysis process, distributed in North America by CNP and deployed in the city of Kenosha, Wisconsin, in partnership with Centrisys, claims a 25 to 35 percent increase in biogas production versus conventional anaerobic digestion.

The process uses heat and the addition of sodium hydroxide to break down the cell walls of organisms in waste activated sludge. This, according to the companies, makes the material more digestible. The technology also reduces polymer costs, reduces solids handling costs (because final solids volume is lower), and increases digester capacity.

It's no longer simply about getting the water clean. It's about taking in wastewater and extracting the resources it contains: clean water, nutrients and energy. At the same time, there are big advances in the processes involved.

ON THE WAY

There's even a big improvement in how wastewater is delivered to the treatment plant, and it's highlighted in the Technology Deep Dive article in this issue of *TPO*. Called the DIP System (for direct inline pumping), it replaces the traditional lift station configuration of a wet well with submersible pumps controlled by float mechanisms.

Instead, wastewater is piped directly into a variable-speed grinder pump that chews up trash and sends the flow on its way. The pumps run continuously, automatically adjusting their speed to fit the incoming flow volume. The article describes the advantages.

These technologies aren't solely the result of the digital revolution, although digital technology surely helped in their development and helps enable their control when installed. The point is that if you operate a treatment plant (or water resource recovery facility), it doesn't have to be business as usual. These and other technologies are available to be explored as ways to make big strides toward better and more cost-effective operations. *tpo*

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At the Water Bar in Minneapolis, operators are bartenders and tap water is the beverage of choice. Find out how this unique experience educates the public about local water-quality issues. The collaborative art project is sparking conversations about local water and the importance of municipal treatment plants.

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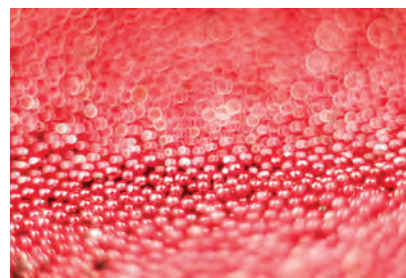
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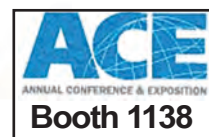
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STORY: **Trude Witham**
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BIG COTTONWOOD WATER PLANT MARKS
16 YEARS OF DELIVERING HIGH-QUALITY
WATER AND EARNING THE DIRECTORS AWARD
FROM THE PARTNERSHIP FOR SAFE WATER



The Big Cottonwood Water Treatment Plant in Salt Lake City serves parts of a city of 380,000 residents.

BIG COTTONWOOD CREEK FLOWS THROUGH THE BIG COTTONWOOD CANYON watershed that supplies Salt Lake City with drinking water.

The canyon offers fishing, hunting, camping, hiking, rock climbing, skiing and other activities. Its national forest is intermixed with homes. In the midst of all this is the 42 mgd Big Cottonwood Water Treatment Plant. Its operators are fortunate to have very high-quality source water, kept that way with a vigorous watershed protection program.

Built in 1957, the plant is one of three conventional water treatment facilities owned and operated by the Salt Lake City Department of Public Utilities. The others are the 40 mgd Parleys facility with 10 operators and the 20 mgd City Creek facility with eight operators.

The Big Cottonwood plant treats 40 percent of the drinking water for the city's 380,000 people. In the early 1980s, it received a capacity upgrade from 28 mgd to 42 mgd. A new clarifier and receiving basin modification in the early 1990s allowed more wash water to be recycled to the head of the plant.

In 1998, a \$4.5 million reconstruction project brought seismic, chemical, mechanical and electrical upgrades. More recently, the utility upgraded the creek-side intake structure. Designed by CH2M Hill, the intake uses a Coanda screen (Cook

Legacy) that removes debris larger than 1 millimeter, while allowing full plant flows to enter.

"Our biggest challenge is raw water turbidity, especially during spring runoff," says Mike Gill, lead operator. "It can fluctuate from 1 to 1,000 NTU. We meet our finished water turbidity goal of less than 0.10 NTU by making chemical adjustments and diligently paying attention to what's going on." The plant received the Partnership for Safe Water Phase III Directors Award in 1998 and has kept that status for 16 years.

RECONSTRUCTING THE PLANT

The Big Cottonwood facility lies on the Wasatch fault line. During the 1998 seismic upgrade, the contractor replaced external walls with reinforced ones without removing the roof. Other improvements included a new chemical building and storage tanks, and new chemical feed equipment (replaced again in 2006). The filter building valves (Val-Matic) and actuators (Rotork) are also new within the last three years.

The upgrades have made the operators' lives easier. Turbidimeters (Hach Filter Trak 660) ensure that the finished water meets or exceeds EPA stan-

dards. The PolyBlend polymer activation system (UGSI Solutions Inc.) adds polymer when turbidity reaches about .07 NTU. Flow controls keep the filter bed flow at a constant rate during backwash, preventing turbidity breakthrough.

The new intake structure is gravity-fed with no mechanical parts except for the intake gate valve. Water flows over a weir and through the Coanda screen. "This is really neat technology," says Gill. "It is set at an angle that causes the debris that builds up to just fall off. It's almost like a self-cleaning screen, with very low maintenance."

Sodium hypochlorite generated on site (Process Solutions, Inc.) is added first to achieve EPA chlorine contact time requirements, since the first connection to the water system is a few miles away. "Before 2003, we used chlorine gas, which required a lot of documentation and safety procedures," says

“Our biggest challenge is raw water turbidity, especially during spring runoff. It can fluctuate from 1 to 1,000 NTU.”

MIKE GILL



Mike Gill, lead operator at Big Cottonwood, oversees a facility that meets a turbidity standard of 0.10 NTU.

Gill. “Then we started ordering concentrated hypochlorite, which was expensive but much safer. We began on-site generation in 2010. It’s much easier to generate our own.”

After chlorination, operators add ferric chloride, cationic polymer and lime. The water is sent to two treatment trains, with four-stage flocculation and sludge collection equipment (all Ovivo). From there it can enter any of the eight dual-media filters. The water is fluoridated before distribution.

SEASONAL CHALLENGES

Plant operation changes with the seasons. In late spring and early summer, snowmelt runoff creates higher flows and much higher turbidity. “Our

average operating flow is 15 mgd, with a high of 38,” says Gill. “We don’t exceed 38 mgd because the filter performance suffers. We only run the filters at the higher end during the May-July runoff months. By August, the level in the creek starts to drop.” During high demand in summer, the plant can draw from up to 65 wells.

“In the winter, the demand is lower, since people don’t have to water their lawns,” Gill says. “The creek level as measured by the 20-foot Parshall flume drops to about 15 to 20 cfs, a dramatic change from spring runoff season, when it can be 400 to 1,000 cfs.”

In winter, the operators drain one side of the plant and clean out the flocculation basins with a 180 psi fire hose to prevent buildup, then do the same thing on the other side. They also inspect the flocculators and drives. “We had a flocculator break once during a winter clean-out, and one side of the plant was down for two to three weeks for repair,” Gill says. They also walk the sludge collection bays and inspect the sludge collectors for loose bolts or a cracked flight.

DIFFERENT STRENGTHS

The operators work as a team to solve problems. “We had struggled for years to get our chlorine feed to split equally to the two trains,” says Gill. “We feed the chemical right before it splits and, depending on the inlet flows, the water will distribute differently to the two sides.” The team recently built a new manifold in the inlet channel to enable small adjustments to the feed as plant flows change: “That was a team effort; we used several different operator ideas in the final design.”

Operators have a say on new equipment choices. “I attend meetings with management, and I pass along any equipment preferences,” Gill says. “The project goes out to bid, so we might not get the particular brand we had in mind, but we get equipment with the features we need.”

Big Cottonwood Water Treatment Plant, Salt Lake City, Utah



BUILT: 1957
POPULATION SERVED: 380,000 customers
SERVICE AREA: Salt Lake City
SOURCE WATER: Big Cottonwood Creek
TREATMENT PROCESS: Conventional
DAILY FLOWS: 42 mgd design, 15 mgd average
DISTRIBUTION: 1,298 miles of water mains
SYSTEM STORAGE: 96 million gallons
KEY CHALLENGE: Raw water turbidity variation
WEBSITE: www.slcgov.com/utilities
GPS COORDINATES: Latitude: 40°37'17.03"N; longitude; 111°46'17.54"W



Jacob Maughan does drawdown on a feed pump in the plant’s sodium hypochlorite feed system (Process Solutions).

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“ I attend meetings with management, and I pass along any equipment preferences. The project goes out to bid, so we might not get the particular brand we had in mind, but we get equipment with the features we need.”

MIKE GILL

Gill started as an operator at the plant 18 years ago. After a few months, he earned his Grade 4 (highest) water certification and was promoted to lead operator in 2008. He reports to Bill Meyer, water treatment manager. Reporting to Gill are Jeff Brinck (nine years), Andrew Killpack (13 years), Dom Martin (three years), Jacob Maughan (two years), Ed Powell (21 years), Russ Ranck (21 years) and Mike Tabish (six years).

All operators perform lab tests for alkalinity, hardness, pH and chlorine residuals. They also calibrate equipment and do small repairs. Heavier maintenance is handled by the utility's pump repair and electrical staff.

Team members bring different strengths to the job. Says Gill, "Jeff Brinck has a laboratory background and was able to suggest how we could improve our water testing methods. He was also helpful in explaining why certain methods were necessary and how the tests actually worked." Other operators are skilled with computers or are mechanically inclined. All are Grade 4 certified and have worked their way up to senior operator. "They are go-getters," Gill says.

FUTURE PLANS

The plant is “running great,” according to Gill, yet several areas need improvement. “Sedimentation is a weak link, since we just don’t get enough sedimentation time at higher flows,” says Gill. “CH2M HILL did a study a

SOMETHING FISHY

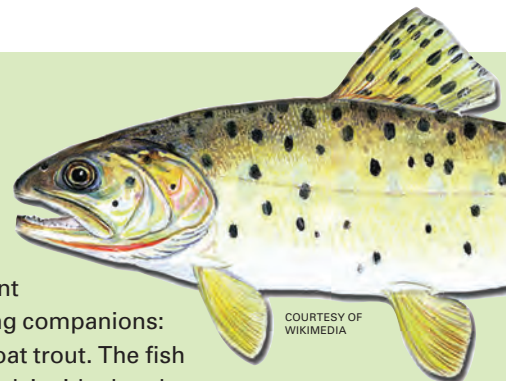
Operators at the Big Cottonwood Water Treatment Plant

have some interesting companions:

20 Bonneville cutthroat trout. The fish live in a 55-gallon tank inside the plant, 5 feet from a control room, staffed around the clock 24/7. A portion of the raw water entering the plant flows into the tank, and it's very clean, since it comes from a creek fed by mountain springwater.

"The idea for the trout happened after Sept. 11," says Mike Gill, lead operator. "In 2002, Salt Lake City was planning to host the Winter Olympics, so security was a big concern. All three of our water plants have fish as a first line of defense, or bio-monitor, against any water safety issues."

The Utah Fish and Game Department provides the trout, which are native to the area. “We have a large bag of fish feed that we buy at a local store, and the operators feed the trout twice a day,” says Gill. He is quick to point out that the fish are just an added safety tool: “Operator diligence and our raw water turbidimeter and pH meter are what we really rely on.”



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ABOVE: The team at Big Cottonwood plant includes, from left, Mike Gill, lead operator; and Russ Ranck, Ed Powell, Mike Tabish and Jacob Maughan, senior operators. RIGHT: Mike Tabish executes a filter backwash from a control panel in the filter building.

few years ago and recommended plate settlers to improve the efficiency of the basin. We have requested money to be budgeted for this project, but it probably won't happen for five to 10 years."

“For the most part, our job is uneventful, because the longer you operate the plant, the fewer surprises it presents. And no operator likes surprises.”

MIKE GILL

ing water, probably because we keep the chlorine residual at 1.0 mg/L in the water leaving the plant,” says Gill. They will also continue with the Partnership program.

“We’re always looking to improve a process, and I enjoy going to other plants to see how they do things,” says Gill. “Turbidity will always be the thing to watch, although we have a pretty good handle on it. For the most part, our job is uneventful, because the longer you operate the plant, the fewer surprises it presents. And no operator likes surprises.” **tpo**

Operators are awaiting a SCADA upgrade in 2016. “The old one is not reliable and requires diligence,” says Gill. “We’ve worked with it enough to learn that we have to watch more closely. It’s mainly a communication problem between the computers, the PLC and the equipment.” The operators have been meeting with the Carollo Engineers firm to discuss SCADA design and offer opinions on options.

In the meantime, the team will continue to make great-quality water. “We’ve been told we have great-tast-



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Taking a DIP

INLINE PUMPING SYSTEM IS DESIGNED TO MAKE WASTEWATER LIFT STATIONS MUCH LESS MAINTENANCE-INTENSIVE WHILE DEALING WITH WIPES AND OTHER TRASH

By Ted J. Rulseh

Lift stations are a key link in the chain of wastewater collection and treatment. They can also be maintenance-intensive. That's especially true since the proliferation of consumer wipes products that, when flushed, can collect in lift stations and clog the submersible pumps.

Now C&B Equipment, based in Wichita and Lenexa, Kansas, offers a different concept in lift station pumping. Called the DIP System (for direct inline pumping), the technology has been deployed in numerous wastewater systems in Europe, but is new to North America.

In place of submersible pumps installed in a wet well and activated by floats, the DIP System pumps are directly connected to the lift station inlet and outlet. The pumps run continuously when there is flow, ramping their speed up and down according to the incoming flow volume. When there is no flow, the pumps stop.

In the process, the pumps grind up wipes and other trash to pass through without causing clogs. Jon Dunham, key accounts manager for C&B Equipment, described the technology in an interview with *Treatment Plant Operator*.

tpo: How would you describe the difference between your system and traditional lift station pumping?

Dunham: Traditional lift stations use submersible pumps in a wet well. The pumps are activated by float switches when the water reaches a preset level. The pumps then run at full speed to empty the wet well. In the DIP System, the inflow is piped directly into the pump — a wet well is not necessary. The pumps operate continuously and are controlled by a vari-

able-frequency drive so they run at the speed necessary to handle the flow. It is not batch pumping.

tpo: What sort of maintenance do traditional lift stations require?

Dunham: A primary issue with submersible pumps in wet wells is clogging with wipes and other flushable materials. The float switches are subject to fouling with fats, oils and grease and may require frequent cleaning to keep them operable. In addition, wet wells occasionally have to be cleaned out, typically with a vacuum truck. Then you have hydrogen sulfide gas that can corrode electrical components, anything made of steel or iron, and even concrete. The cost of maintaining a wet well continues for as long as it is in service.

tpo: Why does the DIP System require less maintenance?

Dunham: The wastewater remains inside the piping and the pump, creating a clean and dry environment. Solid objects such as cans and plastic bottles, and fibrous items such as wipes or bandages, can pass through without clogging the pumps. Whereas wet wells typically use a duplex pumping system, which means two check valves and two plug valves in a valve vault, the DIP System uses only one check valve and one plug valve. There is no valve vault, so the system fits in a smaller footprint. The main system components are stainless steel. With soft starts and stops, there is no water hammer, so you ease the impact on the sewer line and valves downstream.

tpo: How does this system deal with wipes, rags and other trash materials?



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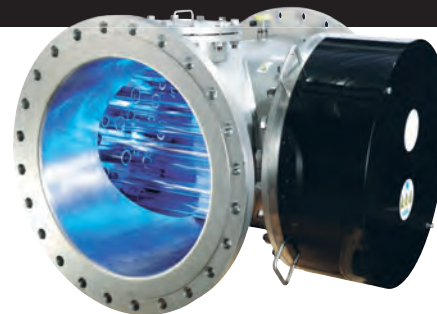
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Dunham: The pump is self-cleaning and uses a special impeller design. When the torque increases, the pump senses that it is becoming clogged. It then automatically slows down, stops and reverses direction. When it does that, knives on the impeller pop up and slice up any trash. When the pump senses that it is running free again, it slows down, stops and returns to the normal pumping direction. All this happens without operator intervention.

“The pump is self-cleaning and uses a special impeller design. When the torque increases, the pump senses that it is becoming clogged. It then automatically slows down, stops and reverses direction. When it does that, knives on the impeller pop up and slice up any trash.”

JON DUNHAM

tablet or desktop computer. They can dial up the pump, see how it's running. They don't have to send a crew to the site.

tpo: Where has this technology been deployed successfully?

Dunham: The first system went into use in Europe in 2003, and since then thousands of them have been installed. In Europe, wastewater is typically handled by the private sector under contract with municipalities. These contractors often remove the submersible pumps from lift stations and install the DIP System to eliminate maintenance. From that point they can largely manage the system remotely.

tpo: What return on investment can a utility expect from a retrofit of this system?

Dunham: That depends on the size of the system and the initial cost, but a typical installation will pay for itself in two to three years from the savings on maintenance.

tpo: How does this technology fit the needs of today's wastewater systems?

Dunham: Every government agency and utility I talk to is looking for innovation and sustainability. This system answers those needs. Furthermore, the wastewater industry is facing a personnel issue with a coming wave of retirements. Our system lends itself to younger people because it's technologically astute and frees them from dirty work, which no one wants to do anymore. **tpo**

tpo: Can this technology be retrofitted to existing lift station wet wells?


Dunham: It is easy to retrofit. There have been cases where retrofits have been completed in one day. You can take an existing wet well, pull out the old submersible pumps, put this system in, and pipe the inlet and outlet directly into the pumping system.

tpo: How is the rate of pumping controlled?

Dunham: The pumps are controlled by the volume of influent, through the electronic system that is provided. The flow rate is measured by a transducer installed in the lower part of the inlet. The transducer measures the depth of the flow over it, and the output from the transducer determines the speed of the pumps. The system has two pumps and two motors and is sized so that one pump and motor will handle 100 percent of the expected capacity. In the case of higher inflow, both pumps will kick on, so in effect you have 200 percent of capacity.

tpo: How is the system monitored?

Dunham: The control scheme is fully customer programmable. Users can check on or adjust the pump operation remotely using a smartphone,



An architect's drawing shows the athletic field that covers the nutrient management facility. The new administration building and five-story apartment complex appear in the foreground.

Going Underground

A MULTIPURPOSE ATHLETIC FIELD SITS ATOP A NUTRIENT MANAGEMENT FACILITY BUILT AS PART OF A MAJOR TREATMENT PLANT UPGRADE IN ALEXANDRIA, VIRGINIA

By Jeff Smith

Expanding a wastewater treatment plant in a residential neighborhood and winning the enthusiastic support of its residents may seem difficult, but that is what Northern Virginia utility Alexandria Renew Enterprises (AlexRenew) did with its one-of-a-kind plant upgrade, completed in 2015.

Faced with tighter restrictions on discharge to the Potomac River, and with limited real estate available for expansion, AlexRenew (formerly Alexandria Sanitation Authority) chose to bury the new facility in an adjoining lot and cover it with an athletic field to provide residents with a new amenity: additional green space.

"Thanks to the scores of people throughout our community who helped us with this project, our water utility is now much more visible in Alexandria than ever before," says Janelle Okorie, chief of engineering and technology.

“The public has responded positively to our project and particularly to the decision to remediate an old landfill site.”

JANELLE OKORIE

CUTTING NUTRIENTS

Driven by state regulations and an agreement among states in the region to lower the total maximum daily load (TMDL) of nitrogen and phosphorus discharged to the Chesapeake Bay watershed, AlexRenew added an 18-million-gallon nutrient management facility (NMF) on the former site of a 33-acre landfill 1/4 mile from a large apartment complex.

Constructed on a deep pile-supported, cast-in-place concrete base slab 30 feet below grade, nearly 1,800 precast concrete wall panels form four 4.5-

million-gallon influent storage tanks that help balance incoming loads for optimum treatment at off-peak times in the main plant. Each 3-foot-thick panel weighs more than 22 tons.

Eight Flowserve pumps (four 40 hp and four 80 hp) transfer flow through two 30-inch headers across 625 feet between the main plant and the NMF. Flow is diverted and stored in the NMF when ammonia nitrogen loading is high. When loading is lower, it returned to the activated sludge process of the main plant (54 mgd design, 35 mgd average flow).

Operators can select between time-based, flow-based or nitrogen-based control using either a fixed setpoint or a SCADA-calculated moving average setpoint. Five carbon filters at the NMF provide odor control; having all the equipment buried eliminates noise. "The public has responded positively to our project and particularly to the decision to remediate an old landfill site," says Okorie.

Also constructed on the AlexRenew campus is a concentrate pretreatment facility, the first designed and separately constructed full-scale side-stream deammonification system in North America, using Anammox microbes to control ammonia.

MAKING IT VANISH

Covering the NMF is the multipurpose Limerick Street Field, with artificial turf and a regulation-size soccer field. It is fenced and lighted, and

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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.**

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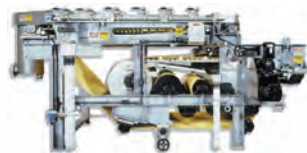
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- sludge thickening
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Boys play lacrosse on the multipurpose field.

fitted with seating and restrooms. The City of Alexandria Department of Recreation, Parks and Cultural Activities manages its use for soccer leagues and other activities.

Funding for the field was separate from the \$92 million cost of the treatment plant upgrade. The field cost less than \$1.5 million and did not affect AlexRenew's rates, since the cost was offset through transfer of development rights and sale of property with AlexRenew's development partner.

A new administration building with an underground parking garage



Early-phase of construction of the facility is shown, including some of the nearly 1,800 precast concrete wall panels that form the tank walls.

capped off construction at the site. Called the Environmental Center, the multi-story LEED Platinum building includes interactive educational displays and meeting rooms available to local nonprofits. The garage roof is landscaped and serves as a grassy seating area overlooking the athletic field.

To celebrate completion of the seven-year project, a two-day field dedication event was held at the site. More than 700 attendees — including local officials, industry leaders and Alexandria citizens and their families — enjoyed speeches, live music, food and soccer field activities.

Okorie observes, "With our partners in the development process, we worked hard to listen so that we could make everyone's vision of the project a reality." **tpo**

Understanding Activated Carbon

ADSORPTION TREATMENTS USING A VARIETY OF CARBON PRODUCTS ARE EFFECTIVE AGAINST ORGANIC CONTAMINANTS IN WASTEWATER AND DRINKING WATER STREAMS

By Henry Nowicki, George Nowicki and Wayne Schuliger

Many municipal drinking water and wastewater plants use activated carbons to purify water and air leaving the plant. Activated carbon is not a subject you learn about in school — you learn on the job.

At present, activated carbon in its various forms has more than 2,500 commercial applications. Operators of facilities that use activated carbon can benefit from a better understanding of what it is, how it works and how to use it most effectively.

TRAPPING CONTAMINANTS

Activated carbon is an inert, solid, adsorbent material that can remove many dissolved contaminants from water and process gas streams. It can be made from almost any feedstock that contains carbon; for municipal plants these mainly include wood, coconut shells and coal. Activated carbons are inexpensive and readily available. Being highly porous, they provide a large surface area to remove contaminants: One teaspoon has more surface area than a football field.

Activated carbon is especially effective for capture of contaminants that impart taste, odor, color and toxicity. Contaminants adsorb on the surface of the carbon particles in tiny pores and are thus pulled out of solution.

FORMS OF CARBON

Activated carbon manufacturers can provide a variety of pore size distributions by using different feedstocks and process parameters. Proper pore structure selection is the key to effective activated carbon treatment.

Carbons are sold and used in forms that include powders, granules, pellets, blocks and composites. The major difference in coconut, coal and wood activated carbons is the size of their graphitic platelets — honeycombed, six-membered, unsaturated carbon rings. The relative sizes of the graphitic platelets depend on the feedstock. Coconut-based carbons have larger platelets than coal-based carbons, which in turn have much larger platelets than wood-based carbons.

Powdered activated carbon

Powdered, micron-sized activated carbon milled from millimeter granular activated carbon acts faster and has more contaminant removal capacity than larger particles. It can be added to clarification units for sporadic

contaminant episodes like algae blooms and industrial spills. Powder also can be used to protect fixed granular activated carbon beds against sudden influent contamination.

Treatment plants that lack the infrastructure to use granular activated carbon or do not have enough granular carbon between the influent and the effluent to remove sporadic contaminant episodes economically can use powder. It is used as a batch process to remove contaminants to acceptable regulated maximum contamination levels (MCLs). It will not necessarily remove the contaminants to zero or non-detected. Powder is a single-use product; it cannot be regenerated.

Granular activated carbon

Millimeter-sized granular activated carbon in beds is more effective than powder; it can remove contaminants to non-detect levels and requires about one-fourth the amount of carbon between the influent and the effluent versus powder. However, the plant needs proper infrastructure to install fresh and remove spent granular activated carbon.

Granular activated carbon is used in continuous processes. It is a multiple-use product in that it can be thermally reactivated. The reactivated carbon (react) costs about half as much as fresh. Water plants in areas with high

Activated carbon is especially effective for capture of contaminants that impart taste, odor, color and toxicity. Contaminants adsorb on the surface of the carbon particles in tiny pores and are thus pulled out of solution.

risk of industrial pollution need more activated carbon in fixed vessels and more powdered carbon available for emergencies.

Pellet activated carbon

Pellets (or extra-large granules) are used to control vapor-phase municipal wastewater hydrogen sulfide (H_2S) and other odorous gases. These forms enable gas streams to flow through uninhibited, without the need for energy-consuming fans. Regular and catalytic carbons are used for H_2S control. With regular carbon, mobile H_2S is oxidized to immobilized sulfur, which accumulates on the carbon surface. Catalytic carbons oxidize H_2S to form sulfuric acid, which can be washed from used carbon with water and reused on site many times.

MASS TRANSFER ZONE

Aqueous- and gas-phase applications develop a fixed, moving-contaminant mass transfer zone (MTZ) as contaminated water or gas passes through a bed. Working carbon beds have three zones. There is a zone where the carbon is completely used, a second zone where contaminants are transferring from the mobile water or air to carbon and immobilized, and a third zone that consists of unused carbon.

Carbon beds are usually 3 to 10 feet deep, use gravity flow, and consist of stratified activated carbon, smaller particles on top and the largest particles on the bottom. Activated carbon removes water-soluble organics and solids; the solids that collect atop the bed are removed by backwashing. Bed stratification must be maintained after backwashing. Used and unused carbon should not be mixed during backwashing. The suspended carbon particles should be allowed to settle slowly after backwashing to maintain the mass transfer zone.

The late beds of activated carbon in the series provide the final polishing to remove trace contaminants. By changing out the earlier exhausted beds with fresh carbon, the later beds function longer as the final polisher and provide a safety margin. When samples are taken to profile a carbon bed, it is preferable to take samples from the top, middle and bottom of the bed. This allows for a more accurate locating of the mass transfer zone and better estimation of the remaining service time.

Multiple carbon beds are typically configured in a sequential series to improve carbon performance and economics. Beds in a series allow complete carbon bed use, where the influent and effluent are equivalent in contaminant concentrations, because remaining backup beds in the series will start another mass transfer zone. This lead-and-lag bed configuration enables treatment of a maximum volume of water per pound of activated carbon before the carbon is replaced.

SPENT ACTIVATED CARBON

Activated carbon does not last forever; pores or physical adsorption spaces are eventually filled and can no longer remove contaminants. Spent carbon needs to be periodically changed out with virgin or reactivated carbon.

Carbon pores are heterogeneous and vary in adsorption energy from strong to weak. Carbon graphitic platelets that are close together provide high adsorption potential energies, and wide platelet spacings provide relatively low adsorption energies.

Reactivation of spent carbon uses government-permitted kilns and gas-phase chemistry similar to the original carbon manufacture. The thermal process used for reactivation can change the original pore structures. Gravimetric adsorption energy distribution (GAED) is a test that detects and quantifies the widening of the pore size distribution.

After several reactivation cycles, the efficacy of reactivated carbon diminishes to a point where it needs to be replaced with virgin carbon. Widening of the pore size distribution from reactivation can be beneficial, especially for contaminants with larger molecules and higher molecular weights. However, water-soluble, low-molecular-weight compounds at trace concentrations, like trihalomethanes, may not be as readily adsorbed if a wider pore size distribution is used.

ABOUT THE AUTHORS

Henry Nowicki, Ph.D., MBA, (henry@pacslabs.com) is president and senior scientist for PACS Activated Carbon Services. George Nowicki, B.A. (george@pacslabs.com) is the company's laboratory director. The company offers training courses on carbon technology and hosts the annual International Activated Carbon Conference. Wayne Schuliger, P.E., provides a short course on the design, operation and troubleshooting of activated carbon adsorbers. **tpo**

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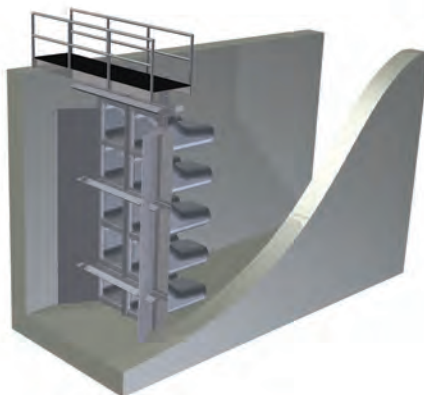
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SOUND LOGIC

JOSH HOLTON APPLIES ANALYTICAL SKILLS LEARNED IN COLLEGE TO OPERATING AN EFFICIENT AND HIGH-PERFORMING TREATMENT PLANT IN CENTRAL OHIO

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Elizabeth Frantz**

SOME MIGHT CLAIM THAT BY WORKING IN THE WASTEWATER industry, Josh Holton isn't making use of his college degree in political science and education.

Holton begs to differ — he puts his schooling to work on a daily basis. “You have to think more analytically in college courses than you do in high school,” says Holton, lead operator at the Southwest Licking Community Water and Sewer District, based in Hebron, Ohio. “That is what you have to do, day in and day out, at a wastewater treatment plant. It's all about collecting data, interpreting data and making informed decisions.”

That analytical approach has served Holton well as he progressed from part-time work at a treatment plant during college to his current role and a Class III Wastewater Operator license, the second highest level in Ohio.

It has helped him keep effluent in compliance, hold plant electricity costs down and work within a challenging set of phosphorus-based biosolids land application regulations. It has also helped him earn the 2014 Professional Wastewater Operations (PWO) Award from the Southeast Section Ohio Water Environment Association (OWEA), the 2015 PWO Statewide Award from the OWEA and a 2014 Awesome Operator Award from the OWEA.

Mel Weaver, water reclamation supervisor with the district, observes, “From his very first day here, Josh has displayed the highest level of initiative, commitment, enthusiasm, adaptability and dedication to his craft. He consistently performs at a level way beyond his years of service. I have never seen him display anything other than an extremely positive and motivated attitude toward his work and others.”



Josh Holton, senior wastewater treatment operator III, Southwest Licking Community Water and Sewer District.

CHANGING COURSE

Holton grew up in Amanda, Ohio, a small community southeast of Columbus. He graduated from high school in 2005 and entered Capital University in Columbus, where he earned his degree. While in college he worked two summers with Fairfield County Utilities, doing odd jobs. “Going into my junior year, I started working part time during school in the wastewater and water departments, operating the belt press and helping out with projects when they needed an extra hand,” he recalls. “I really liked the mixture of indoor and outdoor work. Growing up in the country, I was always outside.”

After graduating from college, he found jobs scarce in his fields. Fairfield County hired him as an operator in training, and he planned to work there until he found a teaching position.

He started working mainly at the largest of the agency's four treatment plants, a 3 mgd vertical reactor facility. He then became a “floater,” helping out at all four plants as needed. “At that point I decided I might as well get my license,” he says. “I passed my Class I test and realized this was what I wanted to do with my life. I just kind of fell in love with it. I like the freedom of this career. On a given day you can be doing paperwork, pulling a pump, hanging a gutter. It's very flexible.”

Along the way, the general manager at Fairfield County, Don Rector, P.E., moved to Southwest Licking. In 2012, he hired Holton as an operator. Two years later, Holton earned his Class III license, and he and Weaver hired another Class III operator, Jeff Shaw. Together they now operate the 2.65 mgd (design) Southwest Licking Environmental Control Facility.



“During storm flows or other high flows, the oxidation ditch treats up to about 1.4 mgd, whereas the extended aeration train fluctuates to as high as 6.6 mgd. Basically, the extended aeration basin provides our storm surge capacity.”

JOSH HOLTON

ABOVE: Holton performs regular maintenance on the belt filter press (Komline-Sanderson). LOWER LEFT: One of the awards earned by Holton during his successful career at the Southwest Licking district is the 2015 Professional Wastewater Operations Award from the Ohio Water Environment Association.



Josh Holton, Southwest Licking Community Water and Sewer District, Hebron, Ohio

POSITION: | **Lead operator**

EXPERIENCE: | **8 years**

EDUCATION: | **Bachelor's degree, political science and education, Capital University, Columbus, Ohio**

CERTIFICATIONS: | **Class III Wastewater Operator**

MEMBERSHIPS: | **Ohio Water Environment Association**

GOAL: | **Attain Class IV certification; help OWEA become more involved with operators**

GPS COORDINATES: | **Latitude: 39°58'1.46"N;
Longitude 82°37'23.69"W**





POWER BROKER

Living within a budget is always a challenge for a small clean-water utility. Josh Holton and the team at the Southwest Licking Community Water and Sewer District have helped hold down costs by managing electricity wisely. They do it by taking advantage of Ohio's competitive power market to secure lower costs per kilowatt-hour, and by managing peak demands to keep utility demand charges down.

"We are in the AEP Ohio utility service area, but we actually buy our energy through Direct Energy, a power-based company in Texas," says Holton. "Because Ohio is a deregulated market, we don't have to buy power from our local utility." The Southwest Licking plant's power is delivered across AEP Ohio lines but is generated elsewhere.

"This arrangement allows us to have much lower per-kilowatt-hour cost than if we purchased it straight through AEP Ohio," says Holton. "It's a fairly simple process, and yet in certain ways complex and time-consuming at the same time. My supervisor, Mel Weaver, really started the process, and I have worked with him and helped him.

"It's definitely something every wastewater utility should look at. Throughout these last few years, our electricity costs have gone up slightly, but without brokering our power the way we're doing, they would have gone up astronomically. We spend around \$200,000 a year on electricity just for the plant. Without brokering

we would be spending in the range of \$260,000 to \$270,000.

"The other aspect is demand management and understanding demand and peak power. We deal with an energy company called EnerNOC for demand response. Our agreement says that anytime the grid is highly stressed, they can direct us to go off the grid by using our backup generators." In return, EnerNOC sends monthly checks that add up to about \$10,000 per year — even though to date the district has not been called upon to fire up its diesel generators (200 kW KOHLER and 800 kW Caterpillar at the wastewater plant, and a 350 kW KOHLER at the water plant).

In working through the demand response program, the Southwest Licking team also learned to manage its own demand. "Under demand charges, the plant's highest peak of demand in a given month can equate to almost 30 percent of our electric bill," says Holton. "With the EnerNOC system, we can look at our demand any given time throughout the day. By changing operating procedures, we can cut that demand and keep our costs down."

The plant normally runs three of its eight 75 hp centrifugal blowers for the aeration basins and aerobic digesters. "During storm flows we have to turn on additional blowers for the increased demand," says Holton. "But just doing that, even for an hour, costs us about \$1,000. So we asked, 'If we have to turn another blower on, what can we turn off?' Now, during times of higher demand, if possible, we turn off the aerobic digestion blower."

OPPOSITE PAGE: The team at the Southwest Licking Community Water and Sewer District includes, from left, Josh Holton, senior wastewater treatment operator III; Don Rector, P.E., general manager; and crew members Rick Mourne, Sawyer Hill, Jeff Shaw, Christopher Gilcher, Chad Sims, Josh Smith and Matt Pennington.

DUAL TRAINS

The Southwest Licking district commissioned a 1 mgd oxidation ditch plant in 1994, but the community grew rapidly and 10 years later added a 1.65 mgd plug flow extended aeration plant. The facilities operate as separate trains except that solids processing is combined. Effluent discharges to the South Fork of the Licking River. Average flow is 2.1 mgd.

The district's service area covers about 80 square miles, and the collections system includes 43 pump stations that feed two main influent pump stations, one at the plant site and the other about 2 miles away. "We have 100 percent force main influent stations," says Holton. "We have no gravity flow into the plant."

“From his very first day here, Josh has displayed the highest level of initiative, commitment, enthusiasm, adaptability and dedication to his craft. He consistently performs at a level way beyond his years of service.”

MEL WEAVER

Influent is lifted by two pump stations equipped with submersible pumps (Flygt - a Xylem Brand) and passes through a Parshall flume and a Muffin Monster grinder-auger (JWC Environmental). From there the flow is split. About half goes to the oxidation ditch (Evoqua Water Technologies) and the balance to the extended aeration unit.

"During storm flows or other high flows, the oxidation ditch treats up to about 1.4 mgd, whereas the extended aeration train fluctuates to as high as 6.6 mgd," Holton says. "Basically, the extended aeration basin provides our storm surge capacity."

Each treatment train has two secondary clarifiers. Effluent is delivered by screw pumps (Lakeside Equipment) to a vertical-bulb UV disinfection system (Ozonix) before discharge.

Waste activated sludge from both processes at 0.5 percent solids is combined in four 270,000-gallon aerobic digesters. Digested material at 2 percent solids is fed to a belt filter press (Komline-Sanderson) that delivers cake at 14 percent solids.

A covered biosolids bay with a concrete pad has about 250 days' storage capacity (about 150 dry tons). Contractor Carl Wheeler Inc. takes charge of hauling and surface-applying the material to farm sites; farmers incorporate it into the soil. Holton and his team handle site permitting and specify the application rates.

FACING CHALLENGES

Apart from the daily challenges of operating and

maintaining an aging facility with a small staff, Holton has had to navigate an increasingly complex set of biosolids rules. Farmers receive the material at no charge. Abundant farmland is available near the plant, though Holton and Shaw look for sites with well-drained soils to minimize times in spring and fall when the land is too wet to accommodate equipment.

Complicating matters significantly, new Ohio EPA regulations took effect in 2013 that require accounting for phosphorus in land application. The regulations aim to help curtail algae blooms in rivers and lakes, most notably Lake Erie. Previously, applications were limited to the amount required to meet the crop's nitrogen requirement. Now the cap is based on the amount of nitrogen or phosphorus applied — whichever is more limiting based on the soil test. In most cases, the limiting nutrient is phosphorus.

In addition, Holton had to learn how to calculate a Phosphorus Risk Index for each field using Revised Universal Soil Loss Equation Version 2 (RUSLE2) software, a computer model from the Natural Resources Conser-

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Josh Holton stays sharp through active involvement in the Ohio WEA. He is a director of the organization's Southeast Section.

vation Service that measures the potential severity of erosion from rainfall and runoff.

"Basically it determines the likelihood of particles of soil washing off the field in a rain event and getting to a stream," says Holton. "It takes into account the soil types, how much biosolids or chemical fertilizer you're adding, the method of application, local rainfall data, the degree of slope and the slope length of field, and the soil hydrology. It's very challenging, but it's definitely for the benefit of the environment."

Although the South Licking plant has no phosphorus limit for its effluent, Holton believes that may be coming: "It could present some challenges for us operationally."

“I encourage younger operators to get with older operators and try to absorb as much knowledge as possible before it's too late. I have benefited greatly from that.”

JOSH HOLTON

FULLY COMPLIANT

As it stands, the plant maintains an excellent compliance record. Holton and Shaw keep a close eye on the process, drawing extensive data on every process phase collected over several years. Last winter, effluent ammonia began edging upward to 1.0 mg/L, though it remained within the winter permit limit (4.5 mg/L weekly average, 3.0 mg/L monthly average).

"We couldn't figure out where it was coming from, though we had a couple of indicators," says Holton. "Because we've kept track of everything through the years I've been here, we could go back and compare data. There's DO for every zone, temperatures from every day, all the data in the world that you would want.

"We have four tanks in our extended aeration basin and four sets of diffusers in each tank. By keeping track of our DO readings and comparing them with temperature, we were able to go back and investigate. It immediately struck us that going into the third tank our DO was 0.5 mg/L, when in years past it had been around 1.0 mg/L at the same time of year and at a similar temperature. So it appeared we weren't delivering quite enough air quickly enough. We made adjustments in our aeration basin to counteract that."

ACTIVE IN THE INDUSTRY

Holton keeps sharp not just through diligence in his own facility but also through activity with OWEA; in 2015 he was elected a first-year director of the association's Southeast Section.

"I think every operator should participate in an organization like OWEA," he says. "It's really a great organization because it meshes engineers and operators, and you don't usually get that interaction in everyday situations."

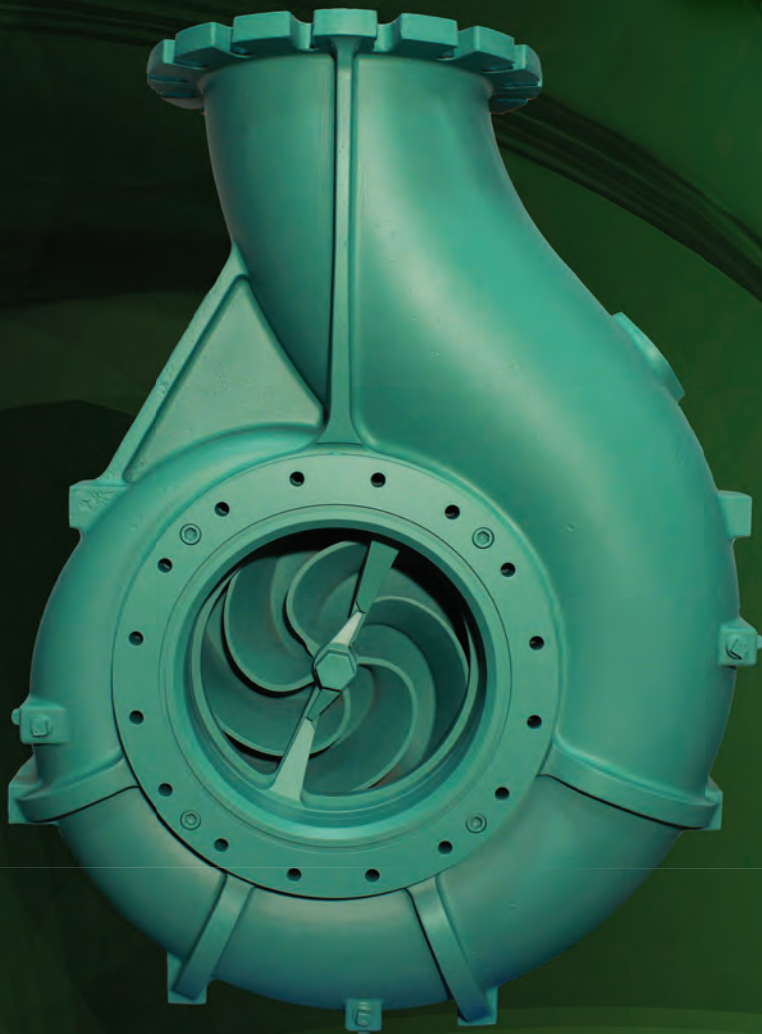
"It definitely helps you get a feel for all the options available for your everyday tasks. It helps you think outside the box more. At my plant, I don't get to see all the different technologies out there, or how other people are

doing things. OWEA allows that, especially in the section meetings where we do plant tours frequently."

Looking down the road at his career, Holton aspires to earning his Class IV operator license. He advises other operators to make full use of the resources around them, including the knowledge of experienced operators.

"This industry is going through a major transition where older operators are retiring, and when they do a lot of knowledge will be lost," he says. "I encourage younger operators to get with older operators and try to absorb as much knowledge as possible before it's too late. I have benefited greatly from that." **tpo**

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Keep It Flowing

SOLIDS MANAGEMENT SYSTEM FROM GORMAN-RUPP ELIMINATES DOWNTIME BY ADDRESSING THE CHALLENGES OF NONWOVENS IN WASTEWATER

By Jennifer West

They might be convenient, and they might make housekeeping less of a chore, but those “flushable” white squares have created a giant headache for municipalities. The cost of removing wipes (nonwovens) from household plumbing, collections systems, lift stations and treatment plants has reached millions of dollars for some cities.

New York City estimates costs of \$18 million over five years related to wipes; Orange County, California, reports spending more than \$300,000 in one year. Several Minnesota cities have filed a lawsuit against the wipes manufacturers.

Still, the costs keep rising. Public education might be the long-term solution, but until then, municipalities must address the issue with equipment upgrades. At the 2016 Water & Wastewater Equipment, Treatment & Transport (WWETT) Show, manufacturers including Gorman-Rupp Company displayed products aimed at wipes.

“People keep flushing wipes, so you have to change your equipment,” says Mark Schneider, district manager, as he discussed the company’s Eradicator. Built to create an obstruction-free flow path, the Eradicator is a solids management system available on new Super T Series pumps or as a retrofit to those pumps.

“New sewage includes the disposable wipes that aren’t disposable, and even adult diapers or any diapers,” Schneider says. Whether it’s hair, plastic gloves, plastic bags, stringy material or wipes, the Eradicator passes material through the pump without interrupting service. A self-cleaning wearplate and a series of notches and grooves on its lacerating teeth grind the solids so that they pass straight through, staying clear of the eye of the impeller. The product includes a lightweight inspection cover for easy access to the impeller; it is necessary to remove the entire back cover assembly to gain access.

The device is available in Gorman-Rupp Hard Iron or cast iron. Besides municipal applications, it has been installed in clog-prone industrial sites such as poultry-processing plants where feathers can wreak havoc on pumps. Schneider says the smooth-bore design is all about preventing snags and thus lowering life cycle cost.

Innovations like the Eradicator kept the Gorman-Rupp WWETT Show booth busy. Although they saw the most foot traffic on the first two days, the company’s booth, filled with shiny new pumps in signature cobalt blue, stayed busy throughout the show. The company has noticed an uptick in international attendees.

“We’ve had lots of international folks coming through,” says Schneider. “We also have a Spanish-speaking person on staff, which helps.” **419/755-1011; www.grpumps.com. tpo**



Mark Schneider, left, district manager for Gorman-Rupp Company, discusses a new centrifugal pump with an attendee at the 2016 WWETT Show. Products including the Eradicator Solids Management System are aimed at resolving the wipes problem.



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Efficient and Garden-Friendly

LESSONS FROM ORANGE COUNTY'S SPRINKLER SPRUCE-UP
ENCOURAGE TASTEFUL WATER-SAVING LANDSCAPES

By Craig Mandli

According to the U.S. EPA, just one broken irrigation sprinkler head can waste up to 25,000 gallons of water and more than \$90 in a six-month watering season.

In the drought-ravaged Southwest U.S., that's not only wasted water, but also wasted opportunity. That's why one California water district formed a partnership with Home Depot to urge efficient irrigation practices.

"We've really cracked down on water usage as the drought has continued, but one area we were kind of missing the boat on was irrigation systems," says Joe Berg, the director of water-use efficiency for the Municipal Water District of Orange County. "The overall goal of our Sprinkler Spruce-Up program is to encourage people to pay attention to their irrigation systems."

TEAM EFFORT

The district, supplying water to 2.3 million customers of 28 water utilities in three cities, collaborated with several water utilities to kick off its Sprinkler Spruce-Up in spring 2014. The district teamed with the Orange County Stormwater Program and the University of California Cooperative Extension to host three events at Home Depot stores in northern, central and southern Orange County.

More than 700 retail customers learned about WaterSense-labeled, weather-based irrigation controllers and the importance of updating and maintaining irrigation systems. The program expands on an idea promoted by the EPA WaterSense program.



More than 700 customers learned about WaterSense weather-based irrigation controllers and the importance of maintaining irrigation systems.

"It puts the focus on the water consumer," says Berg. "Not only are we looking at the amount of water used, but also everything else you are putting in your yard and how that affects both the water supply and water quality. The focus is on the complete journey of every drop of water that hits a yard."

'SMART' SUCCESS

On three Saturdays in May and June, the district and its partners hosted booths at Home Depots garden centers, engaging customers before they made landscaping decisions. The area was stocked with low-water-using plants and WaterSense-labeled controllers marked as rebate eligible.

Knowing that cost-saving incentives often drive customers' behavior, the district offered rebates of up to \$380 per device and \$120 per installation on qualifying controllers. If all consumers who qualified for rebates at the events upgraded their irrigation systems with properly installed, programmed and maintained WaterSense-labeled controllers, they could save more than 4,300 gallons of water per day.

"The controllers direct how much water is used for irrigation, taking into account the weather conditions and humidity, and also the change in seasons," says Berg. "They can be very effective saving water while maintaining a nice garden."

The event included displays of flowering plants and shrubs that don't require extensive irrigation to survive dry conditions.



Water agency and city staff worked with Home Depot staff to inform residents about incentives and rebates, climate-appropriate plants, and irrigation equipment.

The program worked in a big way: WaterSense controller sales at the three locations increased by more than 225 percent compared to average daily sales. Assuming the 106 weather-based controllers replaced standard clock timers, Berg estimates nearly 1.6 million gallons of water saved each year — some 15,000 gallons of water per home.

“May was really the perfect time to promote an event like this,” says Berg. “People are excited to get out and work in their gardens and enthusiastic about learning about the new technology that’s out there.”

SPREAD THE WORD

The Orange County district and its partners used multiple media platforms and advertising to drive customers to the events, including social media, press releases, flyers, brochures, utility inserts and bus wraps. Cities and water agencies promoted the events on bill stuffers, in newsletter articles, and on social media and websites.

The participating organizations distributed fliers to each Home Depot store in the county, highlighting the water-efficient irrigation devices and detailing the program goals. Orange County staff worked with Home Depot to make sure all promoted products were appropriately labeled and easy for customers to find.

“Home Depot shared our commitment to making these events a success,” says Berg. “We educated dozens of their employees on the importance of water-use efficiency and how the irrigation systems and smart controls are effective. They were enthused to work with us, and I think that showed in the overall success of the events.”

Another measure of success was the power of traditional and new-age media. The events garnered more than 7.3 million marketing impressions. “We still get follow-up calls weekly from magazines and newspapers from all over the country wanting to talk about our partnership with Home Depot,” says Berg. “That has led to other water operators and municipalities calling to pick our brains on how to do similar programs in their areas. We’re obviously more than happy to share.”

KEYS TO THE FUTURE

Critical to the initiative was city and water agency staff involvement in the planning, execution and public outreach. Staff took part in coordination meetings and conference calls, helped with applications for permits and volunteered at the events.

Water agencies and city stormwater representatives also promoted local incentive programs and worked with Home Depot staff to increase awareness of incentives and rebates, climate-appropriate plants, and irrigation

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equipment. The stores continued to promote the water-efficient products after the events.

“I think the key to a successful outreach program is choosing partners who share your enthusiasm for the idea you’re promoting,” says Berg. “Home Depot is making sales, but they know they are doing a good thing for the environment as well, and they embraced that.”

After the initial success, Berg sees an opportunity to expand them. Home Depot stores in California and other garden centers have expressed interest in holding similar events.

“These retail outlets are big stakeholders, because if our water reserves become depleted, irrigation is no longer feasible, and people will no longer be able to plant gardens,” Berg says. “Events like this enable them to reach customers and help us get the word out on the importance of water-use efficiency. It’s a win-win.” **tpo**

Much More Than a Contest

TRINITY RIVER AUTHORITY TEAMS FIND THE OPERATIONS CHALLENGE SHARPENS WORKPLACE SKILLS, BUILDS STRONG TEAMS AND HELPS OPERATORS ADVANCE THEIR CAREERS

STORY: **Jim Force**

PHOTOGRAPHY: **George Campbell**

SUPPORTERS WHOOP AND HOLLER AS TEAMS RACE THROUGH A SAFETY rescue operation or repair a pump. The tension mounts as contestants check and recheck their numbers during the lab event, or pore over tough questions on process control.

But the value of the Operations Challenge competition, conducted every year by the Water Environment Federation with finals at WEFTEC, goes much deeper than the races against the clock in the arena on the exhibit floor.

Teamwork, pride in the profession, introduction to new technologies, discipline, humility, respect for others, networking — these are all benefits of competing in the Challenge. That's the unanimous feeling of this year's Division 1 champions, the TRA CReWSers from the Trinity River Authority in Dallas, Texas. That sentiment is shared by the Waste Warriors, TRA's Division 2 entry, which won the lab competition at the national event and finished 13th overall.

"What I truly love about Operations Challenge is how the workforce gains more respect for other departments," says John Bennett, manager of TRA's Denton Creek Regional Wastewater System. "As a mechanic, I understand what my buddies in operations go through. I have more respect for them. It goes beyond the Challenge event."

Adds David Brown, senior maintenance technician and a 15-year member of the CReWSers, "You gain knowl-



The TRA CReWSers team includes, from left, Dale Burrow, team captain; team members Jake Burwell, David Brown and Raudel Juarez; team coordinator Mike Young; and team coach Steve Price.



The Waste Warriors team includes, from left, Andrew Moore, captain, and team members Howard Williams, Andrew Esquibel and Clifford Woods.

edge, you move up to the highest level of licensing possible. That's the story that's repeated in the Operations Challenge program a multitude of times. The number of operators who move up to supervision and management from this program, it's incredible."

SUCCESSFUL RUN

The CREWSers, now five-time national champions, won their other titles in 2005, 2006, 2008 and 2009, representing TRA's 162 mgd Central Regional Wastewater System Treatment Plant. The team included, in addition to Brown:

- Steve Price, chief operator for the liquids division, with 22 years on the Challenge team.
- Raudel Juarez, chief maintenance mechanic, four years.
- Dale Burrow, interceptor systems specialist, 22 years.
- Jake Burwell, construction inspector II, 10 years.

The Waste Warriors competed for only the second year, representing TRA's 11.5 mgd Denton Creek facility. Team members were Andrew Moore, senior operator; Clifford Woods, operator II; Andrew Esquibel, mechanic II; and Howard Williams, operator I.

For both teams, practice is what makes perfect, and management support is critical. "We've been together for a while," says the CREWSers' Burrow. "All team members have been the same for the last four years." For that reason, the CREWSers' practice schedule doesn't ramp up until about a month before the competition.

"We practice a couple of hours, three days a week, but as the competition approaches, we'll practice all day for about a week," Burrow says. The team has a mock-up of all five event categories — safety, lab, process control, collections and maintenance — set up in the back of the plant to simulate the real thing.

For the Warriors, the practice schedule is more demanding, and not just because they're newer to the competition. "At a smaller facility like ours, the

“You gain knowledge, you move up to the highest level of licensing possible. That's the story that's repeated in the Operations Challenge program a multitude of times. The number of operators who move up to supervision and management from this program, it's incredible.”

DAVID BROWN

TEXAS PRIDE

Dale Burrow says one of the things he's most proud of is that Texas is one of only four states that have won the Division 1 Operations Challenge competition since it was introduced in 1988.

The only other states that have had winning teams are California, Colorado and Virginia. In this year's competition, 44 teams qualified for the national event, coming from the U.S., Canada, and, for the first time, Germany.

"The Ops Challenge makes me proud to represent Texas," Burrow says. "We're there to show folks what we do. As they watch and witness the test runs, they realize there's more to it than they may have thought."

The TRA CREWSers have every intention of winning it all again. The Waste Warriors just want to keep on getting better and "take something that we learned home with us," says team member Andrew Moore.

challenges are unique," says Bennett. "Our team actually practices at the CREWSers' facilities."

That's an hour drive, with traffic. "We have to practice before and after shifts," says Bennett. "It takes a lot of coordination to do that. We're really blessed that all 15 of our staff are really dedicated to the Challenge. They take a tremendous amount of pride in how the team does. From a management perspective, this is an excellent team-building activity. All the team members come together. It's really exciting to see it happen."

Brown adds, "We spend a lot of time on our own, maintaining our physical fitness and studying for the various tests. We couldn't do this without great management support."



“It forces me to stay updated on technology. It’s helped me learn more than any class could ever teach me. I’m getting a lot of knowledge that’s useful in my daily routine.”

RAUDEL JUAREZ

KEYS TO VICTORY

In the eyes of the TRA teams, experience counts heavily in a successful competition. “We have been working together so long, we know each other’s strengths and weaknesses,” says Burrow. “We can put the right person in the right spot for a particular event.”

Says Price, of the CREWSers, “Consistency definitely is a key, especially to stay competitive at the national level. Consistency is necessary both during practice and at the event itself. We spend a lot of time going over the rules, working on speed and accuracy. We’re always pushing to better our times.”

At the same time, teams need to be able to adapt to change. “The events change so often,” says Bennett. “The safety event is radically different now than it used to be.” Equipment and procedures change, and vendors bring in new technology, he notes, so teams need to keep up to date and up to new challenges, as the events change about every three years.

The ability to accept criticism is just as important. “One of the things you learn right off the bat is to take constructive criticism,” points out Burrow. Members shouldn’t get upset when things are pointed out that need to be done better, to help the team overall, he notes.

Brown adds, “If you do mess up, you need to forget it and move on to the next event. It can seem simple, but if you have one little blip, it can throw everything off.” He recalls a time when his team recorded a slower time in pipe cutting because they weren’t familiar with the pipe material: “You need to get it out of your head and work through it.”

Waste Warriors and TRA CREWSers members share a lighter moment while practicing proper pipe repair technique.

Finally, success calls for strong individual effort. “We study for the process control event all year long,” says Brown. “The amount of time spent individually is often overlooked.

It ties in with how the team does. All eyes are on you. If you don’t bring it on game day, you’re dead in the water. The guys around you are there to help and support you. We back each other up.”

Operations Challenge championship team members (from left) David Brown, Dale Burrow, Raudel Juarez and Jake Burwell practice pipe leak repair in the Trinity River Authority’s indoor training facility.





The Waste Warriors team of Andrew Moore, Howard Williams, Clifford Woods and Andrew Esquibel practice their lab skills for competition.

FRIENDSHIPS AND NETWORKS

A key outcome of the Operations Challenge is the opportunity it gives participants to get to know other teams from around the country and network with them. "It's great to get out there and meet teams from other states," says Burrow. "It's nice to talk with them. We've become very good friends. During the recent flooding in Texas, other teams offered to bring pumps down to us if we needed them. They had our back."

Likewise, he says, when Hurricane Sandy tore up the East Coast a couple of years ago, his team touched base with teams they knew in that area, offered any help that might have been necessary, and made sure everybody was all right.

Whether on a winning team or not, participants in the Operations Challenge event have a special opportunity to learn what's happening in the clean-water profession and transfer that know-how to their daily work. "A lot of things we do for Operations Challenge give us a better understanding of what we're doing in our job," says Moore, of the Waste Warriors.

Juarez, a four-year veteran of the competition, explains it this way: "When I got involved, it provided me with a window as to where the industry was going." In particular, he says the process control tests introduced him to changes in technology that he hadn't been exposed to: "It forces me to stay updated on technology. It's helped me learn more than any class could ever teach me. I'm getting a lot of knowledge that's useful in my daily routine."

WHAT'S IT ALL ABOUT?

The Operations Challenge is one of the most popular events at the annual WEFTEC conference. It's a chance for wastewater collections and treatment personnel to demonstrate, before cheering audiences, their skills dealing with flooding, workplace accidents, process problems and other emergency situations.

Each team is sponsored by a Water Environment Federation Member Association or recognized Operator Association. In many cases, state and regional competitions determine which teams will compete in the national Challenge at WEFTEC.

Winners are determined by a weighted point system for five events: collections systems, laboratory, process control, maintenance and safety. To find out more about the Operations Challenge, send an email to opschallenge@wef.org.

Burrow echoes that: "For safe entry, we're seeing new gas detectors, new safety harnesses and new gantry tripods." In collections, he says, the team got to see new autosamplers for the first time. "We get exposed to a lot of new equipment supplied by vendors, and we can take that experience into our own departments."

Price adds, "It carries over into our day-to-day responsibilities. After doing this for so many years, it almost seems a mindset, trying to figure out more efficient ways of doing things." **tpo**

Tri-Fuel Cogeneration

AN AWARD-WINNING DESIGN-BUILD PROJECT IN MIAMI-DADE COUNTY FUELS ENGINE-GENERATORS WITH A MIX OF DIGESTER, LANDFILL AND NATURAL GAS

By Doug Day

It's one thing to expand a cogeneration system. It's another to do it on a fast track without taking the existing system out of service or disrupting operations.

The Miami-Dade Water and Sewer Department did just that at its 112.5 mgd South District Wastewater Treatment Plant in 2015. It also expanded its fuel supply by adding the capacity to burn methane from a neighboring landfill in a variable combination with the traditional digester gas and natural gas.

The increased generation capacity will save about \$900,000 a year for the department, the sixth-largest wastewater utility in the United States. For tapping renewable energy resources, the project received \$1.5 million in assistance from the Energy Efficiency and Conservation Program of the U.S. Department of Energy.

It took about 16 months for the \$25 million project to go into operation, according to Bob Ortiz, vice president of the Brown and Caldwell engineering and construction firm. His company teamed with general contractor Poole & Kent on the design-build project.



PHOTOGRAPH BY TREVOR ROSECRANS

FUEL CHOICES

Ortiz says designing a system that can burn three fuels was one of the biggest challenges. "They had some excess landfill gas available, so that led to the idea of trying to recover it," he says. "Blending is a challenge, and each source has a different heating value. In addition, the cogen engines were required to meet defined mechanical efficiency and air emissions standards for any given feedstock."

The old system had three 0.9 MW engines (total capacity of 2.7 MW). The new 8 MW combined heat and power system uses four 2.0 MW Cummins C2000 N6C engine-generators. Despite the three fuel sources, the system requires only one gas-cleanup system. Digester gas accounts for most of the fuel burned by the system.

"Typically, natural gas is used to sweeten the digester gas as needed to produce more energy," says Ortiz. "The plan was to start with about 200 cfm of landfill gas and slowly increase that to as much as 800 cfm. The quality of the landfill gas varies, so you have to be careful with blending it."

Methane content is also different: Landfill gas typically contains about 45 percent methane, while digester gas has a methane content of about 60 percent.

TRICKY LOGISTICS

The new system increases electrical efficiency from 33 percent to 37 percent at full load and meets the nitrogen oxide (NOx) emission standard of 1.0 gram per brake horsepower-hour. The expanded system can provide up to 90 percent of the treatment plant's power demand and reduce grid-purchased electricity by about 30 percent.


To maintain power generation and digester heating without interruption, the engines had to be installed without disrupting the existing cogeneration

ABOVE: The gas conditioning system includes iron sponges and chillers to remove moisture and cool the gases before they enter the cogeneration units. Those engines can use biogas, natural gas, and landfill gas in any combination. BELOW: All components of the new cogeneration system were installed while the old system remained in operation. Three old engines were replaced with four new energy-efficient models in the same footprint with room to add one more generator.



system, installed in the early 1990s. The new engines also had to fit into a tight footprint. In a discussion of lessons learned after completion of the project, the participants considered that the biggest accomplishment, according to Ortiz.

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The exhaust system for the cogeneration units includes eight supply fans, 10 exhaust fans, and extensive piping and ductwork.

Two of the new engine-generators and related systems were installed and put into service before the old engines could be removed. "It was pretty tight," says Ortiz. "They were jacked up, put on rollers, and pulled out one at a time."

Poole & Kent had anticipated that contingency when it built the South District plant in 1991. "They thought ahead, and the building was designed to do that," says Ortiz.

The final two new engines were then installed and put into service before the final old generator could be removed. The design includes room for a fifth generator for future expansion. The 5 kV switchgear did require a new building, constructed next to the treatment plant. The new cogeneration facility was completed in June 2015.

CAREFUL COORDINATION

Ortiz says close collaboration between the Miami-Dade Water and Sewer Department and the design-build team made it possible to complete a difficult job on schedule and on budget. "A lot of times, owners are at an arm's length," he says. "Working very closely with the design-build team really helped and avoided a lot of those little things that can eventually cause problems. Meetings were held every week to talk about outstanding issues, problems and action items."

Cooperation among all parties also allowed the permitting to be completed in short time. Permit documents were developed in just three months, allowing the contractor to start work quickly.

That teamwork and other attributes earned the project the Best Overall Award in the water/wastewater category from the Florida Region of the Design-Build Institute of America. In addition, the Association of Metropolitan Water Agencies gave the project its Sustainable Water Utility Management Award.

The South District facility is one of three plants Miami-Dade County uses to treat wastewater from its 350,000 retail sewer customers. It serves the unincorporated areas of the county and provides wholesale service to 12 municipalities and the Homestead Air Reserve Base. All of the treatment plant's effluent is reclaimed through deep-well injection into the underlying aquifer.

With experience from the project in hand, Ortiz says Brown and Caldwell hopes to have another opportunity with Miami-Dade on a similar project at the county's other wastewater treatment plant, which may also be able to tap a source of landfill gas. **tpo**

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OPERATORS AT THE H.L. MOONEY ADVANCED WATER RECLAMATION FACILITY MEET THE CHALLENGES OF BEING NEIGHBORLY AND CUTTING DOWN NUTRIENT DISCHARGES

STORY: **Ted J. Rulseh**

PHOTOGRAPHY: **Laura Turner**



H.L. Mooney Advanced Water Reclamation Facility has earned three consecutive Peak Performance Platinum Awards from the National Association of Clean Water Agencies (NACWA).



THIRTY-FIVE YEARS AGO, THE WASTEWATER TREATMENT plant serving the east half of Virginia's Prince William County lay mostly isolated, surrounded by woods.

Today, development has encroached on three sides; high-end homes in subdivisions stand as close as 200 yards away. The remaining side abuts Neabsco Creek in an area with wildlife preserves and ecologically sensitive wetlands.

Meanwhile, the plant faces tightening permit limits on nitrogen and phosphorus under the Chesapeake Bay Program. It all means the plant, now known as the H.L. Mooney Advanced Water Reclamation Facility, needs to bring its "A game" every day, limiting odors, controlling treatment processes and minimizing emissions from its fluidized bed biosolids incinerator.

It's a challenge taken with gusto by water reclamation operations manager Rachel Carlson, process engineer Maureen O'Shaughnessy, and teams of plant operators, maintenance specialists and laboratory technicians who work for the Prince William County Service Authority (PWCSA).

Their efforts have earned the H.L. Mooney plant three consecutive Peak Performance Platinum Awards from the National Association of Clean Water Agencies (NACWA), representing seven years without an effluent permit violation.

EXPLODING GROWTH

For years, the PWCSA has been challenged to keep up with growth. "The county population is close to 420,000 people," notes Kipp Hanley, a communications staff member. "From 2000 to 2010, the county grew by almost 40 percent. Prince William is in the top 10 or 20 counties nationally in household income."

Based in Woodbridge, about 25 miles southwest of Washington, D.C., the PWCSA serves an area that is largely suburban; the western reaches are more rural and include some homes on wells and septic systems. The authority supplies Prince William County with drinking water, purchased from neighboring Fairfax County. The 24 mgd (design) Mooney plant serves about 88,000

residential and commercial connections. There are no major industrial users.

"Before the PWCSA was formed in 1983, this area had a number of small wastewater treatment plants," says O'Shaughnessy. "There was a big effort in the 1970s to clean up the Potomac River, and this plant's construction was part of that. After it was built, five smaller plants were closed, pumping stations were built and the wastewater came here."

The plant was upgraded to 18 mgd in 1997; that project replaced an older multiple-hearth incinerator with the fluidized bed unit. A \$131 million upgrade in 2012 boosted capacity to the current 24 mgd and enhanced nitrogen and phosphorus removal. "Our effluent has to meet a total nitrogen limit of 3.0 mg/L,"

“Nitrogen is the limiting nutrient in Chesapeake Bay, because it's saline. The Potomac is freshwater, so phosphorus is the limiting factor. That's why our limits are pretty low on both.”

MAUREEN O'SHAUGHNESSY

says O'Shaughnessy. "For phosphorus, it's 0.18 mg/L. Nitrogen is the limiting nutrient in Chesapeake Bay, because it's saline. The Potomac is freshwater, so phosphorus is the limiting factor. That's why our limits are pretty low on both."

H.L. Mooney Advanced Water Reclamation Facility, Prince William County, Virginia

BUILT: | 1981 (major upgrade 1996 and 2010)

POPULATION SERVED: | 153,000

SERVICE AREA | 69 square miles

EMPLOYEES: | 56

FLOWS: | 24 mgd design, 14 mgd

TREATMENT LEVEL: | Tertiary

TREATMENT PROCESS: | 4-stage Bardenpho, deep-bed sand filter

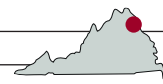
RECEIVING WATER: | Neabsco Creek

BIOSOLIDS: | Fluidized bed incineration

ANNUAL BUDGET: | \$8 million (operations)

WEBSITE: | www.pwcsa.org

GPS COORDINATES: | Latitude: 38°36'58.23"N; longitude: 77°16'2.25"W



OPPOSITE PAGE: Rachel Carlson, water reclamation operations manager, stands with the operating staff at the H.L. Mooney facility. From left, Timothy Krisner, Patrick Hills, Mike Failor, Charles Egharevba, Carlson, Michael Lawson, Robert Peterson, Vincent Taylor and James Nicely.



Patrick Hills measures the sludge blanket in a secondary clarifier.

H.L. Mooney Advanced Water Reclamation Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
BOD	258 mg/L	0 mg/L	5 mg/L
TSS	288 mg/L	0 mg/L	6 mg/L
Total nitrogen	47.8 mg/L	2.70 mg/L	3.0 mg/L
Phosphorus	6.60 mg/L	0.05 mg/L	0.18 mg/L

TARGETING NUTRIENTS

Two pump stations deliver influent to the plant's pre-aeration step. Pre-treatment consists of two band screens (Hydro-Dyne), a manual bar screen (Peabody Wells) and a grit classifier (WEMCO). "Right now, we're bypassing the grit classifiers and the flow goes into three equalization basins," says Carlson. "The grit settles out in those basins. We try to keep one online at a time. Between the three, we have about 8 million gallons capacity."

Preliminary treatment is followed by five primary clarifiers, where ferric chloride is added for phosphorus removal. More phosphorus is removed biologically in five aeration basins, which use a four-stage Bardenpho process. "We add methanol to the second anoxic zone, so we are able to remove enough nitrate to meet the 3.0 mg/L limit," says Carlson. Six blowers (Hoffman & Lamson) supply the air via fine-bubble diffusers (Sanitaire - a Xylem Brand).

The flow then passes through nine secondary clarifiers and into deep-bed sand filters. "Right now, we're using them as conventional filters, although we have the capability to add methanol there if need be to meet our nitrogen limit," Carlson says. After disinfection (TrojanUV3000Plus), final effluent flows over an aeration cascade to the outfall on Neabsco Creek, a Potomac tributary.

Odor controls are integral to the process. Packed tower scrubbers (Indusco)

treat odorous air from pre-aeration, pretreatment and from the sludge thickeners. An odor counteractant is sprayed regularly around the primary clarifiers.

SOLIDS SIDE

Commingled sludges from the primary and secondary clarifiers are fed to four gravity thickeners (Ovivo) and then to a holding tank from which the material goes to three centrifuges (Alfa Laval) that yield cake at 26 to 27 percent solids. Each centrifuge has a cake pump (Schwing Bioset) that feeds material to the fluidized bed incinerator (Hankin Environmental Systems).

"We chose the fluidized bed technology because it puts out much cleaner flue gas and is much more energy efficient to operate than our old multiple-hearth incinerator," Carlson says. The air pollution control equipment is being upgraded to comply with the U.S. EPA's latest sewage sludge incinerator (SSI) maximum achievable control technology (MACT) emission limits.

“We chose the fluidized bed technology because it puts out much cleaner flue gas and is much more energy efficient to operate than our old multiple-hearth incinerator.”

RACHEL CARLSON

"We're adding a wet electrostatic precipitator and a new technology, called a solvent polymer composite," says Carlson. "It's a scrubber with media that removes mercury from the flue gas. It's an emerging technology that our authority pilot tested and decided to install."

The fluidized bed consists of a 5-foot-deep layer of special heat-resistant sand above the combustor. Heated air blows upward through the sand, creating turbulence that breaks up the injected sludge cake. Combustion temperatures of 1,200 to 1,600 degrees F instantly ignite the material. Combustion is self-sustaining.

(continued)

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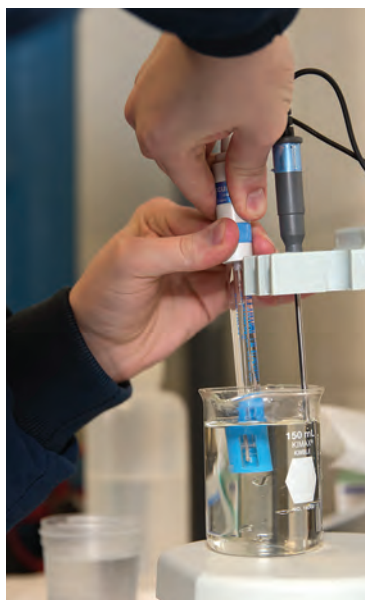


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The plant's laboratory is accredited by the State of Virginia for water and wastewater testing. Its 12 technicians handle some 40,000 samples a year.

Sterile, zero-odor incinerator ash exits the system and goes to on-site settling ponds. The ponds are periodically drained, and the ash is scooped out with a front-end loader and spread on drying pads before being hauled to a landfill. As a backup in case the incinerator should go down for an extended time, the facility includes a mobile Schwing Bioset lime stabilization unit, which can create Class A or Class B biosolids for land application.

KEYS TO EXCELLENCE

For the plant's continuous excellence, O'Shaughnessy points to a highly qualified staff and the success of the 2012 plant upgrade. "Almost every process at the plant was affected in some way," she says. "We added new screens, the new grit system, more aeration basins, more final clarifiers, new filters.

"One of our biggest problems before the upgrade was ammonia breakthrough. Once we got the extra aeration basins, the ammonia breakthrough was under control, and our long string of compliance really started coming together. The extra clarifiers helped us reduce the solids loading to the filters and improve the plant's function, keeping more of the solids in the secondary system."

A Wonderware SCADA system (Invensys) monitors all processes, including aeration. Six Hach LDO probes are strategically placed in each basin; valves automatically open and close to maintain a DO setpoint that tapers through the tank from 2.0 mg/L to about 0.75 mg/L.

STAFF DIVERSITY

Responsibilities for the plant fall to four closely coordinated departments: maintenance, operations, laboratory and administration. Operations staff members man the plant around the clock on four rotating 12-hour shifts, each with four operators.

(continued)



Rachel Carlson, water reclamation operations manager.

RECRUITMENT PIPELINE

The H.L. Mooney Advanced Water Reclamation Facility isn't unique in facing a wave of operator retirements. It is unique in the way its team deals with the issue.

The plant has a recruitment program in which trainees are hired for plant operator and mechanical maintenance positions and placed on a path that can lead directly to careers. "It's attractive to people who maybe didn't see themselves getting into wastewater," says Rachel Carlson, water reclamation operations manager. "They come in and we provide them with training and anything they need to become successful future operators and mechanics."

For the operations department, it's a four-step process. Trainees receive plant-specific training materials and take outside study classes, such as short schools in preparation for Virginia wastewater operator licenses.

Each time a trainee completes the criteria for a given step in the process, he or she receives a noncompetitive promotion to a higher

pay grade. "It makes them valuable to us because they have the training they need, and it gives them the opportunity to make more money," Carlson says. After all four steps, they can become Class 1 licensed operators at the plant.

"It's a seven-year program," says Carlson. "Trainees have the potential, if they come in and really excel, to almost double their salary within seven years. We're trying to lure people into a career that they might not have considered as a possibility."

So far, the program is paying off handsomely. "We've acquired several operators, and we just recently welcomed three new trainees," says Carlson. "Those who have come in so far have all been successful and are at different steps of the process. It's a form of succession plan for us. It ensures that we'll have people with the knowledge and skills required to operate this plant."

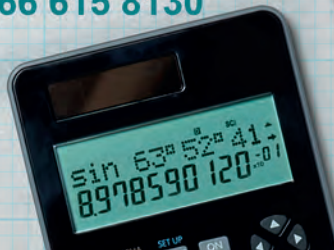
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Mike Failor changes chemicals on a ChemScan analyzer (ASA Analytics).

“We have a well-rounded maintenance department. We have on-call staff so that if there is an issue during off-hours, someone is always available to come in and make repairs.”

MAUREEN O'SHAUGHNESSY

Maintenance is divided into mechanical and instrumentation/electrical specialties, each with six people. “We have a well-rounded maintenance department,” O'Shaughnessy says. “We have on-call staff so that if there is an issue during off hours, someone is always available to come in and make repairs.”

A computerized maintenance management system (MP2) keeps preventive tasks on track, automatically issuing work orders for scheduled activities. The team also deploys predictive maintenance tools such as vibration analysis, fluid analysis and infrared thermography. Emergency power capability is supplied by two 2.5 MW diesel engine-generators (Caterpillar).

The plant's commercial laboratory is accredited by the State of Virginia for water and wastewater testing. Its 12 technicians handle some 40,000 samples a year, including all process control and compliance samples from the H.L. Mooney plant as well as samples from some neighboring plants.

The administrative team oversees all activity and keeps the other departments apprised of higher-level developments, such as impending changes in regulations.

THE DAILY ROUTINE

Workdays at the H.L. Mooney plant start with a morning meeting that involves staff members from all the areas. “We go over the plant priorities and coordinate on any major work that needs to be done, especially if we need to take any equipment out of service so that maintenance can make repairs or a replacement,” says Carlson. “As for the lab, we have a routine of the samples we grab each day for analysis.”

The plant has a safety committee with all departments represented. Weekly safety meetings and safety training sessions cover all work shifts. There are periodic safety inspections and walk-throughs of plant processes to check for hazards and verify compliance with safety policies. Joseph Del Priore, safety manager, has his office in the plant, which has won recognition for its safety program, most recently the 2014 Water Environment Federation George W. Burke Facility Safety Award.

EVER IMPROVING

The accomplishments and accolades to date aren't enough for the H.L. Mooney team. More plant upgrades are in the future. They include an upgrade to the programmable logic controller in the UV disinfection facility and the addition of a fourth disinfection channel. Another project includes replacing the mechanisms in the primary clarifiers and adding aluminum covers to reduce odors.

Besides that, a unique feature of the plant ensures that innovation and improvement will continue: The secondary process includes a testing train. “We have one set of aeration basins and two clarifiers that can be completely isolated from the rest of the secondary system,” Carlson says. “That enables us to try different setups, such as different DO controls and different carbon sources for nitrogen removal, and it doesn't affect the other systems.

“It's like a separate treatment train after the primaries. It shares the same primary influent but, once the water goes into the aeration basin,

it has its own isolated clarifiers. The clarifier effluent joins the rest of the flow before it goes into the filters. It's nice to have that flexibility for testing process improvements. In the future, we were looking to try different technologies for methanol reduction.”

It's just one more reason to think this plant has more NACWA Platinum in its future. **tpo**

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THE CALIFORNIA-NEVADA AWWA SECTION AIMS TO HELP UTILITIES COMPLY WITH STATE WATER AUDIT REQUIREMENTS. IS TIGHTER WATER ACCOUNTING BECOMING A NATIONAL TREND?

By Ted J. Rulseh

In a time of droughts across much of the country, water loss control is gaining importance for utilities. Of course, curbing losses starts with a thorough accounting of water coming in and going out.

Droughts have been especially hard on California, so perhaps it's no surprise that the state has passed new laws requiring some 450 urban water systems to perform and validate water audits. Knowing that water audits can be challenging, the California-Nevada Section of AWWA sought and won \$3.2 million from California's State Water Resources Control Board to provide technical assistance.

Tim Worley, executive director of the California-Nevada Section, sees the challenges of compliance with the audit requirements paying off for utilities in more efficient systems and for customers in more robust water supplies. He also sees water audits as a trend likely to spread to more states. Worley discussed the topic in an interview with *Treatment Plant Operator*.

tpo: What is the background for California's water system audit requirements?

Worley: California passed laws in 2014 and 2015 that require water utilities over a certain size to submit water audit results to the Department of Water Resources. The first law required those results to be submitted every five years in conjunction with utilities' urban water management plans. The 2015 law makes audits an annual requirement, and it also requires those audits to be validated by a qualified professional.

“I think for utilities the silver lining is that even though initially this is a mandate from the state, over time they'll find the process and the resulting information very beneficial.”

TIM WORLEY

tpo: When do these requirements take effect?

Worley: The audit requirements in the 2014 law start with July of this year. Under the 2015 law, it becomes an annual requirement in 2017.

tpo: Do you believe the drought is driving these requirements coming from the state?

Worley: I would say it was the drought that spurred these regulations to make water audits compulsory. Water audits and water loss control have been around for some time, and some utilities in California have been working with them voluntarily, but others haven't grappled with it. The 450 urban water systems now have the state looking over their shoulder.

tpo: Why did your association decide to pursue funds for technical assistance?

Worley: We saw that there would be a need for California utilities to



Tim Worley, executive director of the California-Nevada Section of AWWA.

understand what goes into doing a system water audit — pulling together the data that's required, validating that data, and knowing the gaps where they might not have good information. We saw a need to help bring utilities up to speed as quickly as possible.

tpo: How did you approach creating the proposal you presented?

Worley: We developed the program with a small but diverse group of stakeholders, using help from industry experts who are involved in helping utilities conduct and validate water audits. It's an intensive two-year program that we believe can be very successful if we can implement it as planned. We somewhat followed the pattern of a program conducted in Georgia. We proposed paying for it with local agency training and technical assistance funds within the State Revolving Fund. The State Water Board passed a resolution on Jan. 5 to support the program.

tpo: How will the \$3.2 million be apportioned among the 450 urban water systems?

Worley: We're not passing the money through to the utilities. The program will provide direct technical assistance from experts who can help utilities understand the water audit and validation processes. Some funds will be



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used to administer the program, and some for outreach to get the utilities on board. The vast majority is for technical assistance in the form of workshops, small groups, one-on-one outreach by phone, and probably in-person meetings.

tpo: Why do utilities need so much technical support for water audits?

Worley: In a financial audit, all the money that comes in must be accounted for down to the cent. A water system audit is similar in that if you have good information about all the water inputs, you should be able to track where all that water ends up. But a water audit has some complications. You need to make sure your meters are calibrated regularly and registering properly. You need to accurately estimate the amount of water that is not metered.

You need to understand those variables and get the right information so at the end of the day you have the most accurate estimate possible of your non-revenue water and what your real water losses are. This is not something many utilities have been doing. It's a new way of thinking that will be beneficial to them in the long run but will take quite a bit of effort and help along the way.

tpo: Who will actually deliver the various forms of technical assistance available under your program?

Worley: We will contract with a company or group of companies to do a lot of the outreach. Some of that will be done by our staff, working with a consultant. We will select the consultant we need to run this program through a competitive procurement process.

tpo: Once trained in auditing methods and validation, what investments will utilities need to make to complete the actual audits and validation?

Worley: Their main investment will be a commitment of some real staff time. These water audits really can't just be done by one person. The information will come from field personnel like distribution system supervisors, from the billing department, from engineering. Typically, there may be four or five or more people contributing to the process. It will require some labor

time to really understand what they need to do and then actually complete the audit themselves.

tpo: What do you see as the most significant benefits of the audit process?

Worley: Water conservation has been a big issue in California for many years, but especially during the past few years of the drought. State officials want to make sure utilities don't have major water losses, because during drought every drop of water is precious. While requiring anywhere from 8 to 36 percent reduction in water use by their customers, utilities need to be just as efficient in managing water resources. This change in thinking will result in better decisions on how they manage their systems.

tpo: What actions do you see utilities taking as a result of auditing?

Worley: They'll get information they can use to help find the most economically efficient ways to address problems in their systems. It may be as simple as starting an annual calibration of their meters — both the customer meters and the production meters. They could also take the information and focus on a segment of the distribution system where they need to repair and replace pipe that is corroded and causing leakage problems. So I think for utilities the silver lining is that even though initially this is a mandate from the state, over time they'll find the process and the resulting information very beneficial.

tpo: What is happening with water audits elsewhere in the country?

Worley: I'm not familiar in depth with what is happening in other states, but it seems this whole movement is sweeping across the country. We're still somewhat on the cutting edge with what we're doing here in California, but from what I hear, this is taking hold in a number of states. This is a new trend and probably overdue in some respects. Whether it comes from state law or voluntary efforts, I think it is going to spread quickly. **tpo**

It's All Settled

AN ADVANCED GRIT REMOVAL SYSTEM DELIVERS HIGH EFFICIENCY
AND RELIABLE PERFORMANCE FOR A NEBRASKA TREATMENT PLANT

By Marcia Sherony

As a critical part of a \$21.5 million upgrade to its wastewater treatment facilities, the Nebraska city of Grand Island installed a high-performance grit removal system at the treatment plant headworks.

The system is designed for redundancy and will remove 95 percent of grit 90 microns and larger. The Advanced Grit Management solution from Hydro International proved its capability in challenging first-flush conditions within days of commissioning.

"Our wastewater infrastructure was about 50 years old," recalls Dr. Jue Zhao, P.E., treatment plant operations engineer. "The city had many issues with the plant and equipment, and we were faced with a growing population and rising flows. As a consequence, the city decided to invest \$21.5 million in a five-year refurbishment project built to meet our future needs."

COMPARING TECHNOLOGIES

The pretreatment grit removal facilities were undersized and performing poorly. During peak flows, grit was being flushed through the aerated grit chambers into the primary clarifiers and depositing there. Based on discussions with city officials, the engineering firm Black & Veatch selected HeadCell grit removal technology (Hydro International), with that company's grit washing and collection equipment, to remove grit 90 microns and larger and reliably protect downstream equipment and processes.

"We were approached in 2012 to study the city's wastewater handling and treatment needs well into the 21st century, taking account of matching population growth and regulation changes," says Nathan White, P.E., Black & Veatch engineering manager. "This led to recommendations for upgrading the major sanitary interceptor sewers, as well as the main treatment plant.

“A year's worth of construction trash, sediment, grease and grit was washed through with the raw sewage, and the Hydro equipment coped with the influx without any problems. It was possibly the worst conditions the plant will face.”

NATHAN WHITE

"Grit removal at the headworks was one of the priority areas. The existing plant with its grit basins was inadequate. Much of the equipment, including valves and pumps, was corroded and barely functioning, so a complete replacement was required.

"We evaluated two types of grit removal to meet the new maximum 40 mgd flow capacity: a mechanical vortex-based design and the HeadCell/SlurryCup/Grit Snail system from Hydro. The specification for each was to remove 95 percent of grit 90 microns and larger at the average design flow of 13 mgd per treatment train, and 95 percent of grit 150 microns and larger at the maximum peak hourly flow capacity of 30 mgd per treatment train.

"Overall capital and installation costs were very similar. In consultation with the city's Public Works engineers, we visited the plant at Lincoln,



Grand Island's grit removal system is designed to remove more than 95 percent of grit particles 90 microns or larger at average daily flow rates.

Nebraska, already using HeadCell technology. City engineers were impressed with the collected grit quality. We went with the Hydro design because of its high grit removal performance combined with low mechanical equipment needs, which offer much less maintenance cost in the future."

NEED FOR RENEWAL

Grand Island, the fourth-largest city in Nebraska (population 50,000) sits on the Platte River. The water table is high, and pumping is necessary to maintain flow in pipelines and across the treatment plant, which discharges to the Wood River (a Platte tributary).

The plains topography is composed of low, rolling hills, and the soil is wind-blown and silty/sandy. Particles are inevitably washed by surface runoff into the sewers and the treatment plant. Industrial dischargers include a major meat processing plant.

The existing plant was sized for 35 mgd hydraulic capacity, but age limited its capacity to 27 mgd. Although the original 1965 grit treatment building structure was in good condition, the equipment and facilities, such as the Parshall flume for flow measurement, were in poor condition and undersized. The bar screens required replacement, and the wet well concrete at the building base needed repair. The existing facilities had no provisions for odor control.

REDUNDANCY PLAN

"As a result of all these factors, the project team decided to start with the new headworks, consisting of pretreatment and a grit removal building," says White. "There was sufficient building space to achieve the ideal configuration for a plant with parallel treatment trains, providing the redundancy we

desired. This made the planning, construction and installation of the equipment very straightforward.”

Black & Veatch worked closely with the Hydro team to optimize the layout. Each treatment train is a mirror image of the other. After mechanical bar screening, the setup on each side consists of a 12-foot HeadCell unit with 10 separation trays and a dedicated pump.

The treatment is completed by SlurryCup grit washing and classification and Grit Snail dewatering units, which dewater the grit to not less than 60 percent total solids and a maximum organics content of 15 percent. A dedicated control panel serves each train and allows full automation and integration with the plant SCADA system for remote monitoring and control, including automatic startup when incoming flows exceed set capacities.

“After grit treatment, the wastewater exits via the primary clarifiers and flow distribution structure to downstream processes, including activated sludge treatment and biosolids digestion,” says White. “Achieving a linear series of pipe runs, especially in the inflow to the HeadCell units, allowed us to reduce turbulent flow, maximize flow rates and possible settlement of suspended particles, and thus minimize maintenance in the pipework and downstream equipment, including abrasion damage.”



The dewatered grit is discharged into a hopper for removal and delivery to landfill.

EXTREME LOADS

The built-in redundancy helps maximize return on investment in the pretreatment and grit removal facilities, which have a design life of 50 years. Predicted peak-day flows of 25 mgd per train are well within the plant design, leaving 20 percent spare capacity. Officials expect that only hourly peak flows will reach the equivalent of 60 mgd when both trains would be engaged; 99 percent of the time only one treatment train would need to operate.

Construction started in July 2013, and the new plant was commissioned in early March 2015, first running with groundwater to test the equipment, then with an initial loading from the sewers. After just two days, the grit removal system was put under an extreme test and came through with excellent results.

“The replacement North Intercept sewer had been completed a year before, and the old pipeline was due to be taken out of service,” White says. “We decided to divert the sewer through the new grit removal plant, as the commissioning had proved problem-free.

“A year’s worth of construction trash, sediment, grease and grit was washed through with the raw sewage, and the Hydro equipment coped with the influx without any problems. It was possibly the worst conditions the plant will face, and we ran both treatment trains for a considerable time to catch the accumulated material.”

MARKING PROGRESS

“While we have not made any comparative survey of the rates of grit

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removal before and after, we continue to optimize the plant, with a great deal of helpful service from the Hydro team. Regular site visits and reports from site operators have shown that grit removal is much improved from before, and the equipment maintains its efficient performance.”

The city’s Zhao confirmed progress with the grit system: “I worked in consultancy before I joined the city project team in 2012 and had prior experience with HeadCell. The grit removal is already performing much better than previously, with some ongoing fine-tuning with Hydro’s help.”

ABOUT THE AUTHOR

Marcia Sherony (wastewaterinquiry@hydro-int.com) is national sales manager for the Water and Wastewater Division of Hydro International, which specializes in high-performance equipment and systems for removal of grit, sugar sand, abrasives and fixed solids. **tpo**

Odor Control and Disinfection

By Craig Mandli

Activated Carbon Systems

JACOBI CARBONS ADDSORB OX30

AddSorb OX30 activated carbon from Jacobi Carbons can be used for the control of odors such as hydrogen sulfide, mercaptans, methyl sulfides and VOCs from air emissions at municipal wastewater facilities. Made from a blend of raw materials as an extruded pellet, it is designed as a high hydrogen-sulfide-capacity product while maintaining 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.**



AddSorb OX30 activated carbon from Jacobi Carbons



OdorTrooper air treatment solution from Park USA

PARK USA ODORTROOPER

The OdorTrooper air treatment solution for wastewater systems from Park USA is ideal for piping systems, pump stations and plants located near populated developments. It is inconspicuously placed underground, adjacent to the odor-producing equipment and hidden from view. Carbon adsorption is used to capture

organic chemicals, hydrogen sulfide, VOC concentrations and other toxic and noxious gases. Exhausted air is piped through the activated carbon canisters, absorbing organic impurities. The resulting air vented into the environment is safe, clean and free from odor. The prepackaged system includes a precast concrete vault, OSHA-compliant hatchway, ladder and safety net. A corrosion-resistant air relief valve and piping provide for exhausting and admitting air through the air valves during system operations. The carbon canister is easily exchanged when the activated carbon is spent. **713/937-7602; www.parkprocess.com.**

WESTECH ENGINEERING GRANULAR ACTIVATED CARBON PRESSURE CONTACTOR

Granular activated carbon (GAC) pressure contactors from WesTech Engineering are an effective means for removal of various molecular-weight contaminants from aqueous solutions. They are suited for the removal of dissolved organic compounds responsible for poor taste and odor in drinking water, as well as removal of a variety of contaminants that can be found in industrial and municipal waters. The contactors can be supplied in an open-top gravity system or in pressure vessels. They are typically designed with a conical underdrain for convenient GAC replacement. They are sized according to the contact time required for contaminant removal and desired media replacement fre-



Granular activated carbon (GAC) pressure contactors from WesTech Engineering

quency. Filter piping and valving for multiple units can be arranged to easily change flow paths between parallel flow, series (lead/lag or daisy chain) flow, or single-unit flow patterns. They are typically backwashed once 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.**

Aeration Equipment

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The 50 hp Turbo X-Treme Magnum high-efficiency floating/surface aerator from Airmaster Aerator can pump 12.5 mgd. It incorporates a turbo blower and a double-sided impeller to achieve high-capacity water movement with maximum aeration and mixing. Its efficient design and operation allows it to replace aerators requiring up to three times the horsepower, resulting in substantial energy savings. It raises the dissolved oxygen level in the water while providing high-capacity water movement. It is ideal for a variety of applications, including municipal, industrial, agricultural and disaster recovery, and performs especially well in deep-water applications. An optional chemical injection port for adding enzymes and defoamers is available. The unit is constructed of stainless steel. **888/813-3680; www.airmasteraerator.com.**



Turbo X-Treme Magnum aerator from Airmaster Aerator



Airshell modular biofilter from Anua

Biofiltration

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Airshell from Anua is a modular biofilter with a small footprint. The air treatment system removes a wide variety of noxious odor compounds, including over 99 percent hydrogen sulfide, and can handle high variability in compound concentrations. It is prepackaged with recycled seashells, which protects the environment while reducing solids waste. The seashell media

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The biottta biological filtration system from AdEdge Water Technologies leverages nature to offer a sustainable solution for wellhead treatment of inorganic and organic contaminants. Its fixed-bed, dual-stage biotreatment cultivates an environment for microbiological organisms to destroy contaminants or reduce elements to simple unharmed forms. The fixed-bed treatment process consistently addresses contaminants at low levels, intermittent or fixed operation, and the dual bed assimilates a complete packaged biotreatment plant. It has regulatory approval for the reduction of nitrate and perchlorate and demonstrates hexavalent chromium, VOCs, iron, manganese and sulfide elimination in a single process. The low-volume discharge is easily managed as a non-hazardous waste stream. **866/823-3343; www.adedgetech.com.**



Biottta biological filtration system from AdEdge Water Technologies

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The WHISPER Biofilter from Evoqua Water Technologies is designed for quiet operation and effective odor treatment, removing 99 percent of incoming hydrogen sulfide. The rotating irrigation system provides uniform water and distribution for optimal biological conditions. The nondegradable Bioglas media, made from acid-resistant recycled glass, provides a long-lasting surface for biomass growth. The unit can treat airflows up to 1,100 cfm and hydrogen sulfide concentrations above 100 ppm. The units have skid-mounted controls for easy installation and operation. Regional service centers can provide turnkey full-service programs including on-site evaluation, installation, operation, service and performance reporting. Units are available on a monthly rental basis to reduce capital investment. **800/345-3982; www.evoqua.com.**



**WHISPER Biofilter from
Evoqua Water Technologies**

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**BIO-PRO biological odor control
system from HEE-Duall, a CECO
Environmental Company**

The BIO-PRO biological odor control system from HEE-Duall, a CECO Environmental Company, can be used for the removal of hydrogen sulfide and to reduce sulfur compound (RSC) odors generated during the treatment of wastewater at pump stations, headworks and dewatering applications. The system 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.

It effectively removes more than 99 percent of hydrogen sulfide and more than 90 percent of RSC. Construction materials including PVC, DUAL-Last FRP and concrete are available. **989/725-8184; www.dualldiv.com.**

Chemicals/Chemical Feed Equipment

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**ChemPro M diaphragm
metering pump from
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CHEMTRON DYNOFRESH

The DynoFresh do-it-yourself canister fogging system from Chem-Tron completely neutralizes unpleasant odors caused by bacteria and

molecular sources. Its formula contains bacterial inhibitors, compounds, air sanitizers and other ingredients that circle and trap the source of the odor, neutralizing it so it can't grow. It was formulated to treat a variety of odors, including those caused by pets, food, smoke, sweat, mold and mildew. When an odor is discovered, a canister is placed on the floor and set off to allow its nontoxic spray to treat the area. **954/584-4530; www.dynofresh.com.**



**DynoFresh fogging
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dosing systems accommodate a broad scope of chemicals including sodium hypochlorite, sodium bisulfite, alum, potassium permanganate, sodium hydroxide, acids and anti-scalants. **800/921-7867; us.grundfos.com.**

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Using sulFad molecular neutralizer from Helix Laboratories allows municipalities to counteract hydrogen sulfide, mercaptans and other sulfur compounds. It is designed to break down sulfur compounds, yielding water and a harmless inert byproduct that poses no risk to downstream processes or the environment. It is available in bulk containers of varying size for shock dose (Scour) and maintenance (Commander) applications. A complementary product, ClearAir, is designed specifically for odor control in stations. **877/444-3549; www.helixlabs.com.**



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**SulfaLock HiGel magnesium
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It is suited to applications where sewer networks are long and have long retention times, pH is low, dissolved sulfide levels are high, and sewer corrosion and odor is severe. 877/414-6439; www.ixom.com.

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ECS1502 chlorine scale
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Chlor-Scale ton container scale
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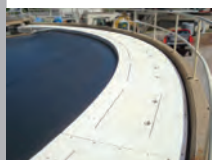
Floating bird ball blankets from ECC

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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 having to manually even out material. Enclosing containers allows outdoor installation without exposing material to the environment or pests. **973/366-6556; www.jdvequipment.com.**



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NEFCO LAUNDER COVERS

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Longofill continuous bag system from Paxxo

SIERRA ENVIRONMENTAL TECHNOLOGIES ODOR GUARD

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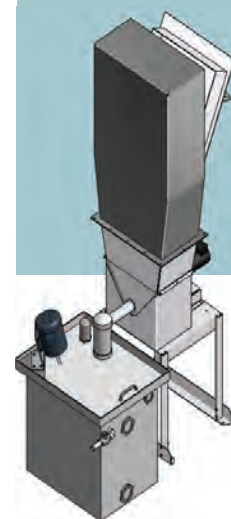
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size or shape of manhole or wet well entry. The lightweight components allow the unit to be installed by one person in less than 30 minutes. It is constructed of stainless steel and other corrosion-resistant materials. 636/273-5189; www.setodorcontrol.com.



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

SIMPLE SOLUTIONS DISTRIBUTING WOLVERINE MEGA T (MT-20)

The Wolverine Mega T (MT-20) odor filter from Simple Solutions Distributing provides odor control for airflows up to 20 cfm and can be used on 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. 866/667-8465; www.industrialodorcontrol.com.

STRONGWELL SAFPLANK HD

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SAFPLANK HD planks from Strongwell



Aluminum geodesic domes from Tank Connection

TANK CONNECTION ALUMINUM GEODESIC DOMES

Aluminum geodesic domes from Tank Connection are available for water and wastewater storage tank applications. In clear-span designs, dome structures leverage design software, including extrusions, struts, batten bars, node cover designs, and state-of-the-art dome fabrication equipment.

All-aluminum construction is corrosion-resistant and virtually maintenance free. The dome cover provides field performance and aesthetics. They are installed using direct factory crews and complete turn-key design, and are offered in unlimited sizes ranging from 32 to 300 feet in diameter. 620/423-3010; www.tankconnection.com.

Detection Equipment

ARIZONA INSTRUMENT JEROME J605

The Jerome J605 gold film hydrogen sulfide analyzer from Arizona Instrument is designed to detect hydrogen sulfide at concentrations as low as 3 ppb with a resolution of 20 ppt. It offers onboard



Jerome J605 hydrogen sulfide analyzer from Arizona Instrument

data logging that can store up to 20,000 measurements for detailed record-keeping and analysis, as well as a USB interface for data transfer and SCADA interface capabilities. Its solid-state design, durable metal casing and 24-hour battery life mean it is ideal for nearly any use and is always ready. 800/528-4711; www.azic.com.



ChemScan mini FreeAm and mini MonoChlor from ASA Analytics

ASA ANALYTICS CHEMSCAN MINI FREEAM AND MINI MONOCHLOR

The ChemScan mini FreeAm (free ammonia) and the mini MonoChlor (monochloramine) from ASA Analytics can be used individually or together to create a suite of chloramination parameters for process, distribution and booster station control. They are designed for anyone needing to ensure proper amounts of ammonia and chlorine in the chloramination process.

They can detect key parameters at a few hundredths of a ppm and hold calibration and accuracy for long periods without operator attention. They provide reliable and accurate analysis of water and wastewater with minimal maintenance. 262/717-9500; www.asaanalytics.com.

ELECTRO-CHEMICAL DEVICES HYDRA NITRATE ANALYZER SYSTEM

The HYDRA Nitrate Analyzer System from Electro-Chemical Devices offers a precision nitrate ISE electrode sensor and an integral self-cleaning sprayer. It monitors the concentration of dissolved nitrate as nitrogen in the water. The nitrogen measurement helps to optimize the methane being transferred to the digester, and as a result helps to reduce operating costs. Additionally, it provides a trend indication of the total nitrogen in the effluent. 800/729-1333; www.ecdi.com.



HYDRA Nitrate Analyzer System from Electro-Chemical Devices



OdorBoss 60G with Heat from Dust Control Technology

Ozonation Equipment/Systems

DUST CONTROL TECHNOLOGY ODORBOSS 60G WITH HEAT

The OdorBoss 60G with Heat from Dust Control Technology combines an enclosure with insulation, heat tracing and internal heat generation to protect equipment and components during operation and storage in freezing conditions. It uses a mixture of water and odor treatment agents to distribute a specially engineered mist over great distances using a powerful fan that propels the treatment into the air, where it can attach to odor vapor. The result is a reduction in both short- and long-range odor without equipment clogging or downtime from frozen lines, helping companies remain compliant with environmental regulations and maintain good neighbor relations. It uses a nucleator nozzle and a 10 hp air compressor to create an engineered fog comprising millions of tiny droplets as small as 15 microns in diameter that hang suspended in the air for long periods of time as they attract and collide with odor-causing molecules, counteracting them in the process. 800/707-2204; www.odorboss.com.

KUSTERS WATER, A DIVISION OF KUSTERS ZIMA CORPORATION, TERMINODOUR

The Terminodour odor-control system from Kusters Water, a divi-



Terminodour odor-control system from Kusters Water, a division of Kusters Zima Corporation

sion 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 is suited for the treatment of hydrogen sulfide, amines, mercaptans, ammonia and DMDS, and 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.

MAZZEI INJECTOR COMPANY OZONE CONTACTING SKIDS

Stand-alone ozone contacting skids from Mazzei Injector Company pull ozone gas from an ozone generator into a sidestream by using the venturi effect, resulting in instantaneous mass transfer. For normal doses, the resulting two-phase solution then flows through a Flash Reactor for further high-velocity mixing, ensuring optimal liquid-ozone contacting. A typical system also includes a degas separator for entrained gas removal prior to mixing back into the bulk flow. For higher ozone doses, direct injection without degassing is enabled by using a Pipeline Flash Reactor, an inline-contacting spool with optimally placed nozzles, for rapid mass transfer. Systems are custom engineered for maximum ozone mass transfer and, if needed, removal of unwanted entrained gases, and each is assembled onto a compact, portable skid frame. 661/363-6500; www.mazzei.net.



Ozone contacting skids from Mazzei Injector Company



JDV LEVEL LODOR™

*Design for Even Distribution
&
Odor Control*

www.jdvequipment.com



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Ozone generators from Ozonology

OZONOLOGY OZONE GENERATOR

Ozone generators from Ozonology are effective in controlling hydrogen sulfide and other odors from wastewater treatment facilities, wet wells and lift stations. Instead of exhausting foul air into the environment, causing nuisance odor complaints, the exhaust is diverted through a contact chamber and mixed with ozone. The resulting chemical oxidation reaction between

odor molecules and ozone molecules can completely neutralize the offending odors. For a lift station or wet well, ozone can be delivered into the headspace to form an odor-neutralizing blanket. The generators are sized according to the odor load, using a formula based on hydrogen sulfide ppm to calculate the grams per hour or pounds per day of ozone required. Generators range from 10 grams per hour to 25 pounds per day, closely matching the application requirement. 847/998-8808; www.ozonology.com.

WASTEWATER DEPOT ODOR CONTROL SYSTEM MODEL ODC-101

The Odor Control System Model ODC-101 from Wastewater Depot is a preassembled unit housed in a fiberglass sound-reducing enclosure complete with electrical controls. It is designed to handle odors in treatable air using carbon absorption, filtration and ster-



Odor Control System Model ODC-101 from Wastewater Depot



Genius™
Water System Control Technology

Control Panels

designed to meet your needs

NEMA 1-4, 4X, 12, 13

Panel Materials: Thermoplastic, stainless steel, painted steel, fiberglass

Hand on/off selector

Backwash indicator

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Security key latch

Probe mounted displays: flow, pH, chlorine, TDS, turbidity, etc.

Level controls

Relay controls

Auxiliary power supplies

Power converter 110v to 24 or 12v & AC to DC

Surge protection

Ethernet networking

Audible/visual alarm indicators

SCADA interface



www.adedgetech.com

ilization of activated oxygen in areas of a wastewater treatment plant that require odor to be controlled. Air to be treated enters by the air intake blower and is sent to the absorption chamber and passed through the activated carbon filter. It then proceeds through a fixed filter to the ionization chamber, where an ozonator produces ozone to precipitate out various gases to be released into the atmosphere with gases removed. 513/732-0129; www.wastewaterdepot.com.

UV Disinfection Equipment

SALCOR 3G UV WASTEWATER DISINFECTION UNIT

The 3G UV Wastewater Disinfection Unit from Salcor is designed for residential, commercial and municipal uses, and is UL-certified NEMA 6P Floodproof and NSF/Washington State Protocol six-month tested (with 21 upstream treatment systems). It inactivates pathogens, including superbugs. Rated at 9,000 gpd gravity flow, it is a reliable building block for large water recovery/reuse systems, according to the maker. When installed



3G UV Wastewater Disinfection Unit from Salcor

in 12-unit parallel/series arrays with ABS pipe fittings, systems are disinfecting over 100,000 gpd. Gravity flow equalizes without distribution boxes. Identical modular units increase plant reliability and reduce the need for spare parts, facilitating plant expansion. Each unit has a foul-resistant Teflon lamp covering, two-year long-life lamp, allows for quick installation, requires minimal annual maintenance and uses less than 30 watts of energy. 760/731-0745.

WEDECO – A XYLEM BRAND DURON

The DURON UV system from WEDECO – a Xylem Brand uses staggered 600-watt ECORAY lamps at a 45-degree angle to meet the disinfection needs of midsized to large sites. It is simple to install and operate and validated for a diverse range of water characters. No lifting device is required and maintenance is easy with fully automatic UV module lifting. It has automatic chemical-free lamp cleaning. Independent third-party bioassay validations have been performed to IUVA, UVDGM and NWRI protocols. Integrated Opti-Dose control regulates the required dose based on real-time lamp aging, fouling, and water parameters. It provides closed-loop monitoring of UV intensity, UVT and flow rate to quickly adapt to water quality changes. 855/995-4261; www.xylem.com/treatment.tpo



DURON UV system from WEDECO – a Xylem Brand

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- ☐ WesTech Engineering granular activated carbon pressure contactors

Aeration Equipment

- ☐ Airmaster Aerator Turbo X-Treme Magnum aerator

Biofiltration

- ☐ Anua Airshell modular biofilter
- ☐ AdEdge Water Technologies biotita biological filtration system
- ☐ Evoqua Water Technologies WHISPER Biofilter
- ☐ HEE-Duall, a CECO Environmental Company, BIO-PRO biological odor control system

Chemicals/Chemical Feed Equipment

- ☐ Blue-White Industries ChemPro M diaphragm metering pump
- ☐ ChemTron DynoFresh fogging system
- ☐ Grundfos Dosing Skid System
- ☐ Helix Laboratories sulfade molecular neutralizer
- ☐ Ixom Watercare SulfaLock HiGel magnesium hydroxide solution
- ☐ Lutz-JESCO America Corp. LJ-Polyblend Polymer System
- ☐ Process Solutions Inc., a UGSI Solutions Company, Microclor On-Site Hypochlorite Generator

Chlorination/Dechlorination

- ☐ Eagle Microsystems ECS1502 chlorine scale
- ☐ Fluid Metering Chloritrol valveless metering system
- ☐ Force Flow Chlor-Scale ton container scale

- ☐ Parkson Corp. MaximOS alternative chlorine disinfection technology

- ☐ Scienco/FAST - a division of Bio-Microbics Inc., SciCHLOR sodium hypochlorite generator

Covers/Domes

- ☐ ECC floating bird ball blanket
- ☐ JDV Equipment Corporation LEVEL LODER cover system
- ☐ NEFCO Launder Covers
- ☐ Paxxo Longofill continuous bag system
- ☐ Sierra Environmental Technologies Odor Guard unit
- ☐ Simple Solutions Distributing Wolverine Mega T (MT-20) odor filter
- ☐ Strongwell SAFPLANK HD planks
- ☐ Tank Connection aluminum geodesic domes

Detection Equipment

- ☐ Arizona Instrument Jerome J605 hydrogen sulfide analyzer

- ☐ ASA Analytics ChemScan mini FreeAm and mini MonoChlor

- ☐ Electro-Chemical Devices HYDRA Nitrate Analyzer System

Ozonation Equipment/Systems

- ☐ Dust Control Technology OdorBoss 60G with Heat
- ☐ Kusters Water, a division of Kusters Zima Corporation, Terminodour odor-control system
- ☐ Mazzei Injector Company ozone contacting skids
- ☐ Ozonology ozone generator
- ☐ Wastewater Depot Odor Control System Model ODC-101

UV Disinfection Equipment

- ☐ Salcor 3G UV Wastewater Disinfection Unit
- ☐ WEDECO – a Xylem Brand DURON UV system

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FREE INFO – SEE ADVERTISER INDEX

Liquid permanganate allows plant to treat unanticipated odors

Problem

After a summer drought, winter rains flushed accumulated solids out of the collections system and into a Massachusetts wastewater treatment plant. In addition, septic sewage was received at a station 2 miles from the plant, and a mechanical failure of a centrifuge cut the plant's biosolids dewatering capability in half. The treatment plant became a large odor source, mainly at the primary clarifiers and aeration basins.

Solution

The plant staff fed **CARUSOL liquid permanganate** from **Carus Corporation** at the bar screens, the primary clarifier inlet, the primary effluent outlet, the gravity thickener effluent, and the gravity thickener center well. Eventually, the primary influent and effluent became the main feed locations. The plant also began removing biosolids for processing at a neighboring plant.



RESULT

The permanganate eliminated the odor. After one week, the dissolved oxygen levels in the aeration basins rose, eventually reaching 3 mg/L as the permanganate destroyed the dissolved sulfides. By week two, the gravity thickeners returned to normal and the plant's biosolids volume stabilized. In addition, the FOG that had collected in the primary clarifiers dissolved and was treated. 800/435-6856; www.caruscorporation.com.

Washing system helps eliminate FOG problem

Problem

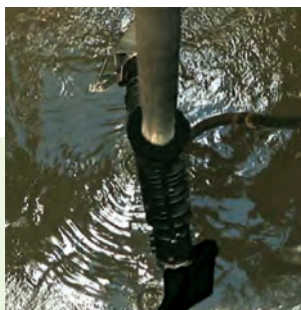
A large north Florida regional wastewater system was battling FOG buildup up to 4 feet thick blanketing lift station walls and equipment. Dry-weather spills exacerbated the problem and drove a search for solutions.

Solution

The agency selected the **EP-1100 well-washing and pretreatment system** from **Anue Water Technologies**.

RESULT

The system eliminated the FOG in two hours. Spills were nonexistent, and confined-space entry for cleaning was no longer necessary. Expenses for a boom truck and two operators for two hours on each occasion were also eliminated, reducing maintenance costs by up to 20 percent annually. The agency now operates 15 EP-1300s and plans to add more. 760/727-2683; www.anuewater.com.



Sodium hypochlorite generation system eliminates safety concerns

Problem

The Anchorage (Alaska) Water and Wastewater Utility's 28 mgd John M. Asplund Wastewater Treatment Facility wished to eliminate storage of gaseous chlorine and deploy safer and equally effective disinfection.

Solution

Electrolytic Technologies installed a **Klorigen sodium hypochlorite generation system** including ozone and UV disinfection, 0.8 and 12.5 percent on-site sodium hypochlorite generators, and bulk-delivered commercial sodium hypochlorite. Fully automated systems safely generate chlorine and sodium hydroxide from brine, eliminating chlorine storage and transportation. The products can be combined in the process to produce high-strength 15 percent sodium hypochlorite.



RESULT

The system can produce up to 5,000 gpd of 12.5 percent disinfectant solution for long-term storage and direct injection. The plant has been designed to enable expansion that would double the system's capacity if required. 305/655-2755; www.electrolyticttech.com.

Water treatment plant expands output capacity

Problem

Expanding population required a 30 mgd water treatment plant in south Florida to increase processed water output while ensuring compliance with sulfurous odor limits on the stripping process. The facility met building codes requiring a 180 mph wind rating. The plant uses membrane softening filters. After filtration, the water is degasified and disinfected. The water is then blended with filtered raw water before distribution.

Solution

Indusco Environmental Services provided a complete **degasifier solution** meeting NSF-61 material requirements, using one-piece vessel construction fabrication with no body flanges and employing an efficient wet chemical off-gas scrubber design.

RESULT

The system is operating with more than 99 percent removal efficiency. 251/621-2339; www.induscoenviro.com.



Oxygenation system prevents odor and corrosion in force main

Problem

The City of Raymore, Missouri, has a history of odor and corrosion in its gravity collections system, to which a force main discharged. Low velocities in the oversized, 17,000-foot force main led to long retention times and anaerobic conditions, leading to hydrogen sulfide formation. With no chemical feed, the hydrogen sulfide concentrations peaked at 600 to 900 ppm daily, causing corrosion, odor issues and worker safety concerns.

Solution

The city installed an **ECO2 SuperOxygenation System** from **ECO Oxygen Technologies**. The system dissolves high levels of oxygen in a wastewater sidestream that is then blended back into the force main. Automated controls pace the oxygen feed to ensure sufficient dissolved oxygen in the line to maintain aerobic conditions. Hydrogen sulfide is effectively eliminated. The system consists of a stainless steel cone, automated system controls and a sidestream pump that is the only moving part requiring standard maintenance.



RESULT

The day the system was turned on, hydrogen sulfide concentrations rapidly decreased from over 600 ppm to an average of 2 ppm. **317/706-6484; www.eco2tech.com**.

Covers provide over 99 percent odor capture at plant

Problem

The Cronulla Wastewater Treatment Plant owned by Sydney Water in Australia had concerns about odors affecting a new residential development near the plant. The utility developed an Odor Management Program Alliance to reduce the impacts. The plant planned to cover tanks but needed a solution that allowed for easy access.

Solution

The utility chose retractable **cover systems** from **Geomembrane Technologies** to capture foul air while allowing workers quick and easy access to tank internals. The system consists of fabric covers tensioned over aluminum arches. The design includes inspection hatches and clear-span guardrails that allow the covers to be safely opened and closed without interference from standard guardrail supports.



RESULT

The covers control odors, while protecting plant infrastructure and allowing operations and maintenance teams to perform their work. The ventilation system allows the covers to maintain a negative pressure of around -20 Pascal and achieve more than 99 percent odor capture. **506/449-0993; www.gtcovers.com**.

Replacement vacuum feeders boost disinfection reliability

Problem

The liquid vacuum feed system for sodium hypochlorite and bisulfite at the 15 mgd wastewater treatment plant in Appleton, Wisconsin, was plagued by plugged injector tube orifices and leaking of the vacuum relief diaphragm, causing feed outages that hindered disinfection reliability. The faulty equipment also distracted the plant's instrumentation technician and operators. While operators became adept at manual changeout of injectors, new operators lacked that training. When management could not find a replacement for the vacuum relief diaphragm, the problem became critical.

Solution

The facility turned to **JCS Industries** for a next-generation **vacuum feeder** without the troublesome diaphragm. Before making the switch to the replacement liquid vacuum feeders, the operations supervisor had his engineering firm consider peristaltic and diaphragm pumping options. They found the replacement vacuum feed to be the most cost-effective.



RESULT

The replacement feed system ended outages due to plugging and leaks, while providing a 30 percent reduction in bisulfite due to greater feeding accuracy. The instrumentation technician can now focus on his SCADA responsibilities, and plant operators can now focus on other plant operations. **281/353-2100; www.jcsindustries.us.com**.

Floating covers help improve chlorine disinfection

Problem

Algae and UV rays were adversely affecting chlorination in an upstate New York reservoir and southern Florida wastewater treatment facility. Algae was shielding embedded bacteria from chlorine, making the bactericide ineffective and requiring increased chlorine dosage. In addition, UV light was dissipating unstabilized chlorine. Calibrating the proper chlorine dosage was challenging.

Solution

Both facilities installed **floating covers** manufactured by **Industrial & Environmental Concepts**. New York installed a floating cover on its pond, and Florida installed a cover on its chlorine contact chamber.



RESULT

Covering the water surface eliminated penetrating UV and sunlight from the water column. Algae disappeared, chlorine demand decreased and residuals stabilized. Dosing expenses went down and disinfection improved with process predictability. **952/829-0731; www.ieccovers.com**.

(continued)

Dryer helps eliminate biosolids odor complaints

Problem

During certain times of year, the Tri-Lakes Biosolids Coalition in southwestern Missouri dealt with wet or frozen ground application restrictions and odor complaints with application of Class B biosolids. There was a need to receive and process biosolids from seven wastewater treatment plants to produce a Class A product. The coalition secured a grant from Missouri Department of Natural Resources that covered half of the project cost; the remaining half was covered by the Taney County Sewer Sales Tax.

Solution

The coalition chose the **Therma-Flite BIO-SCRU 3600 dryer** for its small footprint, ability to handle material at 20 to 94 percent solids, and continuous operation. Biosolids are dewatered and placed in an inground hopper before feeding to the dryer, which heats the product at 240 degrees F, killing pathogens, removing moisture and producing a 93 to 94 percent solids Class A material. The product is sold to farms.



RESULT

Running since spring 2015, the unit has helped keep biosolids storage levels low throughout all seasons, with no odor complaints. 707/747-5949; www.therma-flite.com.

Screening plant uses dry scrubbing to control odors

Problem

The Drainage Services Department of the Hong Kong government operates the Wanchai West Preliminary Screening Plant. Several buildings were affected by odors from the plant, and complaints came from several sources. Odor control using a wet scrubber failed.

Solution

Based on hydrogen sulfide design specifications of 15 ppm, **Purafil** recommended a **DS-100 drum scrubber** for a wet well upstream of the plant and a customized **VS12 vessel scrubber** on site. Both scrubbers use a Puracarb dry-scrubbing medium that removes odor compounds via irreversible chemical reactions and conversion to harmless salts that remain in the media. Spent media is treated as ordinary commercial waste and taken to a landfill.



RESULT

After 60 days, independent lab testing indicated that the scrubbers removed more than 99.97 percent of the hydrogen sulfide, exceeding the specification of 99.5 percent. 800/222-6367; www.purafil.com.

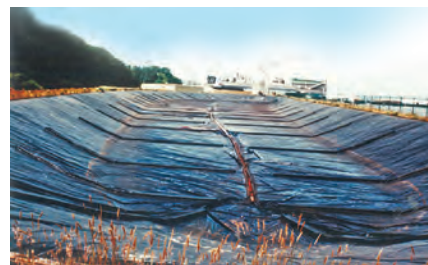
Geomembrane cover used to end odor issues at paper mill wastewater impoundment

Problem

Gases in the wastewater impoundment at ITT Rayonier's paper mill in Port Angeles, Washington, were causing an odor problem.

Solution

A floating cover using 110,000 square feet of **Seaman Corporation's 8130 XR-5 Geomembrane** was installed over the mill's wastewater impoundment. The flexible material rises and falls with the wastewater levels. The cover can withstand conditions including rain, UV rays, wind, and temperature variations, while retaining its tensile strength.



RESULT

The cover contained the odorous gases. The low thermal expansion and contraction, chemical resistance and ease of installation made it the right choice for odor control. 800/927-8578; www.seamancorp.com.

Biocatalyst significantly reduces hydrogen sulfide levels in dewatering operation

Problem

A wastewater treatment plant in Saudi Arabia needed to reduce sulfur-related odors generated by its biosolids dewatering belt presses. The plant handles waste for a large industrial complex controlled by a large company in the oil and gas sector.

Solution

Plant operations conducted a 16-day study with two belt presses, drip-feeding an active solution of **BiOWiSH Odor biocatalyst** from **BiOWiSH Technologies** at 0.32 gallons per hour into the mixing tanks upstream of one of the presses.

RESULT

The increased biological action reduced hydrogen sulfide levels by 72 percent on average. 312/572-6700; www.biowishtech.com.

Treatment plant upgrades UV disinfection system for increased population

Problem

Designed to treat wastewater for a population of 165,000, the Swansea Wastewater Treatment Works in the United Kingdom now serves 185,000. To improve treatment performance and ensure capacity to meet future growth up to 225,000, the plant needed an equipment upgrade.

Solution

Dwr Cymru Welsh Water chose to upgrade to the **TrojanUV Signa**

UV disinfection system for its energy efficiency and low lifetime cost. Other key factors included simple installation, TrojanUV Solo Lamp Technology, and the ability to operate and maintain the existing UV disinfection system during the upgrade.



RESULT

Commissioned in January 2014, the unit has effectively disinfected to regulatory standards. It has a maximum flow rate of 30 mgd and average flow rate of 15 mgd. Three UV banks have a total of 126 lamps for maximum-duty power of 87 kW. 519/457-3400; www.trojanuv.com.

Non-impregnated activated carbon removes malodors from plant

Problem

After investing in an odor-removal system, the City of Grapevine (Texas) Wastewater Treatment Plant still had a hydrogen sulfide odor problem, exhibiting concentrations of 40 to 80 ppm at the headworks.

Solution

Application engineers from **Cabot Norit Activated Carbon** recommended **DARCO H2S activated carbon**. The chief plant operator decided to convert based on the product's high efficiency and the fact that the material is produced without chemical impregnates, preventing bed fires in the odor-control system.



RESULT

The odor-control system has consistently operated without any nuisance odor. The plant also saw 50 percent cost savings by using half as much activated carbon as before. 800/641-9245; www.cabotcorp.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 advanced **remote contaminant control and monitoring technology** from **Kemira**. The smart control 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 remote-operated system lowered the site's overall chemical usage, shortened response time and maintained a consistent level of less than 5 mg/L total dissolved sulfides leaving the injection site. 704/641-0609; www.kemira.com.

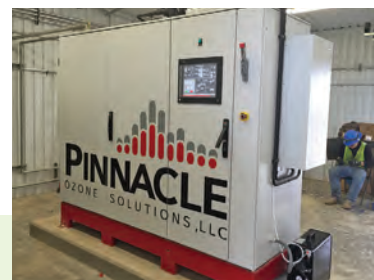
Ozone system helps reduce operating costs

Problem

Years of extreme drought followed by record flooding has caused many utilities to reconsider how they manage water resources. In 2014 the City of Abilene, Texas embarked on a plan to add ozone to its project at the Lake Fort Phantom Hill Water Reuse Project.

Solution

In order to minimize operating cost while maximizing water recovery, the city selected a process where treated MBR effluent is split between reverse osmosis and ozone plus biologically activated carbon for post treatment. The process simultaneously provides disinfection and removal of trace organics while minimizing operating cost, ensuring that trace pharmaceuticals and other organics are removed. The city selected a **modular ozone system platform** from **Pinnacle Ozone Solutions**. The integrated controls and compact modular style simplified design and installation to reduce cost.



RESULT

Since installation the system has been easy for plant staff to learn and operate. Treatment results from the ozone plus biologically activated carbon process have exceeded expectations in terms of water quality and total treatment cost. 321/205-1717; www.pinnacleozonesolutions.com.

Bio-filter replaces carbon adsorption drum in lift station

Problem

Lift Station 103 in the City of Peoria had a carbon adsorption drum that while initially inexpensive to purchase, had total labor, equipment and material costs for carbon media replacement that added up to several thousand dollars per year. The frequency of carbon adsorption media change-outs depends on the concentration of pollutants to be removed (primarily hydrogen sulfide) at the site, as well as the type of carbon media used. Additionally, carbon adsorption systems require shutdown, removal and replacement (manpower and equipment costs), and disposal (transportation and landfill costs) of spent carbon media.

Solution

After analysis and long-term cost considerations, the city installed a **Bio-Trickling Filter** from **EcoVerde** that requires no media changeouts or media cleaning, and minimal routine maintenance. The unit maintains more than 99 percent hydrogen sulfide removal. The unit has a higher initial cost than carbon adsorption drums, but lower ongoing operation and maintenance costs. The carbon media will always need replacing over time, while the Bio-Trickling Filter media becomes more robust.



RESULT

At this site, opting for the higher upfront cost of a Bio-Trickling Filter was cost effective because the system paid for itself within the first three years. 888/330-0772; www.ecoverdetechologies.com. tpo

COVERS

POND & TANK COVERS: Industrial & Environmental Concepts makes gas-collection covers, odor-control covers, heat-retention covers and anaerobic digester covers. Call 952-829-0731 www.ieccovers.com (oBM)

EDUCATION

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

POSITIONS AVAILABLE

Looking for a job in the water-wastewater industry? WATER DISTRICT JOBS, an online career resource, lists dozens of great career opportunities on its website. Job listings are updated daily. You can also post your resume so employers can find you. Visit www.WaterDistrictJobs.com for more information. (oBM)

RENTAL EQUIPMENT

Area/Velocity gravity flow monitor rentals. All inclusive software, rings, sensors, data loggers, \$350 meter/mo. Also have ADS Model#4000 meters and parts for sale. Call Mike 678-900-6805 (C06)

Liquid vacs, wet/dry industrial vacs, combination jetter/vacs, vacuum street sweeper & catch basin cleaner, truck & trailer mounted jetters. All available for daily, weekly, monthly, and yearly rentals. **VSI Rentals, LLC, 888-822-8648; www.vsirentalsllc.com.** (CBM)

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Ideas Ahead

industry news

Matrox Graphics receives technology awards for encoder, decoder cards

Matrox Graphics received the Top New Technology Award in the Video Wall Solutions category for its Mura IPX Series of 4K capture and IP encoder and decoder cards from CE Pro, Commercial Integrator, *Essential Install Magazine* and TechDecisions. Matrox also received NewBay Media's 2016 ISE Best of Show Awards for installation and AV technology.

RWL Water, Praxair form wastewater treatment marketing agreement

RWL Water, provider of wastewater and reuse applications, and Praxair, supplier of industrial gases and applications technology, formed a marketing agreement for the sale and distribution of products and systems that apply pure oxygen for wastewater treatment.

World Water Works receives Manufacturing Leadership Award

World Water Works, designer and manufacturer of wastewater treatment solutions, received the 2016 Manufacturing Leadership Award from Frost & Sullivan's Manufacturing Leadership Council for its AvN technology, named for the balance it achieves in ammonia oxidizing bacteria (AOB) versus nitrite oxidizing bacteria (NOB). The wastewater process control and optimization technology utilizes a control strategy to apply selective pressure to aid in the segregation of the desired populations.

IVC video camera receives safety, hazardous area certifications

IVC received safety and hazardous area certifications for its AMZ-HD41-2 and AMZ-3041-2 video cameras that meet European ATEX and IECEx standards, as well as UL and Canadian CSA standards for electrical safety.

Raven Lining Systems receives USDA Biobased Product Label

Raven Lining Systems received the USDA Certified Biobased Product Label for its AquataFlex 505 and 506 products. The label certifies that the product or family of products meets or exceeds the amount of renewable biobased ingredients set by the USDA. Biobased products are finished or intermediate materials composed in whole or have a significant amount of agricultural, forestry or marine ingredients.

Flygt SmartRun's cleaning function receives innovation award

Flygt SmartRun's pump cleaning function received the 2016 RIONED Innovation Award from the RIONED Foundation. The award recognizes advancements in urban water resilience and management. The pump controller's cleaning function, optimized for use with the Flygt N-impeller, detects abnormal blockages and triggers an automatic cleaning sequence by momentarily reversing the impeller's direction.

Hydro International acquires Hydro-Logic

Hydro International, provider of environmentally sustainable and innovative solutions to water management challenges, acquired Hydro-Logic, provider of water monitoring, data logging and telemetry software and services. **tpo**

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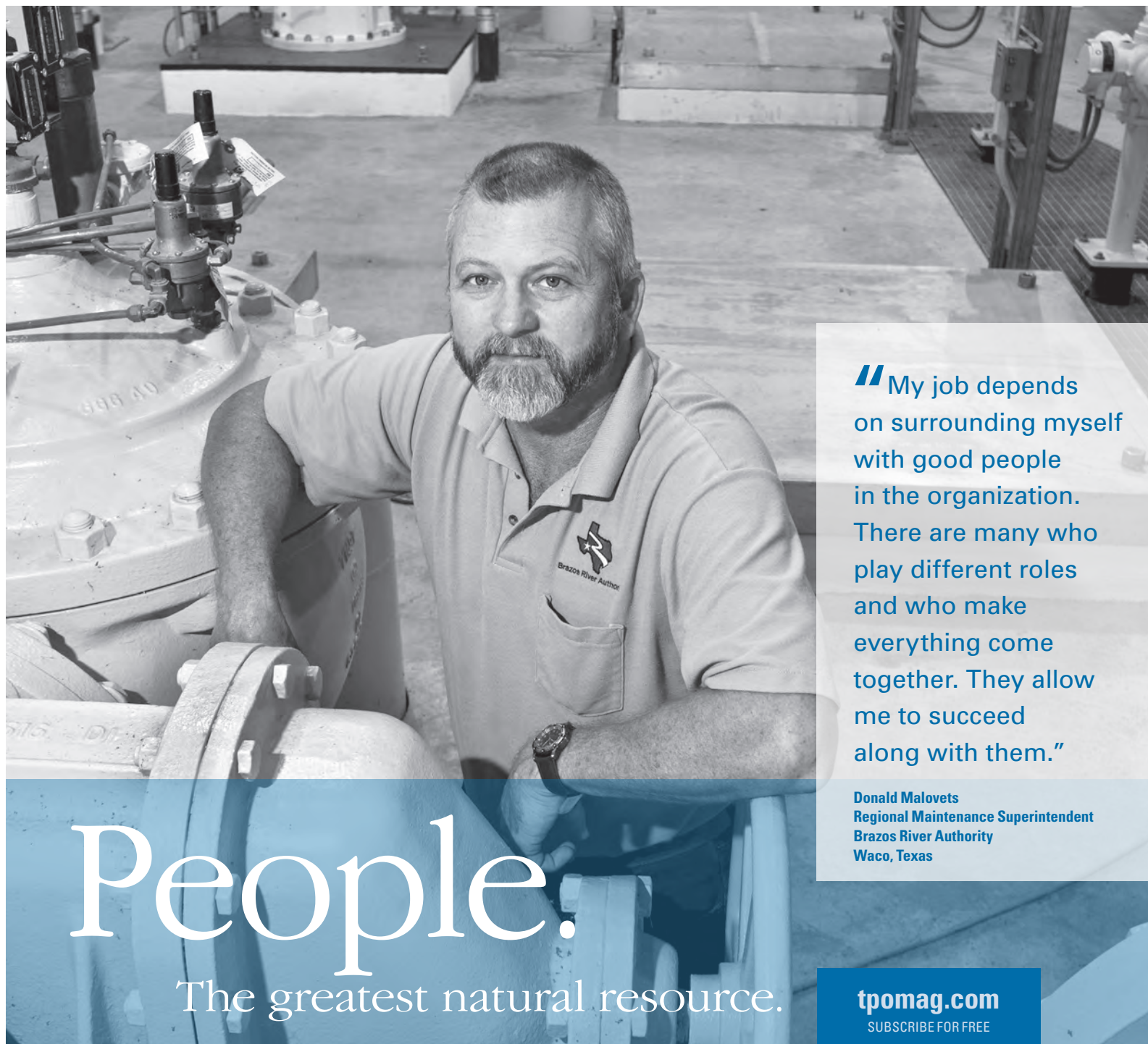
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1. MAGNETROL NONCONTACT RADAR TRANSMITTER

The Pulsar R96 noncontact radar transmitter from Magnetrol Environmental is designed for reliable level control in process applications. The two-wire, loop-powered, 6 GHz radar transmitter measures liquid media ranging from calm product surfaces and water-based media to turbulent surfaces and aggressive hydrocarbon media. Features include 130-foot measurement range, automatic waveform capture and data logging, SIL 2 suitability with safe failure fraction (SFF), and HART and FOUNDATION Fieldbus digital outputs. **800/624-8765; www.magnetrol.com.**

2. WANNER ENGINEERING PERISTALTIC PUMP

The Vector Model 2006 peristaltic pump from Wanner Engineering is designed to handle difficult or challenging fluids without altering their composition. The pump can move high-viscosity fluids (up to 15,000 cPs) and pasty, pulpy, thick, abrasive and corrosive solutions, as well as fluids containing compressible solids up to 27 mm in size. It can pump process fluids such as acids, slurries, sewage, chemicals, cosmetics, pigments, dyes, paints and inks, plus a variety of foodstuffs in industrial and municipal facilities. The self-priming pump has a maximum flow rate of 14.1 gpm and maximum discharge pressure of 60 psig. **800/369-4172; www.wannereng.com.**

3. FRANKLIN ELECTRIC AG SERIES PUMP LINE

The expanded line of AG Series centrifugal close-coupled pumps from Franklin Electric is designed for optimal performance in challenging water transfer applications of industrial and commercial applications. The series includes 10 pump families with models from 3 through 75 hp, flow ratings from 50 through 2,000 gpm and heads to 300 feet. Each pump is equipped with a NEMA standard JM or JP motor for mechanical seal or packing gland configurations, both of which include a 416 stainless steel shaft sleeve for durability. **260/824-2900; www.franklinwater.com.**



4. AQUA-AEROBIC SELF-DEPLOYING SEGMENTED FLOAT

The self-deploying segmented Fold-a-Float from Aqua-Aerobic Systems replaces the conventional float on Aqua-Jet surface aerators and AquaDDM mixers. It is designed for use in potable water applications, including THM removal where aeration equipment access is limited. The float folds into a compact, cylindrical shape for easy shipping, storage and installation. Lowered into place, the float deploys as it meets the surface water. **815/654-2501; www.aqua-aerobic.com.**

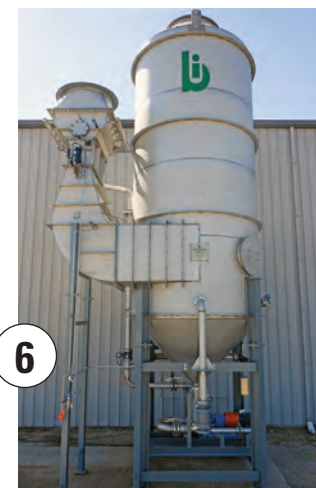


5. METROHM INSTRUMENTS WITH EMPOWER CHROMATOGRAPHY DATA SOFTWARE

Ion chromatography instruments and accessories from Metrohm USA are supported by Empower chromatography data software (CDS) from Waters Corporation that controls all aspects of the system, from a small-volume autosampler to detection schemes. The integrated system determines anions, cations and polar substances by ion chromatography and suppressed conductivity detection in concentrations ranging from percent to ultratrace. **866/638-7646; www.metrohmusa.com.**

6. BIONOMIC INDUSTRIES VENTURE SCRUBBERS PACKAGE

Pre-engineered Series 7000/8000 integrated scrubber packages from Bionomic Industries include recirculation pump, piping networks, instrumentation and automated controls. Designed for outdoor installation, the factory-assembled and tested packages are available with free protection for cold weather climates. The scrubbers meet PM 10 and PM 2.5 particulate emission standards and are available in a variety of materials for operation on extremely corrosive or erosive gas contaminant streams. Throat sections are available for manual operation or can be equipped with an optional automatic adjustment mechanism. **800/311-6767; www.bionomicind.com. tpo**



wastewater: product spotlight

Franklin Miller grinders handle high flows and large solids

By Ed Wodalski

The **Taskmaster Titan TM20000 Series** of grinders from **Franklin Miller** feature a single- or twin-shaft, counter-rotating cutter design. One cutting stack intermeshes with a second, larger-diameter stack to rip, tear and shred solids in liquid flow to fine particles so they can easily be processed by pumps and other equipment.

"The idea of the large cutter is it allows greater flow to pass through and it can grab larger objects by the intermeshing of the cutters and handle it effectively," says Bill Galanty, president, Franklin Miller. "The TM20000 is the larg-

est in the series. Each unit handles 5.5 mgd, which is 8,000 gpm. It's also configured in a duplex version for double the volume."

The grinder has an intrinsically high-flow cutting chamber with an inlet opening that doesn't rely on auxiliary diverting screens for flow capacity.

"It's relatively simple in design with low maintenance," he says. "You can put it in and pretty much forget about it. Even the bearings are sealed for life. The whole system together is what makes it really reliable."

The grinder has an automatic reversing control system that backs up if debris becomes caught and will take three or four passes at an object before shutting down. "If something gets lodged in there, like a hammer or piece of metal, the controller is going to stop and alert the operator through an audible alarm or SCADA master control that there's something that needs to be attended to," Galanty says.

The grinder is available with TEFC, XP as well as FMI's explosion-proof, submersible motors. Guide rails and channel frames allow for easy installation, even in deep wet-wells, eliminating the need to enter a confined space. Other options include hydraulic drives and shaft extension.

"The grinder handles a lot of flow without requiring a lot of power," Galanty says. "It will handle most wastewater solids found in a typical wastewater stream: bags, plastics, feminine products, flushable wipes. Wipes are a big problem these days that these machines solve."

The TM20000 Series grinder is available in 10 models (five heights) with single, tandem and duplex versions in standard iron and steel, as well as 316 stainless steel. Standard units are 21 1/2 inches wide and up to 67 inches tall. Duplex versions are 34 inches wide and up to 67 inches tall.

The Taskmaster can be used either in the headworks to protect downstream equipment — pumps, clarifiers, digesters from stringy materials and sharp objects that can puncture filter presses — or in a wet well in a manhole to protect the submersible pumps. **800/932-0599; www.franklinmiller.com.**



Taskmaster Titan TM20000 Series from Franklin Miller

water: product spotlight

Asahi/America regulators made of chemical-resistant polyethylene

By Ed Wodalski

Made from chemical- and stress-crack-resistant advanced polyethylene (PE) resin, **Chem Proline Frank Series V86 back pressure regulators** from **Asahi/America** are designed for water treatment and chemical process applications, including sodium hydroxide, sodium hypochlorite, caustic soda and low-concentration acids.

"We're excited to expand on our Frank regulator product line that we have in other materials," says Alex Gambino, engineering manager for Asahi/America. "We set out to meet the operators' requirement of having a direct anti-leak system, eliminating all threads in favor of a welded system."

Made of the same material as its Chem Proline pipe and molded fittings, the polyethylene system eliminates joint leaks typically found in sodium hypochlorite and caustic PVC or CPVC lines.

Using heat, the polyethylene compound is fused into a homogenous joint that cures in seconds and leaves no weld seam.

The regulator is available in inline (1/2 through 2 inches) and angled configurations (1/2 through 1 inch) with either butt/IR or socket connections. Adjustable under working conditions, the regulator has an adjustable range of 7 to 135 psi, an outlet of 145 psi and low hysteresis of 1.5 to 8.7 psi.

"For an operator, it's very easy to dial in what pressure you need for the system," Gambino says. "Historically, you may have had to set the pressure at the factory, and they would give you a couple different spring rates for the valve. But if you're able to adjust it from basically zero pressure to full operating pressure, which is 150 psi, it gives you a lot of flexibility if you need to make changes." **800/343-3618; www.asahi-america.com.**



Chem Proline Frank Series V86 from Asahi/America

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people/awards

Nathan Brockman was hired as the wastewater/water operator for Story City, Iowa.

Mike Short was hired as superintendent of the Archbold (Ohio) Wastewater Treatment Plant.

Steve Reusser was hired as a senior process engineer for Ayres Associates, an engineering and consulting firm in Eau Claire, Wisconsin. He will provide wastewater and water treatment design services and operational assistance to communities throughout the Midwest.

The **New Rochelle Wastewater Treatment Plant** was named the Project of the Year by the Westchester/Putnam Chapter of the New York State Society of Professional Engineers.

Jonathan Brown, Water and Resource Recovery Center manager for the City of Dubuque, Iowa, retired after more than 40 years with the city. He had managed the wastewater treatment plant since 2005 and in 2014, received the William D. Hatfield Award.

Ontwa Township, Indiana, entered a three-year contract with Infrastructure Alternatives to oversee the township's wastewater collections system.

The City of Seguin, Texas, honored wastewater treatment plant superintendent **Gilbert Ybarbo** and pretreatment coordinator **Rene Porras** as employees of the month for February 2016 for reducing phosphates in the city's treated wastewater.

The **City of Greenville** joined the Michigan Water and Wastewater Agency Response Network. MiWarn is a statewide network of utilities and public works agencies designed to facilitate mutual aid and assistance during times of crisis.

The U.S. EPA is providing \$50,000 in financial and technical guidance to **Selma, Alabama**, to help the city invest in wastewater and drinking water infrastructure. It is part of the EPA's WaterCARE program.

Mike Baran, Beau Demko, Adam Lung and **Joe Julian**, wastewater operators for the Town of Vernon, Connecticut, attained their Class 2 operator licenses.

The **Idaho Department of Environmental Quality** awarded a \$77,000 wastewater planning grant to the City of McCall for a wastewater planning study that will evaluate its lagoons and determine the extent of leakage.

The Spartanburg Water **R.B. Simms Water Treatment Facility** and its **Landrum Water Treatment Facility** of South Carolina received Directors Awards for excellence in water quality from the Partnership for Safe Drinking Water. Simms received the Partnership's 15-Year Directors Award, and Landrum met the requirements of the Directors Award for the ninth year.

California Water Service Group promoted **Gerald A. Simon** to chief safety and emergency preparedness officer. He previously served as director of safety and emergency services.

Etowah Utilities won the Tennessee Association of Utility Districts regional taste competition, beating out other utilities from a 12-county area.

Andy Fish, retired engineer of the Vermont Department of Environmental Conservation, received a Regional Wastewater 2015 Regional Lifetime Achievement Award from the U.S. EPA's New England regional office. He was recognized for excellence in training and technical assistance to many wastewater professionals in New England.

The **Smithfield (Rhode Island) Wastewater Treatment Plant** and the **Massachusetts Maritime Academy Wastewater Treatment Plant** received 2015 Regional Wastewater Treatment Plant Excellence Awards from the U.S. EPA's New England regional office.

The tap water in **Eldorado Springs, Colorado**, was judged best in the country at the Berkeley Springs International Water Tasting contest held in February in West Virginia.

George Michael Coley of Somers received the Wastewater Operator Cer-

events

June 5-8

New England Water Environment Association/New York Water Environment Association Spring Meeting and Exhibit, Mystic Marriott Hotel & Spa, Groton, Connecticut. Visit www.newea.org or nywea.org.

June 5-8

Pennsylvania Water Environment Association Technical Conference and Exhibition, Penn State Conference Center and Hotel, State College. Visit www.pwea.org.

June 9

Central States Water Environment Association-Illinois Section Collection System Conference, Aurora University, Aurora, Illinois. Visit www.cswea.org.

June 19-22

Michigan Water Environment Association Annual Conference, Boyne Mountain Resort, Boyne Falls. Call 517/641-7377 or visit www.mi-wea.org.

June 19-22

AWWA Annual Conference and Exposition (ACE16), McCormick Place West, Chicago. Visit www.awwa.org.

June 27-30

Ohio Water Environment Association Technical Conference and Exhibition, Bertram Hotel and Conference Center, Aurora. Call 614/488-5800 or visit www.ohioweaa.org.

June 29-July 1

International High-End Drinking Water Industry Expo 2016, China Import and Export Fair Complex, Guangzhou, China. Visit www.waterexpocn.com.

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tification Governance Council Award from the New York Water Environment Association.

Marshalltown (Iowa) Water Works is among the first utilities to achieve the Directors Award from the Partnership for Safe Water's Water Treatment and Water Distribution System Optimization programs in the same year. It is the second utility in Iowa to receive the Directors Award for treatment, and first to receive the award for distribution.

The **R&W Environmental** civil engineering firm in Hampshire, United Kingdom, won the Water Treatment category in the Rushlight Awards for 2015-16 for its treatment facility at Hursley that extracts drinking water from road sweepings.

The **Verdigris Water Treatment Plant** in Broken Arrow won the Oklahoma American Council of Engineering Companies Grand Conceptor Award for a \$58 million membrane plant project.

The **Town of Greentown** received a Merit Award for Engineering Excellence from the American Council of Engineering Companies of Indiana. The award recognizes the efficiency of the town's wastewater treatment plant expansion.

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Thanks to the expansion of USABlueBook's nationwide distribution network, the team in Trophy Club is getting exactly what they need, quicker than ever. "We thought you guys were fast before," said Jeff, "but now we just pick our stuff up from Will Call over at your Dallas warehouse. Last summer we were doing some work on our return pumps, and it was so easy to just run over there and get what we needed. It's great!"

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