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JULY 2016

Great Chemistry

**BARREN RIVER LAKE KEEPS QUALITY
FLOWING WITH A SKILLED STAFF
AND TWO ON-SITE LABS**

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The promise of biosolids

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Tim Smiley
Superintendent
Glasgow, Ky.



TECH TALK:
**Tips to extend
bearing life**

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HOW WE DO IT:
**A flexible filter for
high-rate flows**

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CORRECTION

The Annual Company Directory in the May 2016 issue of *TPO* included incorrect information for two companies. Their correct contact information is below:

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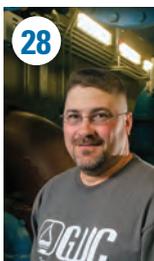


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on the cover

Superintendent Tim Smiley and his team at the Barren River Lake Water Treatment Plant apply advanced knowledge of chemistry, biology and environmental science to ensure efficient operations and a high-quality end product. All operators work in the plant's microbiology and wet labs. (Photography by Martin Cherry)

top performers:

WATER: OPERATOR Page 22

Steady Hand

Operator Jerry Nicholson applies long experience, skills and wisdom to a job; winning praise, award and respect at Boulder's Betasso Water Treatment Plant.

By Jack Powell

WASTEWATER: OPERATOR Page 38

True Tenacity

Rick Cantu's insistence on getting to the bottom of treatment issues served his community well and saved his treatment facility millions of dollars.

By Jack Powell

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Falling Into Place

Bosque Farms operators win Wastewater Treatment System of the Year award with specialized skills, excellent communication and a strong work ethic.

By Trude Witham

WATER: PLANT Page 28

Great Chemistry

A highly educated staff and two on-site laboratories help keep quality water flowing at the Barren River Lake Water Treatment Plant.

By Jim Force

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How was the lead contamination of tap water allowed to happen? And as an operator, what would you have done if forced to deal with a similar situation?

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A California water district undertakes a stream improvement project to enable unimpeded annual spawning migrations for steelhead trout.

By Jeff Smith

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Squeeze Play

A high-rate wet weather treatment system enables an Ohio utility to conquer CSOs and meet its compliance deadline.

By Scottie Dayton

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Making Lessons Last

A contest for fourth-graders in northern Arizona encourages kids to express their idea of a water ethic in artwork and essays.

By Craig Mandli

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Cleaner By Design

A Wisconsin plant goes greener with biological phosphorus removal, higher-efficiency equipment, biogas-to-energy and other upgrades.

By Doug Day

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Self-Contained Convenience

A pipe crawler video inspection system from Deep Trekker provides substantial versatility in a package that can be operated by a single technician.

By Ted J. Rulseh

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A Perfect Marriage

Engineer and WERF Research Council member John Willis finds that often the most economical biogas and biosolids solutions are also the most sustainable.

By Ted J. Rulseh

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Efficient Dewatering

Dewatering box from AQUA-Zyme Disposal Systems can give municipalities a low-cost alternative.

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Effective bearing seals are important to long and trouble-free life in a wide range of rotating equipment in water and wastewater treatment plants.

By Chris Rehmann

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By Ed Wodalski

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» Top Performers:

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Wastewater Plant: Phosphorus reduction in Seguin, Texas

Water Utility: City of Plant City (Florida) Water Utility

Wastewater Operator: Ed Bonham, Newton, Kansas

» How We Do It: Customer engagement for water savings

» Sustainable Operations: Progress toward net zero at Victor Valley Wastewater Reclamation Authority

» In My Words: Finding nutrient credits in watersheds

» PlantScapes: Old treatment lagoons host wildlife in Marion, Massachusetts

» Technology Deep Dive: Single-process control panel from Singer Valve

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By KELLER

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let's be clear

A Look Back at Flint

HOW WAS THE LEAD CONTAMINATION OF TAP WATER ALLOWED TO HAPPEN? AND AS AN OPERATOR, WHAT WOULD YOU HAVE DONE IF FORCED TO DEAL WITH A SIMILAR SITUATION?

By Ted J. Rulseh, Editor



The fallout from water contamination in Flint will persist for years — in politics, in lawsuits, in monitoring of children's health, in construction work to fix lead-bearing service lines and household plumbing, and more.

Questions will linger at least as long, chiefly: How was this allowed to happen?

As I write these words, around April 1, I'm guessing that by the time this July edition is printed, Flint will have faded from the headlines while corrective construction and court cases play out in the background. But Flint should never fade from the consciousness of water treatment professionals.

PUZZLING SILENCE

I wrote in an article for the online edition of *TPO* — “The (So Far) Untold Story of Flint Lead Pollution,” Jan. 21 — that Flint was not so much a case of aging infrastructure as of failure in water treatment. Yes, the decades-old services and household pipe connections contained lead. But the remedy — treatment of the water with anti-corrosives — was simple, well known, effective, widely used and fairly inexpensive.

What baffled me then and still does today is why (as best I know) no one in an operations role in Flint screamed bloody murder in public about the bad water. It baffles me because I talk to water operators often and find they take the quality of their end product personally — they would not sleep well at night if the water were stained brown or tasted or smelled bad, to say nothing of being tainted with a toxin.

Millions of words about Flint have been written. Millions more will be written before the incident is consigned to the history books. Lessons abound and surely have been well learned. For one thing, the events in Flint are all but certain to accelerate some utilities' actions to mitigate or eliminate lead in piping.

SOUL SEARCHING

Perhaps the most important takeaway, from an operator's perspective, is to ask oneself: If I had been an operator

in the Flint water plant, and knew that rusty, bad-tasting, likely poisoned water was being sent to people's homes, what would I have done about it?

When faced with hypotheticals like this, most of us tend to assume we would have been on the side of the angels — that we would have done the moral and ethical thing, no matter the consequences. But would we really?

Suppose we worked for a car company that we knew was manipulating software to cheat tailpipe emissions tests. Would we have complained to a supervisor and run the risk of getting demoted, disciplined or fired? Or would we have felt safer just going along, rationalizing that we didn't authorize the cheating, and anyway it's happening in a different department?

What if we worked for a large medical practice where we knew some physicians were defrauding Medicare by submitting claims for services never performed? Would we resign and go work for someone else? Report the fraud to government authorities? Or turn a blind eye and continue to do a day's work and collect a weekly check?

A TOXIC ENVIRONMENT

Now imagine you worked for Flint. Bad water is going out of the plant. You know it. But city government is controlled by an emergency manager. State regulators aren't taking action. Neither is the U.S. EPA. The entire atmosphere is charged with politics. You fear that if you spoke up you would suffer negative consequences, up to and including getting fired.

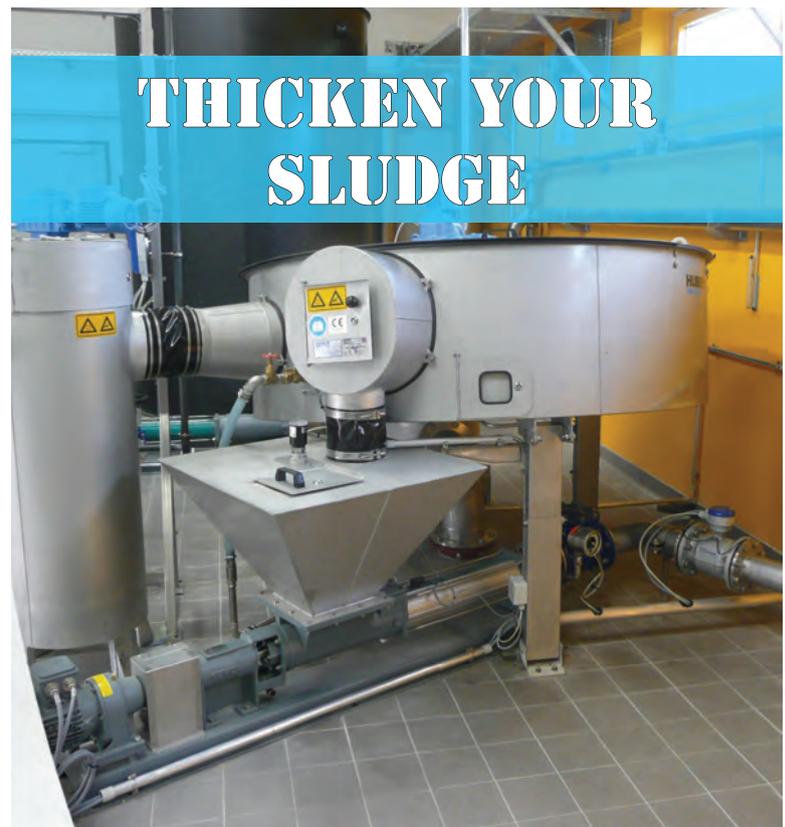
Perhaps the most important takeaway, from an operator's perspective, is to ask oneself: If I had been an operator in the Flint water plant, and knew that rusty, bad-tasting, likely poisoned water was being sent to people's homes, what would I have done about it?

Flint is economically devastated. If you were fired from or resigned from your government job with decent pay and benefits, you might not find anything equivalent unless you picked up your family and moved — and maybe not even then. And after all, you are only a couple of years from retirement with a full pension.

I'm not saying these were in fact the kinds of choices the Flint operators were facing — this is after all a hypothetical. But try and put yourself in the Flint operators' shoes. What might your decision factors have been? What would you have done?

Then try to imagine something bad happening at your workplace — not on the scale of Flint, perhaps, but with possibly serious impacts on the public you're sworn to serve and protect. Under your current set of circumstances, what would you do?

You are welcome to share your thoughts on this topic. Send them to me in an email to editor@tpomag.com. I promise to respond, and we will publish the comments as space permits. **tpo**



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COST SAVINGS

What's Peer-to-Peer Training?

In the heart of British Columbia, Canada, a new program is helping operators maintain educational requirements while eliminating travel expense to metropolitan areas. Find out how industry leaders are using the power of peer-to-peer training to make CEUs more affordable for those who work at remote utilities.

[Tpmag.com/featured](#)

SCHOOL ROUTINE

Get Back to the ABCs

School presentations are public-education gold. In this blog from veteran school presenter and operator Jeff Kalmes, you'll learn how to navigate the school system and become an expert educator. Bonus: Kalmes provides a sample letter that you can use to start your own program.

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OVERHEARD ONLINE

“Why would you do such a thing? It’s a program that is putting people to work in a good career — not just a job, but a good career.”

Operator Training Program Loses Federal Financial Aid
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BOTTLES OF HOPE

Operator Sends Water to Flint

It only takes one person — filled with compassion and ambition — to make a difference. In this online exclusive, find out how an operator from Connecticut is helping the people of Flint, Michigan. What began as a simple idea quickly turned into truckloads of bottled water all destined for those in need.

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BOSQUE FARMS OPERATORS WIN WASTEWATER TREATMENT SYSTEM OF THE YEAR AWARD WITH SPECIALIZED SKILLS, EXCELLENT COMMUNICATION AND A STRONG WORK ETHIC

STORY: **Trude Witham**

PHOTOGRAPHY: **Roberto Rosales**

OPERATORS AT THE BOSQUE FARMS WASTEWATER

Treatment Plant say their biggest challenge is keeping their microorganisms happy. Their biggest worry is staying ahead of grinder pump rebuilds. Fortunately, they have it all under control.

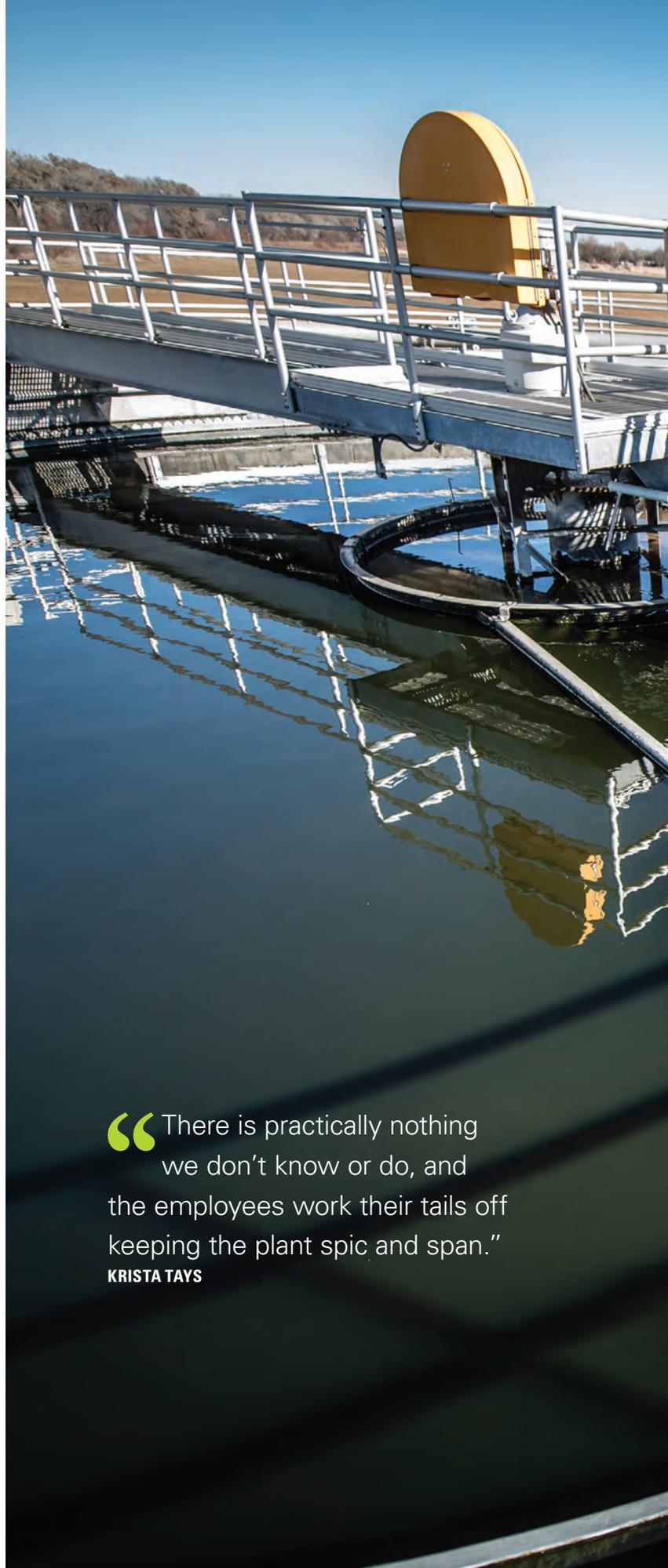
A dedicated, experienced team keeps the plant and 1,460 grinder pumps humming in this community of 5,000 in the Rio Grande Valley of New Mexico. They also operate and maintain the 1,400 gpm conventional water plant and 1.0 mgd and 0.5 mgd tank wells, install and maintain water or sewer lines, and read the water meters.

“It takes all five employees to properly handle operations and maintenance of the treatment plant and both wells,” says Krista Tays, utilities operator. “We’re on call for emergencies such as line breaks, and we take turns handling after-hours grinder pump failures and water calls.”

The hard work has paid off. The plant won the 2015 Wastewater Treatment System of the Year award from the New Mexico Rural Water Association. Treated effluent more than meets permit standards: The plant removes 99 percent of BOD and 97 percent of TSS.

HOUSEHOLD GRINDERS

Built in 1999, the 0.58 mgd (design) Bosque Farms treatment facility is an extended aeration plant with a pressurized collections system. A village ordinance requires installation, maintenance and inspection of grinder pumps, grease traps and sand traps for individual connections. The grinder



“There is practically nothing we don’t know or do, and the employees work their tails off keeping the plant spic and span.”

KRISTA TAYS



The skimmer arm in a clarifier at the Bosque Farms Wastewater Treatment Plant, winner of the 2015 Wastewater Treatment System of the Year award from the New Mexico Rural Water Association.



ABOVE: The team at the Bosque Farms plant includes, from left, Kevin Fryhover, supervisor; Bobby Oglesbee, water operator; Krista Tays, utilities operator; Ralph McClellan Jr., plant mechanic; and Cliff Hibdon, utility director. BELOW: The plant blends in well with its scenic mountain surroundings.



Bosque Farms (New Mexico) Wastewater Treatment Plant

BUILT: | 1999

POPULATION SERVED: | 5,000

EMPLOYEES: | 5

FLOWS: | 0.58 mgd design, 0.23 mgd average

TREATMENT LEVEL: | Secondary

TREATMENT PROCESS: | Extended aeration

RECEIVING WATER: | Rio Grande

BIOSOLIDS: | Land-applied by injection

ANNUAL BUDGET: | \$995,000

WEBSITE: | www.bosquefarmsonm.gov

GPS COORDINATES: | Latitude: 34°50'0.08"N;
Longitude: 106°42'33.49"W



pumps, equipped with alarms, are connected to each residence and commercial facility in the village. Sand traps are required for car washes, schools, day care facilities, commercial laundries and laundromats.

Influent enters the treatment plant's covered anaerobic selector system, and the contents are mixed by a horizontal mixer before moving to the aeration basin. The basin is aerated using diffused air in the tank bottom, delivered by one of three blowers, which operate alternately. The basin's concrete baffles extend aeration time and surround the secondary clarifier. A scum skimmer arm removes floatables from the clarifier and pushes them into a scum pit; the material eventually goes to the sludge storage basin.

Effluent is disinfected with a UV system (WEDECO - a Xylem Brand),

then measured with a 6-inch Parshall flume and a secondary ultrasonic flowmeter (AMETEK Drexelbrook). Discharge is to the Rio Grande.

Waste sludge is pumped with a double disc pump (Penn Valley Pump) from the secondary clarifier to an aerated thickener, where it is thickened with a polymer (UGSI Chemical Feed) and allowed to settle by turning off the aeration. Biosolids are trucked to a village-owned 240-acre property for injection into the soil.

Says Tays, "When wasting, we send it to our aerated holding tank. From there, we load it into our vacuum tanker truck and drive about 21 miles to our injection site." A Big Foot tanker truck injects the material 6 to 8 inches under the surface.

Two Aurora (Pentair) wash water pumps are used for the spray bar in the clarifier and to water the apple, almond and other trees and the grounds. The holding tank biofilter odor control fan is a Nidec Motor Corporation radial fume exhauster with pecan hulls for the top composite cover.

“When one thing works, the next thing works, and when the numbers look good and the water looks good, everything seems to fall into place.”

KRISTA TAYS

DOING IT ALL

The plant’s operators (referred to as utility workers) do everything from laboratory testing and equipment maintenance to grounds work and cleaning. “There is practically nothing we don’t know or do, and the employees work their tails off keeping the plant spic and span,” says Tays.

Tays holds Level 3 wastewater and water certifications and Level 1 laboratory certification, and has been with the village for 18 years. She reports to Cliff Hibdon, utility director (Level 3 wastewater, Level 2 water, Level 1 lab, 22 years). The other team members are:

- Kevin Fryhover, utility worker and field supervisor (Level 1 wastewater, Level 2 water, Level 1 water distribution, two years)
- Utility workers Bobby Oglesbee (Level 1 wastewater, Level 2 water, 11 years) and Ralph McClellan Jr. (10 years)

The plant is required to have two Level 3 employees (Level 4 is the highest). Each team member has special skills. Hibdon specializes in permit reporting and oversees the grinder pump contractor installations. Tays keeps the lab and plant operating at peak performance, and specializes in clarifier operation.

Fryhover oversees all the fieldwork and keeps the wastewater and waterlines in good shape. He also works with utility contractors in and around the village. Oglesbee specializes in grinder pump repair,

A cross-cut housing displays the workings of a grinder pump.



and McClellan, with a background in automotive repair, excels at wastewater plant equipment maintenance.

Operators perform mixed liquor suspended solids, mixed liquor volatile suspended solids, settleability and pH tests. Equipment maintenance includes repairing the aeration system blowers, UV system and water pump, and cleaning the clarifier and biofilter odor control system.

The largest job is maintaining the grinder pumps. “When one fails, we either repair it in the field or replace it,” says Tays. “We take the old one back to our shop at the plant and clean and rebuild it.”

DEALING WITH MOP HEADS

Tays says one of the most important tasks is educating the public about

Red Valve



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**Bosque Farms Wastewater Treatment Plant
PERMIT AND PERFORMANCE (monthly averages)**

	PERMIT	EFFLUENT
BOD	30 mg/L	2.0 mg/L
TSS	30 mg/L	4.0 mg/L
E. coli	126/100 mL	<2.0/100 mL
pH	6.6-9.0	Compliant

Kevin Fryhover takes a sample of biosolids, which are injected on a village-owned 240-acre property.

TRAINING CHALLENGES

When the Bosque Farms Wastewater Treatment Plant was built in 1999, the village hired a team of six to operate and maintain it. Only one had wastewater treatment experience.

“Kurt Moffatt, who had been working for the village water department, became our utility director at the wastewater plant,” recalls Krista Tays, utilities operator. “He had Level 4 wastewater certification, and he trained the rest of us.” On-site classes in grinder pump connection, operation, maintenance and electrical wiring also helped the team come up to speed. They relied on manuals for specific plant equipment operation.

Tays, a former village animal control officer for the village, and her new co-workers attended wastewater treatment classes offered by the State of New Mexico. Tays had worked in a veterinary office laboratory and so was no stranger to the lab environment. She took classes in lab procedures through the New Mexico Water and Wastewater Association, and helped train her colleagues at the plant.

The polymer process posed a challenge. “Operator Cliff Hibdon and I had never worked with wastewater systems before,” Tays says. “We had to learn the polymer-to-sludge ratio when wasting in order to get the best product and keep the food and microorganisms in balance.”

Tays recalls that it took about five years for the plant to come up to speed. Today, operators continually train on grinder pump control board upgrades and pump wiring, troubleshooting and repair. Says Tays, “We have a pressurized system for the grinder pumps, and the alarm system for the pumps is tied into our electrical box, so we have to make sure the voltage is correct and that the box is receiving all the information it’s supposed to.”

“We are so small that we’re more like family. We have our ups and downs like a family, but we communicate well.”

KRISTA TAYS

the effects of grease and lard: “It builds up inside the grinder tanks that the pumps sit in. The motor will burn up from continually running, or the tanks will flood because the motors don’t know when to come on.”

Baby wipes are also a problem: “They get caught in the grinder pumps, so we tell customers no baby wipes or diapers,” says Tays. “Mop heads” are another headache. “Small fibers come off clothes when people wash them, and the fibers find each other and eventually build up,” says Tays. “All this tumbling and spinning in the aeration basin ends up creating humongous mop heads.” Four times a year, McClellan uses a giant pitchfork to reach into the aeration teeth and pull out the fibers.

Perhaps the biggest overall challenge is keeping up with the enormous workload. During the day, the staff goes back and forth between the wastewater plant and the water plant a half mile away. “Whoever is on call for that week will check the tank wells, which are about a mile apart, in the morning and each evening before quitting time to make sure everything is OK,” says Tays.

LIKE A FAMILY

A recent high point was winning the System of the Year award, which was based on the plant's consistent quality control and monitoring of effluent released to the Rio Grande. "We were proud that we won," says Tays. "People in the village called and congratulated us, and Mayor Bob Knowlton presented the award to all of us at the village council meeting. It was very nice."

The plant was nominated by the village's New Mexico Rural Water representative, Susan Maupin. "We thanked her for nominating us, and then we thanked each other for working so hard at keeping the plant operating and looking so well," says Tays.

It's a close-knit group. "We are so small that we're more like family," Tays says. "We have our ups and downs like a family, but we communicate well. Every morning as people check in, we talk. If we have a new project, we have a meeting and discuss it." The team has barbecues at the plant several times a year, and the village does the same for all its employees.

Plant staff members give back to the community. "We give plant tours to elementary, junior high and senior high school kids, and we also take them to visit one of the wells," says Tays. "We show videos of what our microorganisms look like under a microscope. Our favorite is a six-legged one that we call the water bear."

FUTURE GOALS

Staff members hope to maintain the plant's efficiency now that the town of Peralta is tied into the system. "We added them in January 2016," says Tays. "They're about the same size as Bosque Farms, but they have more room to expand their population."

The plant may add a primary clarifier at some point to provide a backup if the secondary clarifier is taken offline for maintenance. A SCADA system and staff additions are also on the wish list. "Sometimes we feel short-staffed, but over the years we've learned to work smarter so that everything flows," says Tays.

She cites efficiency as the team's greatest accomplishment: "When one thing works, the next thing works, and when the numbers look good and the water looks good, everything seems to fall into place."

Hibdon agrees: "The water is flowing and the toilets are flushing, so we're in great shape!" **tpo**

Krista Tays, utilities operator, tests a waste activated sludge sample.



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Helping Hands

A CALIFORNIA WATER DISTRICT UNDERTAKES A STREAM IMPROVEMENT PROJECT TO ENABLE UNIMPEDED ANNUAL SPAWNING MIGRATIONS FOR STEELHEAD TROUT

By Jeff Smith

Thanks to the Santa Clara Valley Water District, fish can swim upstream again to spawn and will be able to do so for many years to come.

In 2015, after 18 years of planning and collaborating with the California Department of Fish and Wildlife (CDFW), the district completed the first of three fish passage projects that will allow the endangered steelhead trout and other fish to swim under bridges and migrate to their spawning grounds.

In the Stevens Creek-Evelyn Bridge Fish Passage Project, a 10-person crew worked for nearly two months to remove two concrete weirs and excavate a low-flow channel with grade control structures. The modifications slowed down the creek's flow so that fish can easily swim under the bridge and use a newly constructed fish ladder. To prevent future erosion and help direct the stream flow, the workers lined the channel with rocks and gravel.

UNDOING DAMAGE

Stevens Creek supports a self-sustaining population of winter steelhead and had been identified by CDFW as the area's prime steelhead habitat. Accumulated sediment and erosive flow patterns upstream and downstream of the 14-foot-wide, 469-foot-long culvert at the Evelyn Bridge diverted the flow and created dry areas in the creek that impeded steelhead migration.

Crews replaced a high-maintenance fish ladder that accumulated debris and was ineffective for migrating fish. A new weir-type ladder with a scouring pool allows continuous, unobstructed passage for steelhead. The total project cost was nearly \$850,000. "The scouring pools allow the fish to rest before continuing upstream to spawn," says Melissa Moore, associate water resources specialist for the district, based in Mountain View.

The weir-and-pool design is one of the oldest styles of fish ladders. It uses a series of small dams and pools of regular length to create a long, sloping channel for fish to travel around obstructions. Spawning habitat can be lost or damaged by culverts if sediment accumulates and alters stream flow patterns or water velocity. It's important for the fish to reach the upper portions of the watershed because fry produced there then have access to the entire downstream watershed for rearing.

PART OF THE PLAN

The water district has made it a priority to help restore and maintain a healthy steelhead population in Santa Clara County. In 1997, a group of conservation organizations including Trout Unlimited complained that water district operations were not allowing adequate flows for the protection of fisheries in Stevens Creek and two other watersheds. As a result, the water district and CDFW collaborated to develop a fish habitat and conservation plan.

District representatives presented the plan at a general public meeting in November 2009. In 2012, county voters approved what is called the Safe, Clean Water and Natural Flood Protection Program, a 15-year program designed to match the community's needs and values. Redesign and reconstruction of fish ladders was a part of the plan.

Looking upstream of Stevens Creek during the early phase of excavation work.

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LEFT: The original fish ladder on Stevens Creek at the Evelyn Bridge. RIGHT: The completed creek bed and fish ladder before stream flow.

Improving fish passage within the Stevens Creek corridor, where summer flows are low, was considered critical to sustaining and enhancing the steelhead population. Low summer flows are caused mainly by limited releases from the 91-acre Stevens Creek Reservoir, nearly 9 miles upstream.

Steelhead typically ascend streams to the upper tributaries where conditions are most suitable for successful emergence of fry, says Moore. Juvenile steelhead may spend up to seven years in freshwater before migrating

to the San Francisco Bay and Pacific Ocean to feed and mature. They can then remain at sea for up to three years before returning to freshwater to spawn. Their maximum age is about 11 years.

BENEFITS FOR ALL

The water district expects an annual savings of about \$12,000 in operation and maintenance costs from reduced routine maintenance and debris removal at the new fish ladder. The project's overall success will be determined by the ability to maintain adequate flow in the natural stream channel during low flows. The stream will be monitored for five years to verify the fishes' migration success under variations in flow and annual rainfall.

Stakeholders and more than 40 citizens met last January to celebrate completion of the fish passage project. Celebratory remarks and speeches were made by the mayor of Mountain View, city council members and members of various environmental and community organizations, including International Federation of Fly Fishers.

"The ribbon cutting was a real big deal to us," says Moore. "It was the first environmental project completed under the voter-approved 15-year program."

To commemorate the project and thank the city of Mountain View for the use of its land, the water district plans to provide an interpretive bench that will showcase information about the project and steelhead trout. The bench will be installed next to a pedestrian pathway at the Evelyn Bridge with a view of Stevens Creek. **tpo**

Squeeze Play

A HIGH-RATE WET WEATHER TREATMENT SYSTEM ENABLES AN OHIO UTILITY TO CONQUER CSOS AND MEET ITS COMPLIANCE DEADLINE

By **Scottie Dayton**

Heavy rains flowing through the Ohio city of Springfield's combined sewer system overwhelmed the wastewater treatment plant. The city averaged 50 to 70 CSOs per year, discharging up to 90 mgd to the Mad River.

In 2012, the city agreed with the Ohio EPA to build a 100 mgd high-rate treatment wet weather clarifier and to have the agreement added to its NPDES permit. The agency gave the city a July 2015 deadline.

The review committee evaluated bids and selected the WWETCO FlexFilter compressible media filtration system from WesTech Engineering. "The technology was brand new," says Bill Young, acting plant superintendent. "Only one small unit



March 2015 view of the 100 mgd WWETCO FlexFilter wet weather clarifier (WesTech Engineering).

“The system is easy to monitor, dependable, and doesn't require a full-time operator. We met our compliance deadline and ended CSOs.

Now we're looking at phosphorus removal.”

BILL YOUNG

was treating stream water in Georgia. Our application was totally different and would be constructed on a massive scale.”

To gather vital information for the design engineers, operators ran a 400 gpm demonstration unit from September 2010 to November 2011. Their tests confirmed criteria for specifying 11 filtration cells including loading parameters, media size and operating conditions. The clarifier entered service in January 2015. Today, it treats excess flows with effluent averaging 19 mg/L TSS and 24 mg/L BOD.

HOW IT WORKS

The clarifier traps pollutants in cells 30 feet long, 22 feet wide and 12 feet deep, each designed to filter 10 mgd. As influent trickles down through 30 inches of synthetic fiber balls, hydraulic pressure flexes a bladder (reinforced rubber sidewalls) inward, compressing the media from the bottom (highest compression) to the top (no compression). This pressure gradient captures a high volume of solids by trapping large particles in the top portion and fine particles farther down.

The process uses no mechanical actuators or other moving parts, relying solely on incoming hydraulic forces. Once the water overflows into the media,

the filtration process begins. There is no ramp-up period after bringing the system online. It treats the flow passively.

Rising influent levels activate the cleaning cycle. Draining the cell flexes the bladder outward, releasing the compressed bed. After an air-scoured backwash cleans the media, the filtration cycle repeats. Effluent passes through a chlorine contact basin and discharges to the river.

Besides the 310- by 100-foot clarifier, the \$52 million upgrade included a wet weather headworks with four 40 mgd horizontal raked bar screens (Process Wastewater Technologies), a rock box, gate valves, 20 hp lobe blowers (Roots Systems), sodium hypochlorite and sodium bisulfite feed pumps (Watson-Marlow Fluid Technology Group), and 310 hp effluent pumps (Flygt, a Xylem brand). An Allen-Bradley programmable logic controller (Rockwell Automation) with touch screen enables operators to make adjustments easily.

Upgrades to the 40 mgd (design) complete-mix activated sludge plant included two RakeMax multi-rake influent bar screens and three shaftless screening conveyors (Huber Technology), an anaerobic digester, a 140-foot-



FlexFilter media.

diameter spiral blade secondary clarifier, and rehabilitation of two 2.2-meter Tower Press belt filter presses (Charter Machine Co.).

PRIDE OF OWNERSHIP

Seven operators (only one per shift) manage the plant's daily average flow of 15 to 17 mgd. They all contributed to the upgrade's design, and it paid dividends. Engineers had the filter backwash water discharging to the three flight screw pump basins at the headworks. This reduced the plant's capacity to treat wastewater. To restore it, operators suggested directing the backwash to the influent channel of the complete-mix activated sludge basin.

"That was a major change," says Young. "The team also relocated some chemical lines to the chlorine basin and made it more efficient."

When the demonstration unit arrived, WesTech representatives trained operators to use the PLC, a TSS meter and variable frequency drives to control flow rates. However, no one had tested the unit in cold weather. "I wanted to see how it operated as a solid block of ice," says Young. With temperatures in the mid-teens, an operator filled the system with water, ran it for 20 minutes, shut it off, and drained it. The mercury dropped below zero that night and stood at 10 degrees F the next morning. When the pumps were turned on, warm effluent from the plant thawed the media immediately, and the unit functioned flawlessly.

STARTUP

In January 2015, the SCADA system brought the clarifier online seamlessly. "When the 84-inch sewer backs up for 6 feet, SCADA dumps the excess flow to the wet weather influent line," says Young. "At 5.7 feet, SCADA switches the clarifier to standby mode, which activates the first four cells. If the flowmeter says more cells are needed, they open automatically."

Last year, the plant activated the system 20 to 30 times and used up to seven cells. The design calls for nine active cells and two in backwash. During the first months, a major rainstorm caused the clarifier to hiccup. It closed valves at the wrong time, sending combined flows out the top of the cells and onto the contained service road. In response, the operator switched from the automatic mode to manual on the PLC touch screen, then opened the inlet valves to empty cells and catch the overflow.

"The stormwater carried a high amount of TSS that filled the filters in



Acting superintendent Bill Young adjusts the wet weather clarifier's influent valve at the Springfield plant.



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the first four cells and activated the backwash cycle," says Young. "However, the PLC failed to open valves to new cells before closing other valves for backwashing. We traced the problem to setpoints in the PLC programming and changed them."

OPTIMIZING THE OUTCOME

Then operators discovered that frigid air settled in the empty cells, turning them into giant freezers. During monthly midwinter thaws with days above 32 degrees and nights below freezing, conditions in the cells formed ice around the gate valves, causing startup problems.

Thaws also brought heavy rain. "When rain was in the forecast, and to ensure the valves worked, we manually sent effluent from the secondary clarifiers to the first four cells," says Young. "That provided enough heat to melt the ice." Operators worked with the engineer to program the deicing mode into the SCADA software.

Basically, the wet weather system runs itself, but operators occasionally still find little things to fix. One situation that went unnoticed was sodium bisulfite flowing back from the dechlorination/post-aeration basin to the chlorine contact basin. That caused the sample pump to give false chlorine residual readings and operators to feed additional chlorine.

In time, they became suspicious and began grabbing hand samples. More realistic numbers revealed the problem. Following the suggestion of Class 3 operator Kirk Morris, workers installed baffles in the bottom of the contact tank to help stop the backflow.

"The system is easy to monitor, dependable, and doesn't require a full-time operator," says Young. "We met our compliance deadline and ended CSOs. Now we're looking at phosphorus removal."

After Young fed alum to the plant effluent and sent it to the FlexFilter to verify it was able to catch floc, he designed a preliminary 12-month study. It will determine which is more economical: catching floc in the main plant or in the wet weather clarifier. **tpo**

STEADY HAND

OPERATOR JERRY NICHOLSON APPLIES LONG EXPERIENCE, SKILLS AND WISDOM TO JOB;
WINNING PRAISE, AWARD AND RESPECT AT BOULDER'S BETASSO WATER TREATMENT PLANT

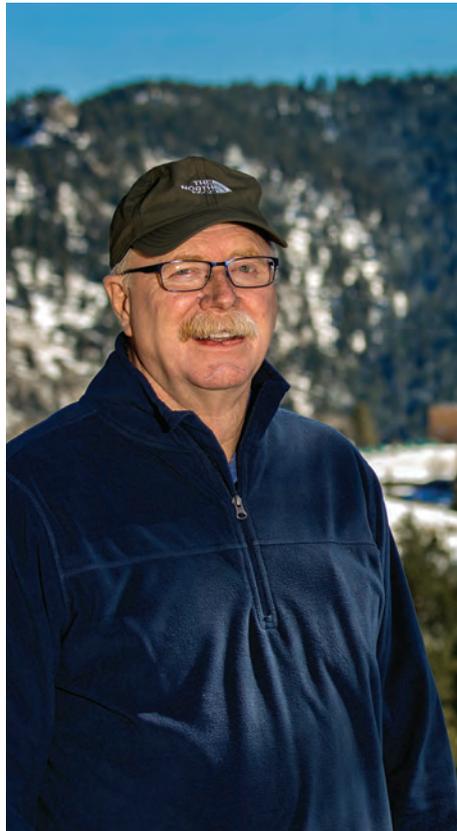
STORY: **Jack Powell**
PHOTOGRAPHY: **Carl Scofield**

WITH 36 YEARS IN WATER TREATMENT, Jerry Nicholson could have called it a career a decade ago. Fat chance. He's committed to the industry and to providing safe, clean drinking water for the people of Boulder, Colorado, where he's the go-to guy at the Betasso Water Treatment facility.

Nicholson has spent his professional life learning water technology, building cohesive teams and doing whatever it takes to keep water flowing. His dedication paid off in September 2015 when he received the Ralph M. Leidholdt Plant Operator Award from the Rocky Mountain Section of the American Water Works Association and the Rocky Mountain Water Environment Association.

"Jerry is keen on every aspect of treatment plant operation, leaving nothing in doubt," says Tom Settle, manager of the Betasso plant, who nominated Nicholson for the award. "Jerry allows no moss to grow under his feet. He is on the move his entire shift, checking equipment, finding obscure problems before they become big ones, bringing them to the attention of management and volunteering to implement the solution. At times, he can be a one-man water plant staff."

Nicholson says he was surprised at the award: "I didn't realize anyone had nominated me. I tell people I won because of being in the field for 36 years, I've stood in line longer than anyone else."



Jerry Nicholson

where he still lives, and graduated from Longmont High School. He attended the University of Northern Colorado in Greeley and majored in business, but didn't graduate, preferring to work. After spending time in construction and other jobs, he wanted something more permanent.

"What interested me about water treatment was the stability of getting a job where there was a real need," he explains. "With water, there isn't much fluctuation based on the economy, so you're almost always needed. Apart from the stability, something is always changing, whether it's new treatment processes or regulations. Also, it typically isn't hard physical labor, so you can do it over the long haul."

After five years as an operator, Nicholson became plant supervisor, and in 1986 he rose to plant superintendent. He held that post until October 2004, when he retired. After taking off several months and managing construction crews, he decided retirement wasn't for him. In May 2005, he went to work for Boulder (population 100,000) as an operator at the Betasso plant.

"I came back as an operator because I always liked operations and I didn't want to supervise again," says Nicholson. In addition to holding a Class A Water Operator license, he is certified in hydroelectric operations because Boulder has nine hydroelectric power plants installed on water supply pipelines above and below the Betasso plant.

"Being a superintendent and having run three water plants, I've dealt with plenty of personnel and administrative issues," says Nicholson. "That provides a different perspective. I look at things a bit differently than the other operators because I've experienced both sides — management and staff."

STABLE CAREER

That line began in March 1980, when he started as a water operator trainee for the City of Longmont, a community of 86,000 about 12 miles northeast of Boulder. Nicholson and his five siblings grew up in Longmont,



“With water, there isn’t much fluctuation based on the economy, so you’re almost always needed. Apart from the stability, something is always changing, whether it’s new treatment processes or regulations.” **JERRY NICHOLSON**



ABOVE: Nicholson cleans, verifies and calibrates a turbidimeter. LEFT: Valves release water from an indoor storage tank to outdoor storage ponds.

Jerry Nicholson, Betasso Water Treatment Plant, Boulder, Colorado

POSITION: | **Water operator**

EXPERIENCE: | **36 years in the water industry**

DUTIES: | **Operate 40 mgd plant, analyze lab data, perform maintenance, mentor new employees on water treatment processes**

EDUCATION: | **Longmont (Colorado) High School; attended Univ. of Northern Colorado**

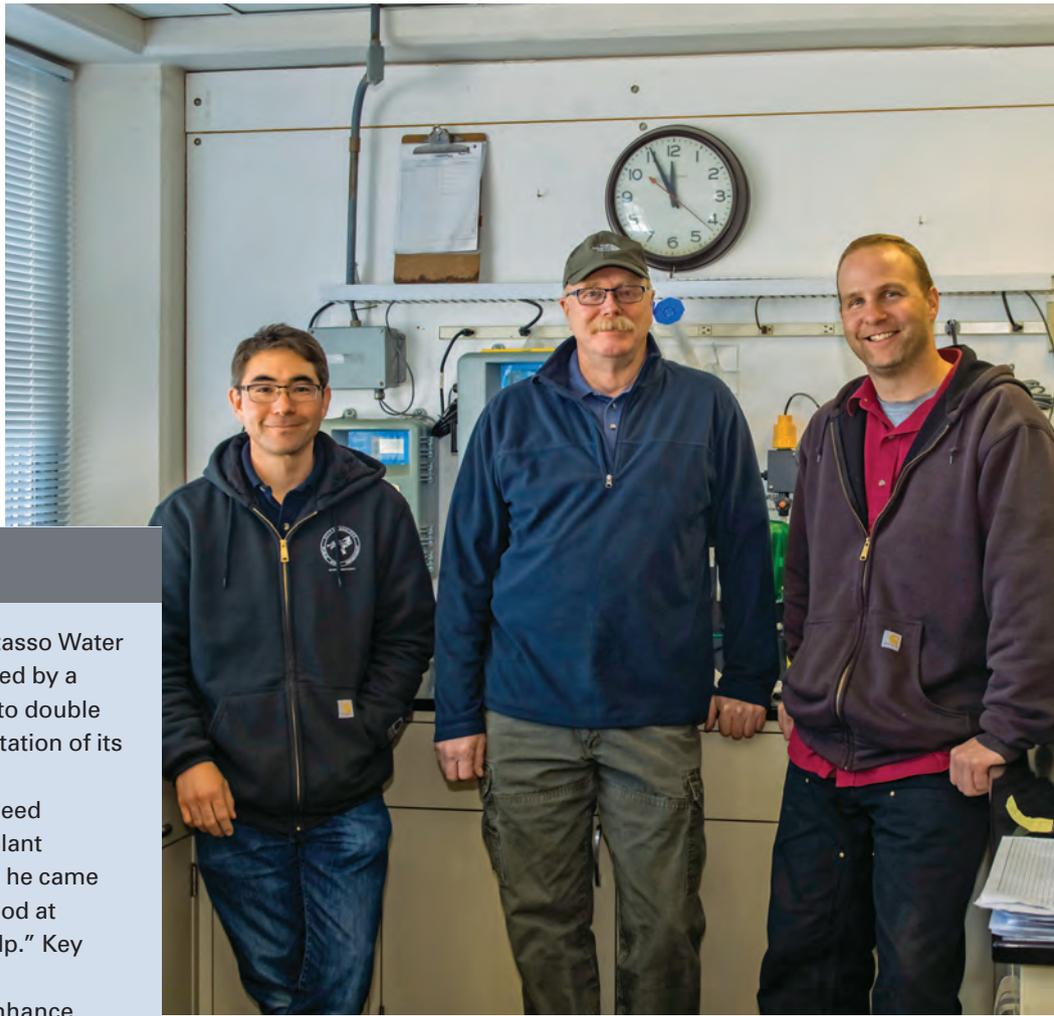
CERTIFICATIONS: | **Class A Water; hydroelectric certification**

MEMBERSHIPS: | **Rocky Mountain Section AWWA**

GOALS: | **Continue to provide clean, safe drinking water**

GPS COORDINATES: | **Latitude: 40° 0'47.65"N;
Longitude: 105°20'11.46"W**

From left, Randy Bass, Jerry Nicholson and Jason Gil in the plant laboratory.



“Jerry’s expertise is vast, and he’s a conscientious individual who constantly tries to break down barriers between maintenance and operations so everybody is on the same page in terms of supporting our facility.”

MATT SWADENER

A TEST OF METTLE

Jerry Nicholson and the other operators at the Betasso Water Treatment Plant will have their skills and patience tested by a major renovation project. Built in 1963 and upgraded to double capacity in 1972, the plant will see a complete rehabilitation of its water treatment processes.

“This will be a huge undertaking for us and we’ll need everyone at the top of their game,” says Tom Settle, plant manager, who has been reviewing plans almost since he came aboard in 2013. “Because Jerry is so proactive and good at spotting and diagnosing problems, he’ll be a great help.” Key elements of the 27-month project will include:

- Installing plate settlers (Meurer Research) to enhance sedimentation. As flow travels up the stainless steel plates, solids settle out onto the plate surface. The clarified water is evenly extracted through the flow control deck and distributed into troughs, where it flows out of the sedimentation basin.
- Downsizing the sedimentation basins from four to two while keeping flow levels unchanged, as a result of the new plate settlers.
- Redoing all mixed-media filters, which have been in place since the early 1990s.
- Installing new surface washers.
- Adding a sludge processing system to dewater treatment residuals.
- Replacing valves and other equipment.

At present, the Betasso plant uses Leopold filters (Xylem), which are an older design, but provide high treatment flexibility. Some of the filters have been reconfigured for better particulate removal. The plant gets high marks; it has excellent source water with low turbidity. Raw water has turbidity of less than 1 NTU; finished water turbidity runs about 0.03 to 0.04 NTU.

“Once the project is completed, we’ll be able to run water more efficiently, and that will help accommodate future growth,” says Nicholson. “And we’ll be able to connect to a sanitary sewer system, which we don’t have now because of our high elevation. Despite the size and complexity of the project, we’re committed to producing the water the Boulder area needs without a hitch.”

BUSY WORK DAYS

Boulder has two water plants: the 40 mgd Betasso plant and the 20 mgd Boulder Reservoir Water Treatment Plant, also called the 63rd Street plant. Together, the plants employ 14 operators, four maintenance workers, three supervisors, two electronics technicians (instrumentation and control) and one SCADA administrator.

Situated in the Rocky Mountain foothills west of Boulder, Betasso is the city’s primary water treatment plant; it is a conventional treatment facility. The 63rd Street plant employs a dissolved air flotation (DAF) process in which solids float to the surface, rather than settling to the bottom of a tank. Boulder operators get hands-on training so that they can work both processes.

On his 12-hour rotating shift starting at 5:30 a.m., Nicholson and his shift partner, operator Randy Bass, exchange information with the night operator before getting to work. One runs the treatment plant while the other handles the distribution system and the hydroelectric stations.

At about 6 a.m., the plant operator does calibrations with the equipment. At 7 o’clock, he runs a complete set of lab tests to evaluate the raw water coming in from the mountain-based Barker reservoir or the Silver Lake Watershed near the Continental Divide. He also monitors the treatment process to make sure the proper amounts of chemicals (coagulants, chloride and fluoride) are added to the water. Then he tests the finished water to ensure that it meets state standards.

For the distribution system, the operator goes through the SCADA screens and checks the hydroelectric stations to see that the proper amount of water is going through them, looks at electric output, checks the generator bearing temperatures and diagnoses any issues. He also determines how much water is in storage; Boulder’s target is to have 28 million gallons on hand. All of this requires extensive experience, considerable knowledge and an unflappable demeanor, all of which typify Nicholson.

“Jerry is a good guy to work with,” says Bass, his carpooling partner and a 14-year plant veteran. “He’s hardworking and very dedicated to the plant and to providing clean water. If he sees something that needs to be done, whether it’s maintenance or a treatment issue, he’ll jump on it.”

BREAKING BARRIERS

Matt Swadener, a chief operator at the Betasso plant for the last 14 years, calls Nicholson “a true professional and forward-thinking operator. Jerry’s expertise is vast, and he’s a conscientious individual who constantly tries to break down barriers between maintenance and operations so everybody is on the same page in terms of supporting our facility.”

Such strong interpersonal skills aren’t surprising, since Nicholson has done a lot of team building, especially during his time as supervisor at Longmont. There, he regularly communicated with both disciplines to promote a team atmosphere. That meant assigning operators to work with maintenance staff and vice versa.

“When you work as an operator, you go into the lab and run tests, look at the monitoring systems and such,” Nicholson says. “But there’s a lot more to a plant. I always found it a lot better if you could get operators doing maintenance and diagnosing equipment problems before those things negatively affected plant processes.”

Settle praises Nicholson for his diligence and his willingness to watch all aspects of plant operations, constantly looking for opportunities to improve the facility. “There is no more selfless team player than Jerry,” says Settle. “He quickly volunteers to assist anyone that needs a helping hand, regardless of how nasty or dirty the job may be. Jerry is good at teaching, which comes from his background and length of experience both here and his previous career at the City of Longmont. He’s been helpful to me and good at sharing his knowledge with new people and getting them up to speed on processes.”

“There is no more selfless team player than Jerry.

He quickly volunteers to assist anyone that needs a helping hand, regardless of how nasty or dirty the job may be.”

TOM SETTLE

ALL ABOUT THE WATER

Nicholson takes such compliments in stride. A self-described “outdoor guy,” he likes to backpack into Colorado’s high-lakes wilderness area (above 12,000 feet) to fly fish and hunt. He tries to eat only wild meat — deer, antelope, moose and elk. And he keeps in close contact with his daughter, who lives in Colorado Springs, and a son and fellow hunter who lives in Littleton.

Yet water treatment remains uppermost in his mind. It’s what brought him out of retirement and what motivates him to get up at the crack of dawn and drive to work, even braving washed-out roads during the 2013 flooding. “What I like about this job is that I get to provide clean water for the resi-

dents here,” says Nicholson. “A water plant operator is expected to be perfect all the time, and if you make a mistake and the water isn’t treated properly, you can impact the entire community.

“Think about it: If a doctor messes up, it typically affects only one person, but we can affect the health of everybody if we don’t do our job correctly. I enjoy what I’m doing and I’m excited about the capital improvement project we’re about to undertake. I’m going to work until I get bored or get tired.” **cpo**

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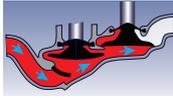
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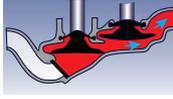


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Fourth-grade teacher Jaimie Mimran poses with her class at Sechrist Elementary, where the overall winners and third-place essay winners attend school.

Making Lessons Last

A CONTEST FOR FOURTH-GRADERS IN NORTHERN ARIZONA ENCOURAGES KIDS TO EXPRESS THEIR IDEA OF A WATER ETHIC IN ARTWORK AND ESSAYS

By Craig Mandli

A child's mind is like a sponge, ready to soak up information. How that information is processed depends on the child. Sometimes when kids' imaginations are free to run wild, the results are extraordinary.

That's the idea behind the Fourth Grade Water Ethic Contest, sponsored by the Coconino Plateau Watershed Partnership (CPWP), with Willow Bend Environmental Education Center. School classes and individual students throughout northern Arizona are invited.

“Because this contest is so open and the kids can express their thoughts in such a variety of ways, it's fun to see what pieces the kids find important, and what's sticking with them.”

AMANDA ACHESON

To introduce them to the ethical use of water, students enter a contest in which they demonstrate the principle of responsible water use through artwork and essays. The ethic adopted by CPWP is simple: Water is life.

“We encourage kids to participate in a variety of ways,” says Amanda Acheson, sustainable building program manager for Coconino County Community Development. “They can write an essay or

draw a picture covering just about anything in the water spectrum. We provide some guidance and instruction beforehand, but it's really based on how water conservation is interpreted through the eyes of these students.”

INQUIRING MINDS

The contest began in 2010. According to Acheson, fourth-graders were chosen because while the water narrative is touched on in the school science curriculum, conservation is a relatively new concept for them. The contest is a way to see how that concept is hitting home with students.

“That age is where a lot of kids form habits they will follow for years,” says Acheson. “The teachers do a great job talking about the value of water, but it's sometimes hard to determine how much of those ideas they retain. Because this contest is so open and the kids can express their thoughts in such a variety of ways, it's fun to see what pieces the kids find important, and what's sticking with them.”

The call for entries goes out in September, and entries are due after about two months. The Coconino Plateau Watershed Partnership's Public Outreach Committee chooses first-, second- and third-place winners in both the essays and artwork.

The winning students' classes received treats: a pizza party for first place, an ice cream social for second, and a popcorn party for third. The winners receive other prizes, including a T-shirt featur-

Helping the Planet

How can we save water? There are many ways to save water, and they all start with us. When you are washing dishes by hand don't let the water run. Fill on sink with wash water and the other with rinse water.



The prize for best overall in the 2015 Fourth Grade Water Ethic Contest went to Phoebe Curran and Aubrey Johnson of Jaimie Mimran's class at Sechrist Elementary. This is their winning essay and drawing.

says Acheson. "Seeing the art helps educate the whole community, and the kids get really jazzed seeing their work on display all over northern Arizona."

FREE TO IMAGINE

The program works, says Acheson, because of its unregimented approach: "It's cool because we're basically giving them a blank slate. It's the water narrative and what it means to them. There really isn't a wrong answer. It's coming from those kids' minds how they depict the water ethic."

"We can preach about water conservation, but there's only so much information you can present. When adults read or see something that comes from a child's mind and can see what concerns that child or even what scares them, it can really drive the point home."

Acheson suggests that municipalities looking to start a similar program first contact the schools and find out what other groups are already working in the classroom. Often, schools work closely with wildlife and environmental education centers that a treatment plant staff could easily partner with to present the water narrative.

"It really goes back to our theme: Water is Life," she says. "It's all interconnected, and water is that connective tissue." tpo

What's Your Story?

TPO welcomes news about your public education and community outreach efforts for future articles in the Hearts and Minds column. Send your ideas to editor@tpo mag.com or call 877/953-3301.

ing the winning artwork and movie tickets. The teachers of the winning entrants receive scholarships: \$300 for first place, \$200 for second and \$100 for third, to be used for classroom materials.

"There's incentive for the students and the teachers to get involved," says Acheson. "Our goal is to make the contest an enhancement to the fourth-grade curriculum all over the area."

SUCCESSFUL YEAR

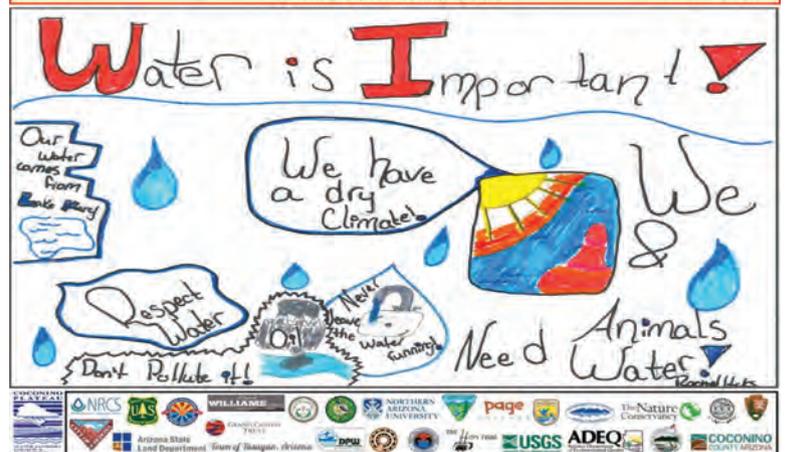
Ten schools took part in the 2015 contest, submitting more than 300 total entries. The prize for best overall went to Phoebe Curran and Aubrey Johnson of Jaimie Mimran's class at Sechrist Elementary. Second place in art went to JaRon Fowler of Kori Moore's Star School class. Second place in essays was won by Christian Kern-Dubois from Danielle Grimmitt's class at Marshall Elementary. Third place in essays was won by Olivia Lanssens and Mina Khatibi, also students of Mimran. Third place in art was won by Faylee Howe from Marshall Elementary.

The students' artwork is displayed at Flagstaff City Hall until mid-January, in the meeting room next to the city council chambers. The submissions are also used to promote water stewardship across northern Arizona, through posters created for classrooms, events and presentations.

Last year, for the first time, contest organizers created laminated water awareness signs from a 2014 winning entry and displayed them in bathroom areas at the Grand Canyon South Rim Visitor's Center, the City of Flagstaff, Coconino County, the City of Sedona, Northern Arizona University, and two elementary schools.

"The bathroom posters were a huge success, and we still get requests from parks and other municipal facilities asking where they can get them,"

Did you know?? Recycling a pound of paper, less than the weight of your average newspaper, saves about 3.5 gallons of water. Buying recycled paper products saves water too, as it takes about six gallons of water to produce a dollar worth of paper. Source: National Geographic



Last year, contest organizers created laminated water awareness signs from a 2014 winning entry for display in public bathrooms.



Great Chemistry

A HIGHLY EDUCATED STAFF AND TWO ON-SITE LABORATORIES HELP KEEP QUALITY WATER FLOWING AT THE BARREN RIVER LAKE WATER TREATMENT PLANT

STORY: **Jim Force** | PHOTOGRAPHY: **Martin Cherry**

IF WATER OPERATORS ACROSS THE COUNTRY HAD to take a chemistry test, it's a good bet the Barren River Lake Water Treatment Plant team would be the winner.

Nearly all plant personnel have college degrees, many in chemistry, biology and environmental science. All operators also work in the plant's microbiology or wet labs. And chemistry is the most important parameter in the successful operation of the plant.

"It's really nice when you have people who have a good understanding of alkalinity and pH and other variables," says Tim Smiley, superintendent of the plant in Glasgow, Kentucky. "If we have issues, we have operators with degrees ready to grasp the problem and understand it. It's a nice blend of knowledge and experience. It makes a world of difference."

It also means excellent quality water and recognition from peers in the profession; the plant won Kentucky's Best Tasting Water award in 2012, a distribution award from the Kentucky Rural Water Association in 2014, and this year, Water Treatment Plant of the Year from the Kentucky Water and Wastewater Operators Association.

CONVENTIONAL PROCESS

The Barren River Lake plant draws water from a reservoir on the Barren River. Four raw-water pumps bring the supply from the intake structure to the plant, which is rated for 12 mgd and averages about 6.76 mgd. Its conventional surface water treatment process consists of flocculation, sedimentation, filtration and disinfection.



Brittany Pour, lab analyst and operator, counts colonies.

consisting of 4- to 6-inch pipe with suction holes, were added in 2007 and have made a difference. “We’ve had no buildup,” Smiley says. “We’re not pulling sediment into the filters.”

Solids are pumped to a holding tank; when they reach a certain level, another pump moves the material to lagoons next to the plant. After the solids dry, they are dug out and spread on utility-owned acreage around the plant. The clarified water flows to a main header that splits into two filtration trains, each containing six 30-inch-deep anthracite-sand-gravel filter beds with Leopold underdrains. Six of the filters were added during the 2007 plant expansion; the other six date back to the 1990s.

Finally, the flow is chlorinated, polyphosphate is added for corrosion control and fluorosilicic acid for fluoridation. Finished water is stored in an 8.4-million-gallon container before being pumped into the 800-mile distribution system. Smiley’s team monitors the distribution network using a SCADA system (HTI). A maintenance crew responds to line breaks and manages new line instal-

“If we have issues, we have operators with degrees ready to grasp the problem and understand it. It’s a nice blend of knowledge and experience. It makes a world of difference.”

TIM SMILEY



Barren River Lake Water Treatment Plant, Glasgow, Kentucky

BUILT: | 1967 (upgrades 1997 and 2007)

POPULATION SERVED: | 37,000

AREA SERVED: | 444 square miles

SOURCE WATER: | Barren River Lake (reservoir)

PROCESS: | Conventional

CAPACITY: | 12 mgd (6.76 mgd average)

SYSTEM STORAGE: | 8.4 million gallons

ANNUAL BUDGET: | \$1.8 million (operations)

WEBSITE: | www.glasgowh2o.com

GPS COORDINATES: | Latitude: 36°59'43.10"N; longitude: 85°54'42.77"W



Hydrogen peroxide is fed at the intake to oxidize organics and control iron and manganese. “You have to watch your doses, so as not to strip too much iron and manganese,” says Smiley. “We use Hach’s DR3900 spectrophotometer, and have good data on dosage. We’ve had good luck with the hydrogen peroxide as a pre-oxidant.”

At the plant, the water passes through a flash mix process where lime and a coagulant (Nichem chemical 4900) are added. Floc starts forming on the floc blades in the four rectangular settling basins, and the staff constantly monitors the water in an effort to maintain the biggest and best floc possible.

Tube settlers (Brentwood Industries), added during an expansion in 1997, help settle the solids. Sludge sweepers run on a cable pulley system and sweep solids twice a day from one end of each basin to the other. The sweepers,

The team at the Barren River Lake Water Treatment Plant includes, front row, from left: Brittany Pour, operator/lab analyst; Wesley Wilson, lab director/operator; and Scott Jones, operator/lab analyst. Second row: Lee Hammer, chief operator/lab analyst; Tim Smiley, superintendent; and Cody Richardson, operator. Third row: Scott Young, general manager; Chris Gentry, chief operator; and Tyler Emberton, operator trainee. Fourth row: Clint Harbison, engineering manager; and Billy Carver, systems operations manager.



lation. The utility's engineering department helps hold down external costs for planning upgrades — another 6 mgd expansion is being planned.

CHEMISTRY IN BALANCE

Using chemistry, Smiley and his staff watch over the plant the way a mechanic might fine-tune the engine of a classic automobile. Chlorination is an example. "We sometimes add chlorine at the flash mix points or in the settling basins, instead of at the end of the process," Smiley says. "We get longer chlorine contact times when we add it at flash mix."

At the same time, chlorine helps depress the pH of the water, and manipulating pH in this way can help the function of the coagulants being added at the same point. "Lime increases our alkalinity," Smiley says. "We need a little chlorine to depress pH."

IN MEMORIAM

As pleased as Tim Smiley and his staff were about receiving the recent Water Treatment Plant of the Year award from the Kentucky Water and Wastewater Operators Association, the honor was somewhat bittersweet. That's because Chase Powell, one of the operators most responsible for the award, was killed in an automobile accident last August.

Powell had been on Barren River Lake plant staff for three years. His death demonstrated how close-knit the plant staff is. Smiley says everyone attended Powell's funeral and felt the loss personally as well as professionally.

"Chase was my organizer," says Smiley. "He had a degree in environmental science from the University of Kentucky, and he was really particular about keeping records. He had all our data and information organized in file folders, and that made it a lot easier to find things as we compiled the information for the award application. He even organized our tool room."

The award is given annually for having at least a two-year operational record that demonstrates proficient operations in accordance with all required permit standards, with no more than one violation in the last 12 months.

The approach works best during winter, but from April to November the staff adds chlorine at the sedimentation basin. This lessens the contact time and reduces formation of trihalomethane (THM) and haloacetic acids (HAAs). "Temperature plays a big role in the formation of THM and HAA," says Smiley. If necessary, the staff can also employ post-chlorination at the storage reservoir.

Operational adjustments like these show that the laboratory is the nerve center of the plant, and both the wet lab and a microbiology lab are well used. The wet lab enables the staff to test daily for alkalinity and hardness, scaling, pH, fluoride, peroxide, manganese, iron and chlorine. "We walk a fine line on chlorine," says Smiley. "The EPA and the state require us to have a 0.2 ppm chlorine residual throughout our distribution system.

We watch disinfection byproducts and bacteria very closely."

KEEPING IT CLEAR

The same goes for turbidity. "We've been meeting Area-Wide Optimization Program standards of below 0.3 NTU 95 percent of the time for 10 consecutive years," says Smiley. To maintain a low-turbidity profile, the staff monitors turbidity continuously at four points: raw water, top of the filters, combined filter effluent and finished water.

"The lab has four separate faucets we draw from and test," says Smiley. "Each carries water from one of the sampling points." While the Hach equipment monitors continuously, the faucets enable the staff to manually check water quality and chemistry, as well. Taste and odor are also tested, as are algae blooms at certain times of the year.



Chris Gentry runs a check of water hardness.

While all operators are proficient in the wet lab, they are just as well versed in operating the plant's microbiology lab. "The lab has the same standards as the state's microbiology lab," says Smiley, who built the lab when he joined the staff several years ago. "Having it helps us keep the water safe. If we have a break in the distribution system and have to issue a boil order, the sooner we get results from our own lab, the sooner we can notify our customers."

“It all goes back to personnel. From top to bottom, your biggest asset is your people. Our people care. It's not just a 9-to-5 job. You can't just walk out the door and forget it.”

TIM SMILEY

The plant also doesn't have to send samples to an outside lab and worry about hold times.

The knowledge of chemistry helps keep costs down, too. "We're really conscientious on dosing and proper use of chemicals," says Smiley. "We cut

all the waste. Plus, with a good source water, we can keep coagulants and other dosages down. That helps save on costs."

THE ROAD AHEAD

Even a smooth-running operation like the Barren River Lake plant must look ahead, and Smiley's team sees a number of challenges, some of which may increase costs. The plant needs to replace the media in the older set of filters. "During the 2007 upgrade, we added six new filters, but now, according to our filter profiles, we probably need to be replacing the media and cleaning out the older set of filters," Smiley says. "For us, that's a big project and a big cost."

The filters haven't exhibited breakthrough, but the plant needs to stay ahead of the situation.

And while planning for expenditures, the team recognizes the value of investment. "We just replaced the roofing on our intake and chemical buildings," Smiley says. That makes the structures more energy-efficient and that will pay dividends by reducing heating costs.



The Barren River Lake Water Treatment Plant was built in 1967 and expanded in 2007.

“The EPA and the state require us to have a 0.2 ppm chlorine residual throughout our distribution system. We watch disinfection byproducts and bacteria very closely.”

TIM SMILEY

While investing in the plant is prudent, Smiley values investment in people even more. If there’s anything he’s learned in the water profession it’s the necessity to hire qualified people.

The team includes:

- Chris Gentry, chief operator
- Lee Hammer, chief operator and lab analyst
- Wesley Wilson, microbiology lab director/operator
- Scott Jones and Brittany Pour, operators and lab analysts
- Cody Richardson, operator
- Tyler Emberton, operator trainee

“It all goes back to personnel,” he says. “From top to bottom, your biggest asset is your people. Our people care. It’s not just a 9-to-5 job. You can’t just walk out the door and forget it. We get really close at the water plant. We



Scott Jones checks the coagulant feed.

don’t have a day off — treating water never stops. We rely on each other. If we have an issue, my staff calls me and asks what they can do.”

Smiley says that feeling of dedication and mutual respect comes from his administration and works its way down through the organization: “The quality of the people you have reflects the quality of the water you’re putting out.” **cpo**

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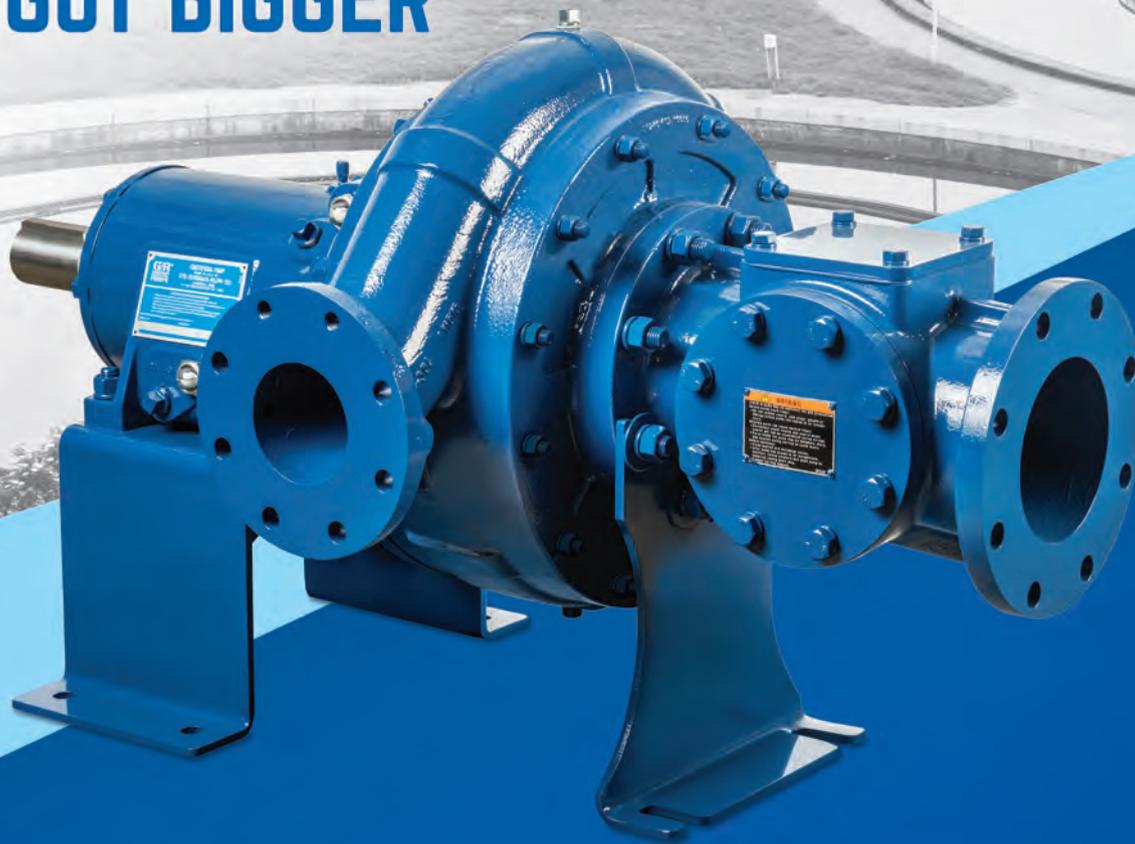
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Cleaner By Design

A WISCONSIN PLANT GOES GREENER WITH BIOLOGICAL PHOSPHORUS REMOVAL, HIGHER-EFFICIENCY EQUIPMENT, BIOGAS-TO-ENERGY AND OTHER UPGRADES

By Doug Day

To serve a growing population, the Eau Claire Wastewater Treatment Plant needed improvements.

A 2007 facility plan for the plant in northwestern Wisconsin pointed toward adding an activated sludge process with biological phosphorus removal (bio-P) capability to meet increasing demand and satisfy new regulations.

A higher level of treatment normally means using more energy. But Jeff Pippenger, utilities administrator, says Eau Claire has offset that increase by using more biogas and heat recovery; adding high-efficiency motors, blowers, mixers and variable frequency drives; upgrading heating and lighting; and reducing chemical usage in treatment.

MULTIPLE CHANGES

The facility plan included a number of changes to improve energy and water efficiency at the 1980s-era 11.5 mgd (design) plant. Serving 75,000 people in Eau Claire and Altoona, the plant has an average flow of 5.1 mgd.

“Our rotating biological contactors weren’t doing a very good job on the biological oxygen demand (BOD),” Pippenger says. “We were seeing our loading coming up because the city has increased in population, and we have more industrial companies coming in. Our secondary treatment process wasn’t keeping up with it.”

The \$40 million project began in spring 2013, and most of the improvements were online by spring 2015, immediately improving treatment efficiency.

	2013	2015
Influent flow	5.3 mgd	5.1 mgd
BOD loading	17,000 pounds per day	12,000 pounds per day
Effluent BOD	783 pounds per day	204 pounds per day
BOD treatment efficiency	95.4%	98.3%
TSS loading	15,500 pounds per day	14,500 pounds per day
Effluent TSS	1,100 pounds per day	118 pounds per day
TSS treatment efficiency	93%	99.2%

ENERGY SAVINGS

Two old 240 kW engine/generators were replaced with two 275 kW models (Gen-Tech). The additional generating capacity will save the plant about \$300,000 a year at current electricity rates.

The plant’s heating needs are being met partly by heat recovery from the engines (about 20 percent of demand) and by the addition of boilers for



Two 275 kW cogenerator units will increase electrical generation at the plant and save about \$300,000 a year (Gen-Tech). Recovering waste heat from the engines will also contribute about 20 percent of the plant’s heating needs.

digester heating. “We added two 5,000 MMBtu/hr biogas boilers from Hurst to help heat the sludge before it enters the digesters,” says Pippenger. “So we’re using the gas produced in the digesters to heat the digesters.” The plant has three primary digesters and one secondary unit.

Put online in early 2014, the boilers burned 9 million cubic feet of biogas in the first 22 months, saving the plant about \$40,000 over natural gas fuel.

Other equipment upgrades included the replacement of 86 motors 1/4 hp to 350 hp with high-efficiency models from Marathon, Baldor-Reliance and Toshiba. Forty Eaton VFDs were installed throughout the facility. To help further reduce energy demand, the plant cut back on areas that are heated in winter and added LED lights, zone lighting controls and motion sensors in offices and equipment rooms.



A pair of Hurst 5,000 MBH boilers will use biogas from the digesters to heat sludge before it enters the digesters to improve treatment efficiency.

WATER EFFICIENCY

To reduce the amount of potable water used, the wastewater treatment plant is reclaiming about 740 gpm of effluent and using it for purposes including:

- Cleaning and washing a variety of equipment, including the gravity belt thickener, process tanks, washer/compactor screens, grit classifier, lime slurry preparation tanks, scum troughs and sludge thickener hopper
- Digester foam suppression in the biogas handling vessel
- Elutriation for thickening primary solids in the gravity thickener
- Odor control in the engineered media system in the headworks
- General site cleaning and landscape irrigation

ENVIRONMENTAL IMPROVEMENTS

To stay below its 1 mg/L permit limit on phosphorus, the facility used to chemically treat its effluent. That is no longer necessary. "It used to be our highest chemical cost," says Pippenger. "We spent hundreds of thousands of dollars a year on ferric chloride to make sure we maintained our limit."



The Eau Claire facility also has two diesel-powered 600 kW emergency generators in the event of a power loss to the plant (Kohler).

“Phosphorus removal happens in the selector zone of each aeration basin. That’s an anoxic zone, so we have low-energy mixers. The six aeration tanks have high-efficiency blowers.”

JEFF PIPPENGER

Fewer chemicals does mean more energy expended, but the biological process was designed for efficiency. It is automatically controlled through oxygen, ammonia and pH probes and inline orthophosphate analysis. "Phosphorus removal happens in the selector zone of each aeration basin," says Pippenger. "That's an anoxic zone, so we have low-energy mixers. The six aeration tanks have high-efficiency blowers."

One result of the new treatment system is more solids, since more waste material is being captured. The plant's biosolids are spread on area farms. "Last year we land-applied 7.75 million gallons of biosolids in the spring and fall," says Pippenger. About a dozen farms receive material at no charge, accounting for 3,000 acres.

The biosolids are injected with a plant-owned TerraGator vehicle (AGCO). "We're fortunate that we have quite a few farmers close by," Pippenger says. "We don't have to drive an hour to get to the field. They're typically within 10 minutes."

In 2016, Pippenger is busy upgrading drinking water facilities as the city continues to improve its infrastructure. "We have water and sewer mains that date back to the 1880s," he says. "Those are the things that keep you up at night." **tpo**

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A PIPE CRAWLER VIDEO INSPECTION SYSTEM FROM DEEP TREKKER PROVIDES SUBSTANTIAL VERSATILITY IN A PACKAGE THAT CAN BE OPERATED BY A SINGLE TECHNICIAN

By Ted J. Rulseh

Equipment for inspecting pipes, tanks, culverts and other water infrastructure can be a major investment. Truck-mounted systems are extremely powerful but involve substantial expense both for the equipment and the labor to operate it. Push cameras are limited in the types and sizes of facilities they can inspect.

Now, Deep Trekker has introduced a portable crawler camera system that one technician can deploy in streets or in remote locations. It is battery operated and does not require a support vehicle. The crawler and camera have the added benefit of being fully submersible and thus useful for inspection of underwater facilities or pipes filled with water.

The technology is an offshoot of the company's experience with Deep Trekker submersible remotely operated vehicles (ROVs) for inspecting potable facilities such as water tanks and reservoirs. Amanda Coulas, marketing manager, talked about the crawler camera system in an interview with *Treatment Plant Operator*.

tpo: What need in the marketplace drove development of this technology?

Coulas: Infrastructure is aging, especially in North America, and it's important that it be inspected. We work with service companies, municipalities and commercial divers, and many smaller entities find it difficult to

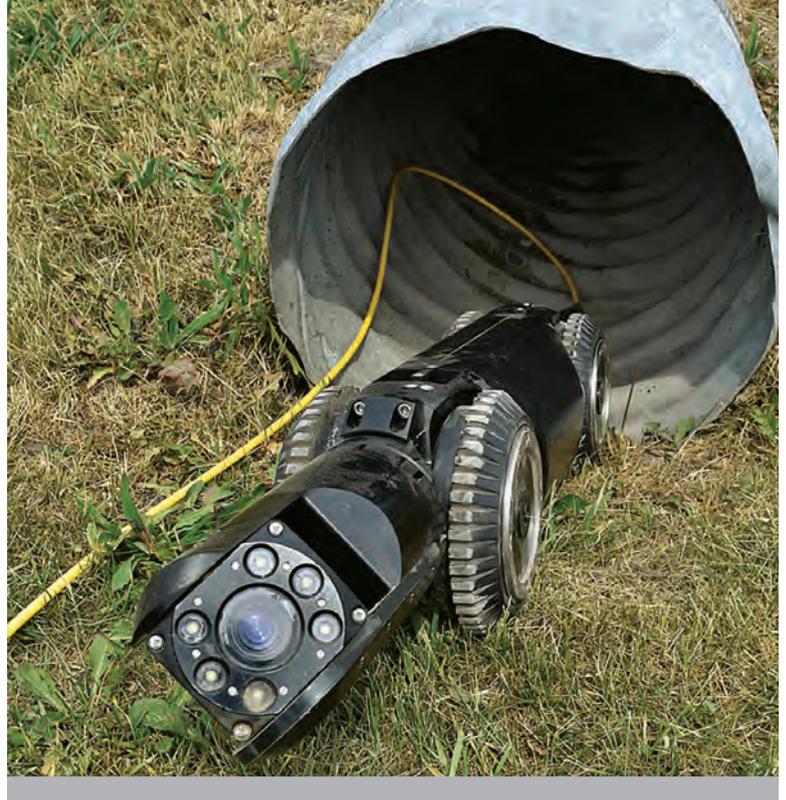
“You don't need a generator, and you don't need a dedicated truck. It's self-contained. It can be deployed from a pickup truck or an ATV.”

AMANDA COULAS

afford both the manpower and the inspection systems themselves. We set out to make a portable pipe crawler for those small entities, as well as for larger ones that need a system one technician can deploy almost anywhere. You don't need a generator, and you don't need a dedicated truck. It's self-contained. It can be deployed from a pickup truck or an ATV.

tpo: What enables this unit to operate underwater?

Coulas: We come from the underwater world, so all the waterproofing technology and robust components used to make our submersible ROVs has



The crawler camera from Deep Trekker is operable by one technician and is fully submersible.

been brought over to the crawler world. The crawler is depth rated to 164 feet. It can go into reservoirs, underwater pipelines and operate semi- or fully submerged in stormwater systems.

tpo: Can this unit be used for general sanitary sewer pipe and water pipe inspections?

Coulas: Yes, definitely. We have tracks and different wheel options that enable it to go into larger pipes, including sanitary sewer pipelines. It can also inspect potable water pipes, and in fact any pipe as small as 8 inches. As with our ROV system, all materials are acceptable for use in drinking water.

tpo: What type of camera does this system use?

Coulas: We offer a static camera head and a pan-tilt-zoom camera. The proven block camera head is intended for low-light inspection with 10x optical zoom. Six small, ultrabright, dimmable LEDs surround the camera to provide a full shadowless view at 1,000 lumens. The cable reel has a capacity up to 1,300 feet, and we offer a deployed cable length counter.

tpo: How are the crawler and camera controlled when deployed?

Coulas: The hand-held monitor and control unit include everything needed to operate the system. It is designed like a familiar video game controller. One joystick controls the steerable wheels. Another joystick handles the pan, tilt and zoom of the camera head. There are buttons on the front for functions such as bringing the camera back to center and turning on or dimming the

lights. Planned innovations include an elevating arm to position the camera head in the middle of larger pipes. That will also be operated from the hand-held controller.

tpo: What about the system's video capability?

Coulas: We've aimed to provide the same quality video recording available in truck-based systems.

The monitor has a 5.6-inch screen that is about five times brighter than a laptop computer screen. The screen shows the incline roll and the camera

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“The crawler is depth rated to 164 feet. It can go into reservoirs, underwater pipelines and operate semi- or fully submerged in stormwater systems.”

AMANDA COULAS

pan and tilt angle. A digital video recorder plugs into the back that can hold up to 64GB on an SD card — enough for several hours of footage. An RCA connector in the back of the monitor lets users plug into a PC or other monitor device to implement pipe survey and reporting software.

tpo: What do you see as some of the most promising applications for this system?

Coulas: We've seen a lot of interest from municipalities for their sanitary sewers. Service companies that already own ROVs are interested in using it for stormwater and potable waterlines. Some clients who use ROVs primarily for water tank inspections plan to add the crawler to their service fleet.

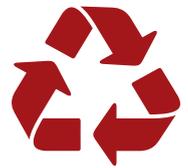
tpo: Do you see significant potential in stormwater applications?

Coulas: Yes. Our ROVs are used a lot in the stormwater sector, and the pipe crawler will expand our capabilities in that market. Different states have different regulations about how much sediment can accumulate in stormwater pipes. If pipes are not properly maintained, flood risks increase. It's important for cities and suburbs to keep inspections current.

tpo: How would you describe the durability of this equipment?

Coulas: ROV applications tend to be really rough on equipment, and we have brought the robust engineering and construction technology over to our crawler. It's very durable, with a diecast aluminum body and a powder-coated finish. **tpo**

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RICK CANTU'S INSISTENCE ON GETTING TO THE BOTTOM OF TREATMENT ISSUES SERVED HIS COMMUNITY WELL AND SAVED HIS TREATMENT FACILITY MILLIONS OF DOLLARS

STORY: **Jack Powell** | PHOTOGRAPHY: **Oliver Parini**

GO THE EXTRA MILE. FOR RICARDO “RICK” CANTU, THAT’S MORE THAN a saying — it’s how he defined his life in wastewater treatment. Since he started in 1978 as an operator, Cantu has spent countless hours researching, studying and looking at the “whys” behind every process and decision, challenging his bosses and the U.S. EPA.

The result: a stellar career marked by advancement; the respect of management, colleagues and regulators; and, last year, the 2014 Regional Wastewater Treatment Plant Operator of the Year Excellence Award.

Presented by the EPA’s New England office, the award acknowledges Cantu’s achievements as superintendent of the Manchester (New Hampshire) Wastewater Treatment Plant. Those include improved water sample collection, substantial cost savings and commitment to mentoring of clean-water professionals. The New Hampshire Department of Environmental Services (DES) was instrumental in Cantu’s nomination.

STEADY PROGRESS

“I was a bit surprised that I won, because while I’ve done a lot of work in wastewater, I’ve been a bit of a thorn in the EPA’s side over the years, particularly when it comes to water sampling,” says Cantu, who retired in July 2015. “I was committed to helping people realize that our rivers are a lot cleaner than many believe. Wastewater is the best choice I made in terms of a career.”

Born and raised in Berlin, New Hampshire, a city of 9,600 along the Androscoggin River, Cantu forged a resume many in the industry would envy. After high school, Cantu worked four and a half years for Converse, the sneaker manufacturer. At Converse, Cantu took a Bell & Howell course in electronics, built an oscilloscope and started making a color television.



Rick Cantu, former superintendent of the Manchester Wastewater Treatment Plant.

In 1977, he told a job counselor that he wanted to be a radio and TV repairman. The counselor suggested Cantu go into water or wastewater treatment where demand was high, so he earned an associate degree in water/wastewater technology from Berlin Vocational Technical College. When he graduated in 1978, the Berlin treatment plant had just gone online and he got a job as an operator.

Two and a half years later, Cantu moved to the wastewater facility in Dover (30,000 population) in New Hampshire’s seacoast region and stayed six years. He then worked four years for the plant in Biddeford, Maine, before becoming operations manager for OMI, the operations arm of CH2M HILL.

With OMI, Cantu worked for a series of plants before leaving for Manchester, the largest city in New Hampshire (population of 110,000). There he worked as pretreatment coordinator from 1997 to 2002, ran the newly created stormwater division from 2002 to 2007 while handling environmental permits, and ultimately became plant superintendent. Cantu has certifications in several states, including a Grade 4 Wastewater Operator license (highest) in New Hampshire.

IN EMPLOYEES’ CORNER

As superintendent of Manchester’s 40-year-old conventional activated sludge plant, Cantu managed a \$22 million annual budget (\$11 million capital and \$11 million operations). He supervised 32 people, including four supervisors, five maintenance workers, five laborers, 13 operators, two lab technicians and three electricians, as well as one person in the stormwater organization and two in pretreatment.

In addition, Cantu oversaw all plant functions and 11 pump stations serving Manchester, Bedford, Goffstown and Londonderry. Just before retiring he directed a \$20 million aeration project, which moved the plant from



“I’ve been a bit of a thorn in the EPA’s side over the years, particularly when it comes to water sampling. I was committed to helping people realize that our rivers are a lot cleaner than many believe.”

RICK CANTU

Cantu has saved his community significant money with his meticulous and effective approach to solving problems.



Ricardo “Rick” Cantu, Manchester (New Hampshire) Wastewater Treatment Plant

POSITION: | **Superintendent (retired late 2015)**

EXPERIENCE: | **37 years**

DUTIES: | **Oversaw all plant operations**

EDUCATION: | **Associate degree, water/wastewater technology, Berlin Vocational Technical College**

CERTIFICATION: | **Grade 4 Wastewater Operator**

MEMBERSHIPS: | **Water Environment Federation, New England Water Environment Association, New Hampshire Water Pollution Control Association, National Safety Council**

GOALS: | **Consult with communities and stay active in the wastewater field**

GPS COORDINATES: | **Longitude: 42°56’39.79”N; longitude: 71°27’28.78”W**



The plant team includes, from left, Fred McNeill, chief engineer; Rick Cantu, former superintendent; Rob Robinson, superintendent; and David St. Armand, chief operator.

mechanical aeration to fine-bubble diffusers (Sanitaire - a Xylem Brand). The project allowed the facility to increase aeration capacity with fewer aeration tanks.

Through everything, Cantu has been steadfast in supporting his team. "One of the big things about being a good leader is standing behind your people," he says. "At a lot of places, when something goes awry, they look for a scapegoat. My philosophy is that if someone makes a decision and it was made with forethought, then I'm with them all the way. I'd rather have a person make a decision, even if it's wrong, than no decision at all, as long as it's thought out."

CHALLENGING THE STATUS QUO

In his 18 years at the 34 mgd Manchester plant, Cantu distinguished himself for tenacity in the face of tough federal and state environmental reg-

ulations. For example, in 2008 the EPA insisted that the plant install a \$25 million aluminum treatment system, believing too much aluminum was being discharged into the 117-mile-long Merrimack River. Cantu didn't believe aluminum was a major problem and asked for an extension of the plant's NPDES permit, which set the aluminum limit at 87 ppb. The EPA gave the facility 15 months: 12 for a study and three to produce a final report.

Cantu and a team of state DES and plant staff members collected water under clean sampling conditions, which had never been done before in New Hampshire. That meant double-bagging bottles, avoiding clothing with aluminum zippers and buttons, and even removing aluminum eyeglass frames — anything to prevent contamination. Samples showed that the river was not endangered from aluminum, so the EPA dropped the requirement from the permit.

Meanwhile, the EPA proposed permit limits for copper and lead, to which Cantu responded, "If there's no problem with aluminum, then there's probably no issue with copper or lead." He asked to do a full-year study. EPA officials agreed that the plant could take clean samples during low-flow conditions at the river. Cantu's team produced impressive numbers: They measured 20 percent of what the EPA used in fact sheet calculations from Whole Effluent Toxicity ambient river sampling measured for copper, and a non-detect result for lead. Again, the river was found clean in terms of those metals, so the EPA dropped that requirement.

"Rick has been willing to invest a lot of research time in topics that affect the Manchester plant," says Kenneth Kessler, DES operations section supervisor, who nominated Cantu for the excellence award. "He was always trying to get to the bottom of the reasons for decisions, rather than simply accepting them. Rick has also been active in advocating for clean sampling techniques, which have affected the permitting cycle for a lot of wastewater treatment plants, finding lower background levels compared with the previous willy-nilly way data was collected."

VALUABLE MENTORSHIP

As diligent as Cantu was with sampling and permit issues, he has been equally committed to developing wastewater talent. Kirk Ray, Manchester plant maintenance supervisor, says, "Rick mentored me in the job, helping me understand what was required in terms of our permits and how to motivate staff. As a boss, he was very easy to work with and let you do your job without micromanaging. Our staff liked and respected him; pretty much wherever he went there was a lot of good humor."

Fred McNeill, chief engineer of Manchester's Environmental Protection Division and Cantu's supervisor, recalls how a few years ago Cantu mentored

AS THOROUGH AS POSSIBLE

Rick Cantu's hard-nosed approach has been part of his persona at the Manchester Wastewater Treatment Plant. Early on, he addressed issues with pretreatment and industrial discharges.

With his strong industrial pretreatment background at OMI, Cantu had a good idea of industry impacts. When he saw the industrial discharge levels at the Manchester plant, he told the chief engineer that the local industries were doing a good job. "But I told him that we'd have to make some operational changes at the plant, and even though the culture wasn't to rock the boat, he could see that what I said made sense," Cantu says.

Another example occurred when Cantu became superintendent in 2007, during an upgrade of the plant's primary clarifiers. A contractor had taken out two of the plant's three clarifiers, and the two new ones were having problems with poor capture. The contractor wanted to take out the third one and see what would happen. Cantu and his operators refused, preferring to keep the good clarifier. They also brought in John Essler of CPE Services, who installs clarifiers all over

the country, and worked with the engineering firm of Metcalf & Eddy to resolve the problems.

"After six or seven months, the original contractor admitted that its design specifications didn't factor in heavy return flows," says Cantu. "So the flows going through were much faster than we anticipated and as such missed a lot of solids. In the end, we got the contractor to pay 50 percent of the cost to retrofit those two clarifiers and adjust the third one."

Perhaps the best example of Cantu's doggedness comes from his former boss, Fred McNeill, chief engineer. McNeill remembers getting a memo from Cantu about algae in levels in the Merrimack River, on which state and federal officials base phosphorus limits. "One day Rick comes running into my office and says, 'Look at this; this sample was taken at 4 o'clock in the afternoon, which means the sun was setting and therefore not the optimum time to take the sample,'" McNeill says. "That's how deep he drilled down."

Cantu checks the automatic raw influent sampler.

operator Dan Driscoll, who had never worked in the municipal wastewater business: “Rick helped him tremendously and groomed him for a leadership role here. Within five years, Dan seized an opportunity and went to Concord as chief operator for that city’s wastewater facility, one of the biggest treatment plants in the state, with a chance to become plant superintendent. It shows how effective Rick was in getting him up to speed on processes, regulations and management skills.”

Other operators under Cantu’s tutelage have gone on to senior wastewater positions in Nashua, Seabrook, Milford and Derry. Some came in 2011 when many industries closed down along the New Hampshire-Massachusetts border. Cantu made sure they got a well-rounded education in all aspects of wastewater treatment so they would be eligible to move up when better jobs came open.

CLOSE TO THE ACTION

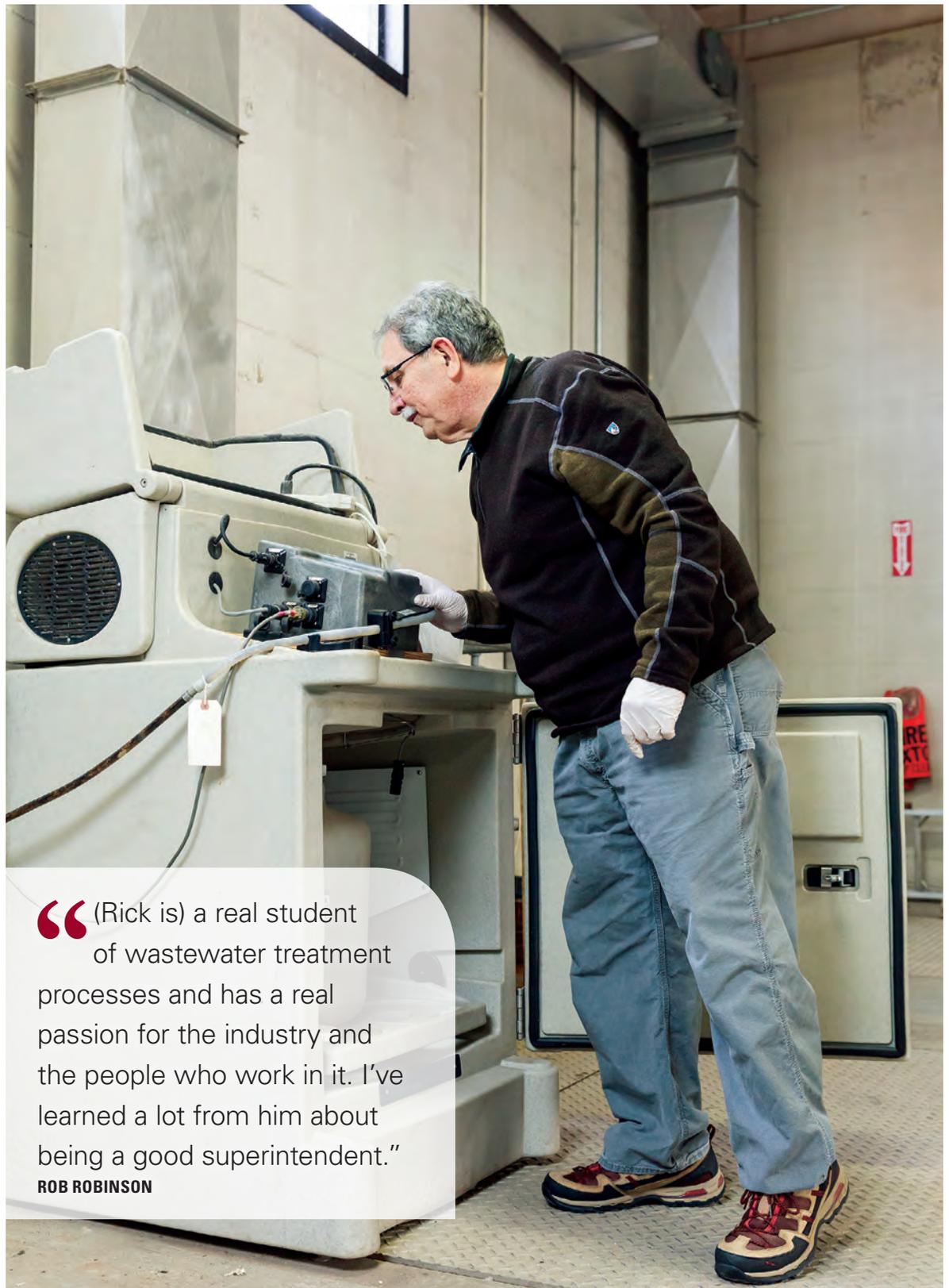
Since retiring, Cantu has worked a day or two a week helping his successor, Rob Robinson, learn the superintendent’s job, with its mounds of paperwork and ever-tightening regulations. Cantu is also helping Robinson complete the aeration upgrade and make sure that the plant’s phosphorus removal system, added in 2015, is working as it should.

“Rick has been a great help during the transition period,” says Robinson, who joined the Manchester plant in 2003. “He’s a real student of wastewater treatment processes and has a real passion for the industry and the people who work in it. I’ve learned a lot from him about being a good superintendent, and I appreciate him sharing his knowledge so freely.”

Besides helping at the plant, Cantu has launched a small consulting business. In August 2015, he went to Nashua and tested the water because of lead and copper permit issues and got the same results as he achieved in Manchester — the EPA dropped those requirements from Nashua’s permit. Later he helped Lowell, Massachusetts, do sampling for silver, zinc, cadmium and other metals. Every sample came in under the requirements, which meant there was no need to treat for them. He has received calls from some small plants that need assistance with sampling and permits.

To relax, Cantu spends time with his wife, Rita, his high school sweetheart. He also plays guitar with a group of friends and enjoys camping.

Still, maintaining clean water remains a top priority: “Something just



“(Rick is) a real student of wastewater treatment processes and has a real passion for the industry and the people who work in it. I’ve learned a lot from him about being a good superintendent.”

ROB ROBINSON

clicked between wastewater treatment and me. As I tell school kids who visit the Manchester plant, I never saw anybody get laid off in this profession because of lack of work. Plus, everyone has to go to the bathroom, and as the area’s population increases, so does our workload. That’s just a fact.” **tpo**

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A Perfect Marriage

ENGINEER AND WERF RESEARCH COUNCIL MEMBER JOHN WILLIS FINDS THAT OFTEN THE MOST ECONOMICAL BIOGAS AND BIOSOLIDS SOLUTIONS ARE ALSO THE MOST SUSTAINABLE

By Ted J. Rulseh

In a time when resource recovery is a top priority, clean-water agencies increasingly look for biogas and biosolids solutions that are economical yet sustainable.

In the view of John Willis, P.E., those two attributes go hand in hand a large share of the time. Willis, a vice president with the Brown and Caldwell engineering and construction firm, was elected to the Water Environment Research Foundation Research Council for a three-year term that began in April 2016.

A nationally recognized expert in biosolids and biogas-to-energy, Willis has worked for 25 years helping utilities combat inefficiency and make the maximum use of energy. He has done significant work in areas that include thermophilic anaerobic digestion and innovative biogas-to-energy upgrades. He has also done work on thermal hydrolysis, digestion and biogas usage for agencies including DC Water, the Hampton Roads (Virginia) Sanitation District, and the City of Raleigh, North Carolina.

Willis has served as principal investigator for several WERF research programs, including Barriers to Energy Efficiency, Barriers to Biogas Use, Undocumented Sources of Methane from Wastewater Treatment and Conveyance, and others. He was also principal investigator for the U.S. EPA Technology Evaluation for Digester-Gas-Fueled Combined Heat and Power and serves as chairman of the Water Environment Federation's Bioenergy Subcommittee.

Willis, who works out of Brown and Caldwell's Atlanta office, holds a master's degree in environmental engineering from Duke University and is finishing work on a doctorate from the University of Queensland in Brisbane, Australia. He talked about the current state of the art in biogas and biosolids, and what the future holds, in an interview with *Treatment Plant Operator*.

tpo: What makes you a good choice for a position on the WERF Research Council?

Willis: I've been principal investigator on several WERF projects and have been a project team member on another 15 or so. I'm very passionate that as an industry we can do a lot better job than we are today at all sorts of things, whether it's doing things with less energy or with lower greenhouse gas impact. There are win-win-wins all over the place if we approach some of the key questions differently. The Research Council has opportunities to generate projects that create high value for the industry.

tpo: In terms of resource recovery, and specifically biogas, what do you see as the obstacles to more development of energy projects?

Willis: There are two economic barriers, and they actually amount to the same thing. One is that the utility only has a certain amount of capital and they have to spend it on something else, like a consent order or a capacity expansion. The other is that people don't think there's a good enough

return on investment. Often, when presented with an opportunity to save money, a utility will say, "We need a five-year payback." That's not sustainability-minded, and it doesn't really look at the upside. The question ought to be, "Is this likely to make my rates lower over the next 20 or 30 years, after the project has been completely paid for?"

tpo: What's the issue in thinking in terms of simple payback in some number of years?

Willis: The biggest problem with simple payback is that people can set an arbitrary "go" threshold. If a project has a 13-year payback, they can say, "Well, I need 10 years." If it instead has a seven-year payback, they can say, "I need five." If that bar is allowed to move, then anybody can kill the project by creating a higher bar.

tpo: Are there any barriers in terms of the technical aspects of, say, knowing how to run a combined heat and power (CHP) system?

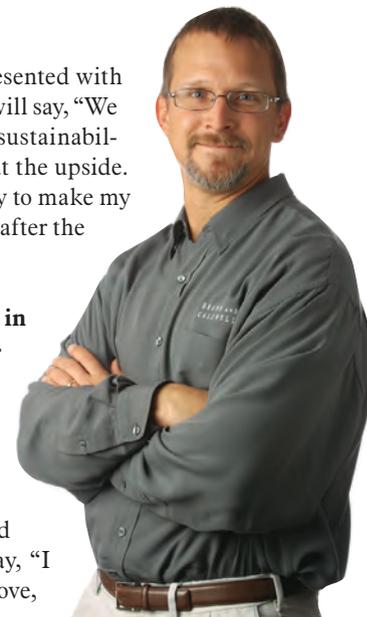
Willis: I don't think in general that's a barrier. A bigger issue is that producing power is not part of most wastewater utilities' core business. Taking on a new obligation to keep something running that doesn't help their effluent quality — that seems to be a bigger barrier.

tpo: What are some promising developments in biogas and energy production that you see coming down the road?

Willis: In terms of biogas, one of the coolest things that everybody should be looking at is vehicle fuel — pulling out the CO₂, pulling out all the contaminants, compressing the gas and putting it into buses or sanitation trucks. There is a huge economic upside to this.

tpo: Why is there more upside to vehicle fuel than to CHP at the plant?

Willis: Vehicle fuel is not the best solution for everyone. But while CHP is good, you need to treat the gas to a high level to put it into today's engines, and then you need to run the engines. Vehicle fuel systems can be about half as expensive from a capital perspective, and they cost less to run because you don't have the engine. And the revenue can be a lot better. About half of



John Willis

“In terms of biogas, one of the coolest things that everybody should be looking at is vehicle fuel — pulling out the CO₂, pulling out all the contaminants, compressing the gas and putting it into buses or sanitation trucks.”

JOHN WILLIS

the revenue comes from replacing fuel in vehicles, while the other half is the petroleum industry's payments to meet their renewable portfolio standards.

Under the EPA's Renewable Fuel Standard (RFS), petroleum companies need to account for a certain amount of renewable fuels of various types for every gallon of fossil fuel they produce. The RFS came into being in 2006, and ever since then the EPA has been running with it and making sure that renewable fuel credits (Renewable Identification Numbers or RINs) get bought. The renewable fuel credits are worth as much as the fuel itself, and so wastewater utilities can double how much money they get per gallon of biogas-derived vehicle fuel.

tpo: Where is this being done today?

Willis: San Antonio has a plant that takes the digester gas, produces pipeline-quality natural gas, and puts that into the distribution line. Brown and Caldwell put a gas-upgrading system in at one of the plants in King County, Washington, that has been running since the mid-1980s. We're doing a project now with St. Petersburg, Florida, for vehicle fuel. It will produce the energy equivalent of 1,700 gallons of diesel every day. It works because the city is converting its trash truck fleet over to compressed natural gas. The project has a \$90 million construction project, but over 20 years, after paying back the capital, it will save between \$30 million and \$60 million.

tpo: What about co-digestion to boost biogas production and generate more energy?

Willis: Co-digestion is exciting and we ought to be doing more of it. If you think of what we typically treat in digesters, it's once-digested food waste. If we take in raw food waste and digest it, we get a lot more fuel value. We get what we normally would from the sludge, and we also get what the human body would have taken out. It's a high-Btu feedstock.

But for co-digestion to have value, you have to be using the gas. Looking at the other side of the question, the State of Massachusetts has banned food waste from landfills. So far they haven't enforced it, but if they did, then the food waste producers and solid waste haulers would have to find something to do with the food waste. So there may be a revenue stream for treatment plants accepting that material. That kind of tipping-fee revenue has driven many co-digestion projects.

tpo: What else on the biogas side is exciting right now?

Willis: I think the DC Water program is a new paradigm. A lot of utilities are looking at thermal hydrolysis. That's a pretty neat technology. It creates a lot less of a better biosolids product that dewater better. It helps reduce the cost, and it also allows more diverse uses. There isn't as much "yuck factor." There is a considerable product upside.

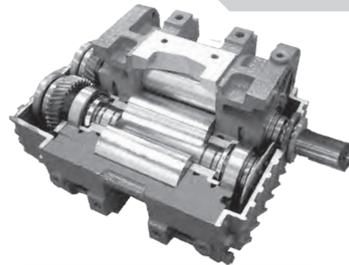
tpo: Do you see any more futuristic technologies in the developing stages?

Willis: There's a company called Kore Infrastructure that's looking at turning sludge into diesel, using a process called hydrothermal liquefaction. It takes energy and equipment to do that. I'm not sure it's entirely perfected yet, but what if instead of producing biosolids we could produce diesel? There's a spinoff from one of the Stanford University research groups called Mango Materials. They are using a similar high-temperature process to form fundamental carbon molecules that can be used to produce plastics.

tpo: Looking at the biosolids side, what do you think can be done about the horror stories that continue to be told about land application?

Willis: The industry and the EPA have done everything we possibly can to document that land application is safe, but we can't prove a negative. It's pretty tough to prove that it's absolutely, positively safe, even though everything we've done says the risks are virtually nonexistent. It's a public relations machine that generates the misinformation, and it just keeps cranking. I think we need to routinely tell the public about all the good we're doing as an industry. We ought to be willing to call our newspapers and get that message out there. Many of us still have the attitude of "Let's keep our heads down and hope the newspapers don't call." That's shortsighted. Where

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biosolids are concerned, we ought to be talking about how good what we already do is.

tpo: Is there anything new under the sun in Class A biosolids products that are more readily accepted in the public arena?

Willis: I have been involved in a number of thermophilic digestion projects. I'm excited about the ability to create products that people will pay for, whether that's as simple as a dried product or composted materials and pelletized products. I think the biggest opportunity lies in putting material on a train and taking it to places where it's needed, such as the Midwest, where there is an abundance of farmland and relatively few people. That's a completely untapped market. There are farmers working 10,000 acres who have never heard of biosolids. That's just wrong. There has to be a business model that can make that work.

tpo: Where do you see the WERF Research Council heading?

Willis: It's an exciting time. We've done dramatically more in the last five years than we did in the previous five to 10. That needs to keep going. There are many places where we can do better: efficiency, other biosolids products, better ways of processing solids, better ways of saving costs. Every time I looked at one of these areas, I find that getting green and being sustainable actually can save a lot of money. There is really good alignment between being more sustainable and reducing life cycle cost.

I often find also that the best economic approach tends to be the most sustainable from a greenhouse gas perspective, too. DC Water's biogas program saves \$28 to \$33 million a year in operating costs — it also reduces their carbon footprint by 35 percent. I think those kinds of opportunities exist everywhere, but we're just not looking for them hard enough. WERF is essential to the job of doing wastewater treatment better. It's a question of figuring out how to do it and how to make better decisions at the utility level. **tpo**

AQUA-Zyme Disposal Systems Vice President Justin Atkinson, right, describes the 30-cubic-yard dewatering box using a scale model. Company representatives spoke with hundreds of WWETT Show attendees from the private contractor and municipal sides.



PHOTO BY CRAIG MANDLI

Efficient Dewatering

DEWATERING BOX FROM AQUA-ZYME DISPOSAL SYSTEMS CAN GIVE MUNICIPALITIES A LOW-COST ALTERNATIVE

By Craig Mandli

With biosolids handling costs continuing to rise, municipalities increasingly look to become more efficient. AQUA-Zyme Disposal Systems had plenty of interested attendees at the 2016 Water & Wastewater Equipment, Treatment & Transport (WWETT) Show wanting to learn about its versatile 30-cubic-yard dewatering box.

The unit is designed to dewater municipal biosolids, septage and grease trap waste, generally within 24 hours. Injection of polymer causes the solids to coagulate. Clear effluent drains from the box and can be sent to the wastewater treatment plant. According to Suzetta Bonifay, sales manager, the unit takes no energy to use and can effectively pay for itself in decreased hauling costs.

“It is an alternative to using a press unit,” she says. “It saves a ton of money.”

VOLUME REDUCTION

The solids collect inside the roll-off dewatering box, which can be picked up and taken to a landfill or compost facility. The unit reduces the volume of solids and can enable the owner to generate revenue by processing waste from outside sources. Solids produced by the unit will pass the paint filter test and contain 18 to 22 percent solids. Units can be either stationary or mobile. They offer a processing rate of up to 450 gpm for single units, and more for multiplex units. Units come with a roll-over tarp system; side, floor and center screens; 1/4-inch floor plate; 7-gauge side plates; four door binder ratchets; eight drain ports; two inlet ports; and long-handle scraper.

“It makes a lot of sense for smaller wastewater treatment plants that still use drying beds, because it can really help speed that process up.”

SUZETTA BONIFAY

“The solids will be taken at most landfills, or can be turned into a compost that can be sold or applied to livestock feed fields and landscaping with the proper permits,” says Bonifay.

SMALL-PLANT SOLUTION

The box can be filled with 22,000 to 25,000 gallons of wastewater at 1.5 to 2 percent solids in about two hours. After 24 hours, volume can be reduced by up to 80 percent. While AQUA-Zyme has long offered the box to septic system and grease trap pumpers, Bonifay says more municipal operators have seen uses for it in recent years.

“It makes a lot of sense for smaller wastewater treatment plants that still use drying beds, because it can really help speed that process up,” she says. “Municipalities are always looking to cut costs, and we believe this is an easy way to help them do it.”

Bonifay says the company is already working on some innovations to the dewatering box to roll out at the 2017 WWETT Show: “We make a product that has a 15-year life span, which is great for a dewatering product, but we’re looking at some coatings that are more corrosion-resistant. Texas and other coastal states where there is a lot of salt in the air tend to be pretty hard on metal equipment. We’re working on something that’s going to be a great fit for those areas.” 979/245-5656; www.aqua-zyme.com. tpo



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Blocking Contamination

EFFECTIVE BEARING SEALS ARE IMPORTANT TO LONG AND TROUBLE-FREE LIFE IN A WIDE RANGE OF ROTATING EQUIPMENT IN WATER AND WASTEWATER TREATMENT PLANTS

By Chris Rehmann

A study of equipment reliability at an industrial plant found that 40 percent of overall failures of rotating equipment, such as pumps and mixers, were due to bearing failure.

It also found that 48 percent of the bearing failures were due to particle contamination and 4 percent were due to corrosion caused by liquid in the oil. That means bearing oil contamination accounted for 52 percent of all bearing problems and 21 percent of all rotating equipment failures. [1]

One of the most effective ways to prevent contamination from water, dust or other process fluids is with effective bearing protection. Bearing seal upgrades have been proven to work, and with return on investment of only a few months in some cases.

WHAT MAKES BEARINGS FAIL?

Water and wastewater treatment plants are full of rotating equipment whose bearings can fail without proper seal protection. These failures occur for a number of basic reasons.

Particle contamination

Particle contamination is a major problem. Even microscopic particles suspended in the air can eventually find their way into bearings. Although the bearing housing offers some protection, ingress can still occur.

One significant contributor to bearing oil contamination is a “breathing” process that occurs in all rotating equipment. When equipment rotates, the bearing housing heats up; the oil/air mixture inside then expands and is

Particle contamination is a major problem. Even microscopic particles suspended in the air can eventually find their way into bearings. Although the bearing housing offers some protection, ingress can still occur.

forced through the seal. When the equipment cools, the oil/air mixture cools and contracts, sucking air from the environment through the bearing seals and back into the housing.

Over time, particle contamination builds up inside the bearing, eventually leading to oil contamination, abrasion and bearing failure. If bearing seals are to work effectively, they must facilitate this breathing cycle while preventing particle contamination.

Some modern labyrinth seals have an air purge design that makes them suitable for use in extreme environments and applications where contami-

nation may completely cover the seal or equipment (Figure 1). These seals use a positive air purge to enhance the performance of the labyrinth, along with mechanical seal pressure balancing technology to maximize the seal performance and minimize air consumption.

Humidity and moisture contamination

Moisture can enter bearing housings through seals as water vapor or via a stream of water from hose-down operations. It can also enter through the breather vent, from widely used nonpressure balanced constant level lubricators, or from abraded oil ring material.

Water vapor present in the atmosphere causes many contamination problems. Even though the air in plants may appear dry, moisture is always present. Because warmer air holds more water vapor, air around hot machinery will have higher relative humidity.

The pathway for water vapor into bearings starts when the bearing house begins to breathe (Figure 2). As the machine cools, warm and moisture-laden air is sucked back into the housing. As the equipment cools and reaches the dew point, minute water droplets form inside the bearing. Just as dust accumulates, this moisture builds up, causing corrosion and eventually failure.



Figure 1. Labyrinth bearing seal (LabTecta 660AP) on a powder application. Air purge keeps the dust away from the stator to rotor interface.

PHOTOS AND ILLUSTRATIONS COURTESY OF AESSEAL

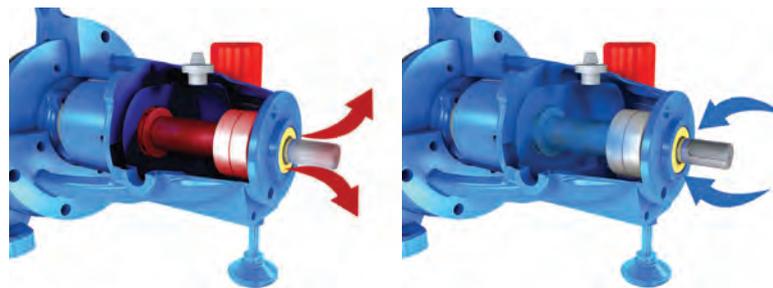


Figure 2. When equipment rotates, the bearing housing heats up and the oil/air mixture expands, forcing air through the seal. As the equipment cools, the oil/air mixture contracts, and air is sucked into the housing, laden with dust, moisture and other harmful substances.

Moisture and humidity alone can damage mechanical components, but they can also create an even more corrosive combination for bearings when coupled with noxious elements from the air around the production process.



Figure 3. A modern labyrinth bearing protection seal on an Archimedean screw fitted in a wastewater treatment plant.

The best way to deal with this moisture contamination is to use a modern labyrinth bearing protection which, when the shaft stops rotating, creates a perfect vapor seal against moisture and dust. These designs also protect against other sources of moisture, such as water jets, and can operate in totally flooded or submerged environments (Figure 3).

Excessive heat

Overheating is another cause of bearing failure. The trick is to run the bearing at optimum temperature; that requires optimum lubrication. A sure sign of bearing overheating is discoloration of the rings, balls and cages in shades of blue to brown. Unless the bearing is made of special alloys, temperatures of about 292 degrees F (200 degrees C) can anneal the ring and ball materials, resulting in loss of hardness and, in extreme cases, deformation of the bearing elements.

The most common causes of overheating are excessive speed, inadequate heat dissipation (insufficient cooling) and lubricant failure.

Overheating is a major issue, as even slightly elevated temperatures can cause oil or grease to degrade or bleed, reducing lubrication efficiency. Under even higher temperatures, oxidation destroys lubricating elements and leads to formation of carbon, which may clog the bearing. The best way to extend lubricant life and keep it in optimum condition is to use a labyrinth bearing protector, proven to prevent contamination ingress and lubricant egress.

LUBRICATION ISSUES

Another major reason bearings fail is improper lubrication, which accounts for about one-third of failures. Reasons for inadequate lubrication range from poor lubricant viscosity, prolonged service or infrequent changes, excessive temperature, the wrong type of lubrication, and over-lubrication (the rolling elements of bearings operate at their optimum temperature when the minimum amount of lubrication is used).

Creating optimum lubrication is a balancing act: Both over- and under-lubrication can create problems, as will use of a lubricant not suited to the equipment. Consistency, viscosity, oxidation resistance and anti-wear characteristics all figure into lubricant selection. Usually, the application dictates the amount, type and frequency of lubrication needed.

EXTENDING BEARING LIFE

In recognition of bearings' vulnerability, more advanced labyrinth bearing protection seals have been developed to protect against all the major types of contamination. These seals are non-contacting in operation to avoid shaft wear, and they incorporate dynamic lift technology to protect against breathing issues.

The technology uses the centrifugal force of rotating equipment to open

a temporary micro-gap, allowing expansion of the oil-air mixture in the bearing housing and enabling the equipment to breathe. When the equipment stops rotating, the micro-gap immediately closes, forming a perfect seal that keeps dust and moisture from being sucked back into the bearing housing (Figure 4).

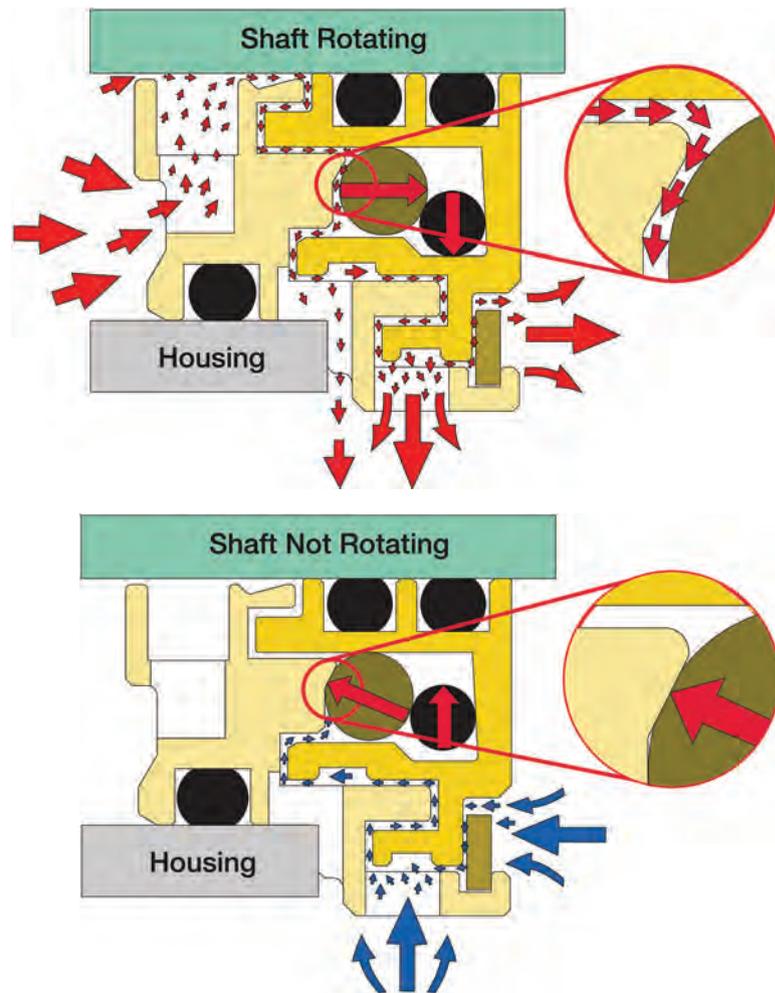


Figure 4. While the shaft is rotating, a micro-gap opens, allowing thermal expansion within the bearing housing. While the shaft is not rotating, the micro-gap is closed, forming a perfect vapor seal.

These labyrinth seals can reduce water contamination of the bearing oil from as high as 83 percent to just 0.0003 percent compared to lip seals, even when exposed to high-pressure water jets. They are also designed with a thinner cross section and seal length, and thus can be retrofitted on more equipment without modifications. The seals can be retrofitted to damaged shafts, avoiding costly replacement.

CONCLUSION

Bearings require a continuous clean film of lubricant in the appropriate amount. An effective way to achieve this is with labyrinth bearing protectors. They can help increase reliability in pumps, electric motors, fans, pillow blocks, steam turbines and gearboxes.

ABOUT THE AUTHOR

Chris Rehmann is business development manager for AESSEAL, a company specializing in design and manufacture of mechanical seals and support systems based in Knoxville, Tennessee, www.aesseal.com. tpo

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- [1] Bloch, Heinz; *Pump Users Handbook: Life Extension*, 2011.

Pumps, Drives, Valves, Blowers and Distribution Systems

By Craig Mandli

Blowers

EURUS BLOWER ZG TRI-LOBE AERATION BLOWERS

ZG tri-lobe aeration blowers for MBBR, biosolids and/or equalization tanks from Eurus Blower are rated to 15 psig and flows to 3,950 cfm. They have integral-shaft ductile iron impellers, dual splash lubrication, oversized roller bearings, piston ring air seals, viton lip seals, plus low vibration and noise characteristics. Packages have an integrated intake filter/silencer with washable filter media, heavy-duty base/integrated discharge silencer, vibration dampers, OSHA guard and a V-belt drive with auto belt tensioner. Options include motors, check valves, safety valves, flexible connectors and sound enclosures. **630/221-8282; www.eurusblower.com.**



ZG tri-lobe aeration blowers from Eurus Blower



SCL K10-MS blower from FPZ

FPZ SCL K10-MS

The SCL K10-MS blower from FPZ incorporates regenerative/side-channel technology to provide up to 556 scfm with continuous pressure up to 7.6 psig. It is available in 7.5, 10, 15, 20 or 25 hp versions, depending upon pressure requirements. Standard motors are suitable for use with variable frequency drives, so the blower can operate at slower speeds to minimize power consumption. It has an

integral, direct-drive TEFC motor (no belts/transmissions) and is oil-less, requiring virtually no maintenance. Optional intake/exhaust ports maximize installation flexibility. It weighs less than 300 pounds and has a noise level under 82 dBA. **262/268-0180; www.fpz.com.**

WASTEWATER DEPOT PACKAGED BLOWER MOTOR UNITS

Packaged Blower Motor Units from Wastewater Depot are preassembled units, housed in a fiberglass sound-reduction enclosure with optional electrical controls. Packaged air systems are available as a standard factory package or are engineered to meet specialized requirements. The units are built using a choice of Roots, Sutorbilt or Tuthill positive displacement blowers and use a standard ODP motor or an optional TEFC motor (explosion-proof motors are also available). The discharge piping includes a pressure relief valve, pressure gauge and check valve to prevent pressure backflow from entering the blower. The vented fiberglass housing includes vibration isolation mounts to reduce both vibration and noise emitted from the system. A rubber hose connection is provided with the package for ease of installation at the project site. All packages enable simple on-site installation, whether going into a service building or outdoors. **513/732-0129; www.wastewaterdepot.com.**



Packaged Blower Motor Units from Wastewater Depot



Eddy Current Drives from DSI Dynamatic

Drives

DSI DYNAMATIC EDDY CURRENT DRIVE

Eddy Current Drives from DSI Dynamatic directly convert constant speed rotary energy of a standard motor to precisely controlled speed or torque, without significant electrical conversion. No harmonic distortion or audible noise is created, and the equipment operates in normal ambient conditions without the need for auxiliary cooling or special power supply considerations. When applied

to centrifugal pumps or blowers, power consumption compares favorably with that of variable frequency drives. Ratings range from fractional to approximately 2,500 hp. Designs include integral motor/drive units, horizontal coupled units and vertical designs with a variety of thrust-handling capacities. Weather-protected designs are available for outdoor applications. They are supplied with the EC-2000 Controller, which enables digital or analog integration with digital process control systems, SCADA systems or PLCs. The flexible keypad enables simple programming of control parameters and digital display of any two of several status parameters. **800/548-2169; www.dynamatic.com.**

KAMAN INDUSTRIAL TECHNOLOGIES TRANS-POWER

Trans-Power decentralized AC drive solutions from Kaman Industrial Technologies provide plant operators flexibility and ease of use, saving operators time, energy and money. Locating the drive near the equipment eliminates cable runs to space-consuming panels. They have IP66 NEMA 4X enclosures with integrated operators, lockable power disconnects, simple setup and commissioning, and 14 parameters that get most applications up and running, with 50 parameters total. **800/526-2626; www.transpower.com.**



Trans-Power decentralized AC drive solutions from Kaman Industrial Technologies

Hydrants

WCM INDUSTRIES WOODFORD U200M/W

The Woodford U200M/W freezeless, high-flow utility hydrant from WCM Industries is designed for use where year-round availability of water is required. It can be used for filling tanks and cleaning equipment, automatically draining (so the hydrant can't freeze) when the hose is detached. It is available with a manual-close lever handle or wheel handle (to regulate water flow). The lever handle can be removed to prevent unauthorized use. The hydrant is serviceable from above ground; all working parts can be removed through the top of the hydrant. The outlet can be located at any height above ground level; bury depth is adjusted accordingly. **800/621-6032; www.woodfordmfg.com.**



Woodford U200M/W utility hydrant from WCM Industries

Motor and Pump Controls

CRYSTAL ENGINEERING XP2I

The XP2i digital pressure gauge from Crystal Engineering is available in three accuracy levels. In addition to the plus-or-minus 0.1 percent "of reading" version, accuracy options of plus-or-minus 0.02 percent "of full scale" and plus-or-minus 0.05 percent "of full scale" include the same features, and were created to meet the requirements of DNV for



XP2i digital pressure gauge from Crystal Engineering

hydrostatic testing. The increased accuracy levels mean that the XP2i can now be used in high-accuracy lab applications. It can be combined with optional data logging software to provide high-accuracy, intrinsically safe pressure recording. Start and stop multiple runs from the keypad, and when finished, simply download the data to commonly used spreadsheets. Simple software reduces the amount of training time needed to accurately record pressure. It can be combined with the GaugeCalHP pressure comparator and high-pressure Crystal Pressure Fittings. **215/355-6900; www.ametekcalibration.com.**

GREYLINE INSTRUMENTS MODEL DFS 5.1 DOPPLER FLOW SWITCH

The Model DFS 5.1 Doppler Flow Switch from Greyline Instruments measures liquid flow with a non-contacting ultrasonic sensor mounted on the outside of 1/2-inch-diameter or larger pipes. It installs in minutes, no pipe drilling or cutting is required, and there is no maintenance. It is designed for pump protection, valve control and flow/no-flow alarms. It is ideal to control wastewater, slurries, caustics, acids and difficult liquids. The watertight NEMA4X switch enclosure includes a 5-amp DPDT control relay with adjustable on and off setpoint controls, adjustable time delay, flow rate bar graph, and relay status LEDs. A sensor mounting kit is included, and the sensor cable can be extended up to 492 feet. **888/473-9546; www.greyline.com.**



Model DFS 5.1 Doppler Flow Switch from Greyline Instruments

PRIMEX MUNI FLOAT



MUNI float from PRIMEX

The MUNI float from PRIMEX is internally weighted, mechanically activated and provides level control in municipal sewage pumping stations or applications with high grease content. Gold cross-point contacts provide precision and reliable control signals up to 1 amp. The CSA-certified unit can be used in water and sewage applications, as well as in low-current control panel alarms and with programmable logic controllers. It has an SPDT cable that can be wired as normally open or normally closed, a large twin-wall teardrop float design offering increased buoyancy, and a two-tone colored float housing for easy identification. **844/477-4639; www.primexcontrols.com.**

Flow Pulse from Pulsar Process Management is a noninvasive flow monitor that clamps to the outside of a pipe and is simply secured with a screwdriver, meaning there's no need to break into a pipe or get any engineering involved. It offers repeatability and is available in a variety of systems, either as a sensor only, a fixed flow system or a portable flow system. **850/279-4882; www.pulsar-pm.com.**

PULSAR PROCESS MANAGEMENT FLOW PULSE

Flow Pulse from Pulsar Process Management is a noninvasive flow monitor that clamps to the outside of a pipe and is simply secured with a screwdriver, meaning there's no need to break into a pipe or get any engineering involved. It offers repeatability and is available in a variety of systems, either as a sensor only, a fixed flow system or a portable flow system. **850/279-4882; www.pulsar-pm.com.**



Flow Pulse flow monitor from Pulsar Process Management

SMITH FLOW CONTROL FLEXIDRIVE

The FlexiDrive remote valve operator from Smith Flow Control helps workers remotely operate valves in hard-to-reach or hazardous locations. Its linear drive cable transfers torque from a handwheel to any conventional wheel-operated valve up to 100 feet away, accommo-



FlexiDrive remote valve operator from Smith Flow Control

dating 360-degree bends in the cable run. It is suitable for use in extreme climates, making it ideal for water and wastewater applications. Valves in underground pits that create a risk for falling, or in areas

with odors from chemicals or waste, can be operated from a safe location. A submersible version is available that operates valves in up to 50 feet of water. It is completely maintenance free, and available in two sizes to accommodate large and small valves. **859/578-2395; www.smithflowcontrol.com.**

Pumps

BBA PUMPS BA180E D315

The BA180E D315 compact 8-inch dry self-priming pump from BBA Pumps provides a maximum capacity of 3,150 gpm and a maximum head of 135 feet at 59 psi. It is driven by a Caterpillar diesel engine that meets stringent global emission standards. It is built according to strict U.S./EU emissions legislation and is suitable for use worldwide, and comes in a sound-attenuated enclosure, ensuring a low noise level and protection against dust, wind, rain and snow. It has a high-end LOFA control panel with support in 10 languages. Its light weight makes it easy to move around on site, or it can be mounted on a trailer. **843/849-3676; www.bbapumps.com.**



BA180E D315 pump from BBA Pumps



ProSeries-M M-2 peristaltic metering injector pump from Blue-White Industries

BLUE-WHITE INDUSTRIES PROSERIES-M M-2

Designed for smaller municipal water and wastewater systems, the ProSeries-M M-2 peristaltic metering injector pump from Blue-White Industries is suited for injecting the aggressive and/or viscous chemicals often used in

water treatment applications. It has an intelligent control system that permits connection to SCADA systems and other remote controllers. Optional advanced SCADA communications command and status capabilities include start, stop, prime, and setpoint speed, motor status and others. Available protocols include Profibus DPV1, Modbus RTU, Modbus-TCP, EtherNet/IP and Profinet RT I/O. Built-in inputs include 4-20mA and pulse inputs for remote external speed control and either powered 6-24 VDC or non-powered dry contact closure for remote start/stop. Outputs include one 250-volt/6-amp relay to monitor the tube failure system and flow verification system, and 4-20mA analog signal scalable to the motor speed. It has feed rates from .01 to 17.2 gph, pressures to 125 psig, 200-1 turndown ratio and is NSF-Listed Standard 61. **714/893-8529; www.blue-white.com.**

BJM PUMPS SKGF SERIES

The SKGF Series submersible pump from BJM Pumps is designed to pump clear or solids-laden liquids up to 200 degrees F (93 degrees C). It has RAD-AX Dual Shredding Technology to obliterate difficult solids in high temperature installations using radial and axial shredding elements. It has hardened 440C stainless steel (HRC 55) shredding elements. Its controlled shredding system efficiency alleviates potentially high surge loads to the motor. Large solids can

pass through the impeller and volute, coupled to a high-torque four-pole motor (2, 3 and 5 hp) for large solids shredding. An oil-lubricated double-mechanical seal with separate lip seal protects the motor. A heavy-duty SOOW power cable and Seal Minder cable enable early warning pump and motor protection.



SKGF Series submersible pump from BJM Pumps

860/399-5937; www.bjmpumps.com.



BLUEline rotary lobe pump from Boerger

BOERGER BLUELINE

The Boerger BLUEline rotary lobe pump is a self-priming, valveless, positive displacement pump used for the conveyance of biosolids, grease, sewage, scum, lime slurry, alum sludge, permeate and polymers. There are 21 pump models in six series with pulsation-free operation, fully reversible rotation, dry run capabilities and flow rates

up to 7,500 gpm. They are stable and wear-resistant with MIP-Design (Maintenance in Place) that allows for all wetted parts to be easily replaced through the front cover without the removal of pipe or drive systems. 844/263-7437; www.boerger.com.

CRANE PUMPS & SYSTEMS BARNES SOLIDS HANDLING SERIES

Barnes Solids Handling Series pumps from Crane Pumps & Systems are municipal-quality submersible non-clog pumps with 3- through 10-inch discharge sizes in 2 to 150 hp. They deliver clogging resistance by providing three impeller styles to match varying solids loads. In addition to a variety of vortex, monovane and dual vane impeller designs, they have a plug-and-play power cord that eliminates the need to pull power cords out of conduit in order to work on the pump. They provide flows up to 4,000 gpm and heads to over 240 feet including low-flow, high-head pumps with steep performance curves designed for low-flow connections to existing pressure mains. 937/778-8947; www.cranepumps.com.



Barnes Solids Handling Series pumps from Crane Pumps & Systems



All-Terrain Sewer (ATS) from Environment One Corporation

ENVIRONMENT ONE CORPORATION ALL-TERRAIN SEWER

The All-Terrain Sewer (ATS) from Environment One Corporation is ideal for extremely flat, wet, rocky or hilly conditions. The system, driven by a rugged, long-lasting grinder pump, provides the freedom to sewer anywhere at a fraction of the cost of gravity sewer systems. 518/346-6161; www.eone.com.

FLYGT - A XYLEM BRAND EXPERIOR

The Experior pump system from Flygt - a Xylem Brand incorporates state-of-the-art hydraulics, premium-efficiency motors and intelligent controls. N-technology, a premium-efficiency motor and SmartRun control provide efficient wastewater pumping and energy savings. Adaptive N-hydraulics further improve the clog-free, energy-saving pump performance. N-technology is suited for speed regulation, as self-cleaning functionality



Experior pump system from Flygt - a Xylem Brand

operates independently of rotational speed. SmartRun control is preprogrammed to meet specific wastewater customer requirements. It has up to 4 percent higher motor efficiency than the nominal premium-efficiency motor standard. 855/995-4261; www.xylem.com.

GOULDS WATER TECHNOLOGY, A XYLEM BRAND, E-HM

The horizontal e-HM Series of multistage pumps from Goulds Water Technology, a Xylem brand, comes in six models for modular construction, and is available for usage in applications such as industrial washing and refrigeration, food and beverage, water



e-HM Series of multistage pumps from Goulds Water Technology, a Xylem brand

treatment and pressure boosting. This pump has lower life cycle costs and leaves a smaller energy footprint compared to previous models. The standard balanced impeller leads to a 40 percent reduction in axial thrust and the 20 percent increase in body thickness leads to a higher working pressure and reaches a flow rate of 27 gpm. A broad hydraulic range and multiple space-saving configurations have

reduced carbon dioxide emissions while increasing performance. 866/325-4210; www.goulds.com.

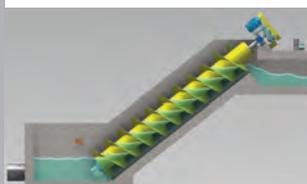
GRUNDFOS PUMPS SL1

The SL1 submersible wastewater pump from Grundfos Pumps is designed to handle raw, unscreened sewage, effluent, large volumes of surface water and process water in municipal, utility and industrial applications. The solids-handling pump, in motor ranges from 1.5 to 15 hp, has a tube impeller to accommodate solids up to 4 inches,



SL1 submersible wastewater pump from Grundfos Pumps

and is designed particularly for large flows of raw sewage. It is designed for permanent submerged installation in demanding applications such as municipal wastewater, network pumping stations, wastewater treatment plants, public buildings, housing projects and other commercial applications. The series is designed with IE3 premium efficiency motor components, quick-removable pump housing clamps, cartridge seals, quick-removable plug-in cord, and smooth exterior components for high efficiency performance. 800/921-7867; us.grundfos.com.



Screw pumps from Lakeside Equipment Corporation

LAKESIDE EQUIPMENT CORPORATION SCREW PUMPS

Screw pumps from Lakeside Equipment Corporation have built-in variable capacity that automatically adjusts the pumping rate and power consumption while operating at a constant speed to match the incoming flow. They have a high rate of acceptance for their ability to lift water efficiently at

any stage of the treatment process. They can be used in a variety of applications, including wastewater plant lift stations, return activated sludge, stormwater pumping, land drainage and industrial applications. They efficiently lift large quantities of water at low heads. Patterned after the Archimedean screw, the pump's assembly consists of a simply designed screw, upper bearing, lower bearing and drive arrangement. 630/837-5640; www.lakeside-equipment.com.

MEGATOR CORP. ALPHA

The Alpha skimmer from Megator Corp. removes wastewater scum from aeration tanks. Made of stainless steel, it handles aggressive liquids at varying depths and concentrations. It has a lightweight design

with one-man operation, an adjustable intake weir, a tri-float design for stability and a shallow draft that enables it to operate in as little as 12 inches of water. The skimmer can be arranged for gravity flow in new construction. 800/245-6211; www.megator.com.



Alpha skimmer from Megator Corp.

MET-PRO GLOBAL PUMP SOLUTIONS FYBROC 5530 SERIES

The Fybroc 5530 Series vertical pump from Met-Pro Global Pump Solutions is a corrosion-resistant pump suitable for handling difficult dry pit applications including acids, bleaches and caustics. The design includes mounting outside tank, FRP construction and FRP wrapped shaft (1/8 inch), heavy-duty column, shaft and bearings, and optional high-pressure shaft seal. 215/723-8155; www.mp-gps.com.



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

NEPTUNE CHEMICAL PUMP COMPANY 7000 SERIES

The 7000 Series mechanical metering pump from Neptune Chemical Pump Company eliminates the use of contour plates on the liquid side of the diaphragm, resulting in a simple, straight-through valve and head design that allows improved flow characteristics. It's designed to handle clear liquids with viscosities ranging from water-like to 5,000 cPs. The capacity is manually adjustable via micrometer dial while the pump is running. This allows the pump to produce flow rates ranging from 10 to 450 gph at head pressures up to 150 psi. Its liquid ends are constructed of PVC with explosion-proof, variable-frequency drive and washdown-duty motor options available. It is also self-priming. 215/699-8700; www.neptune1.com.



7000 Series mechanical metering pump from Neptune Chemical Pump Company



VTSH-SCR pump from Pentair - Fairbanks Nijhuis

PENTAIR - FAIRBANKS NIJHUIS VTSH-SCR

By using an induced flow impeller design, the VTSH-SCR from Pentair - Fairbanks Nijhuis provides a wider variable-speed operating range than conventional solids-handling pumps. This provides flexibility to the operator to adjust for unanticipated flow demand or suspension velocities that could clog traditional pumps. 913/371-5000; www.fairbanksnijhuis.com.

PROMINENT FLUID CONTROLS GAMMA/ X

The gamma/ X solenoid diaphragm metering pump from ProMinent Fluid Controls is user-friendly and has a long service life. A solenoid control measures the back pressure and protects the system from overload. This technology makes a pressure sensor superfluous, meaning that operating safety can be significantly increased



gamma/ X solenoid diaphragm metering pump from ProMinent Fluid Controls



BOLDLY GO

WHERE NO AERATOR OR MIXER HAS GONE BEFORE.



Aqua-Jet® aerator featuring Fold-a-Float® technology.

The **Fold-a-Float®** self-deploying, segmented float from Aqua-Aerobic is lowering capital costs while removing THMs from enclosed water reservoirs through openings as narrow as 30 inches.

This patent-pending float technology is engineered to self-deploy when it meets the surface water in a tank or basin. Once in-place, the Fold-a-Float may be fitted with an Aqua-Jet® aerator or AquaDDM® mixer power section to provide efficient aeration or mixing.

Fold-a-Float units are ideal for applications where conventional equipment simply can't go.



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

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since no additional parts come into contact with the feed chemical. It is suitable for continuous micrometering from 1 mL/h thanks to the regulated solenoid drive. It has integrated pressure measurement for greater safety during commissioning and during the process. It includes an integrated seven-day timer for timed metering tasks. It can be integrated into automated processes and used in all industries, and can work as a control unit with the process timer. **412/787-2484; www.prominent.us.**

PULSAFEEDER PULSATRON

PULSAtron pumps from Pulsafeeder have a guided check valve system with a seat-and-ball design that ensures reliable and accurate metering year after year. Their fin-cooled solenoid enclosure dissipates heat, ensuring that the pressure-handling capability of the pump can be maintained. The thermally protected solenoid protects the pump from seizing up in extreme heat conditions with an automatic reset feature, allowing the pump to resume operation upon cooldown. Units are tested and rated under hot conditions so flow and pressure ratings meet specifications. They offer flows up to 600 gph and pressures up to 300 psi, with a wide range of flows and pressures. **800/333-6677; www.pulsatron.com.**



PULSAtron pumps from Pulsafeeder



Tube-mounted screw pump from Schreiber

SCHREIBER TUBE-MOUNTED SCREW PUMP

The tube-mounted screw pump from Schreiber incorporates the Archimedean screw pump concept in a self-contained unit for ease of installation and construction. It transports liquid inside a stationary tube, simplifying design and eliminating grouting. Units are

factory assembled and can be set at a fixed angle, or the lower end can be supported by a hoist to vary the pump angle and for maintenance access. The pump provides variable capacity at constant speed. It uses a single-row spherical roller and self-aligning combination radial/thrust lower support bearing. A flanged bearing provides radial support at the upper shaft. **205/655-7466; www.schreiberwater.com.**

SMITH & LOVELESS STAR ONE

The STAR ONE non-clog pump from Smith & Loveless raises the bar on pump efficiency anywhere from 3 to 5 percent higher than previous pump models. It has an oversized, stainless steel shaft that minimizes overhang, reducing shaft deflection and improving pump efficiencies. This is achieved through minimal pump heights and rigid construction. Shaft end play is limited to bearing shake. Shaft runout is limited to 0.003 inch. Close tolerances are tighter than even NEMA specifications. The impeller is designed for maximum efficiency, as by trimming the impellers inside the shrouds, it leaves the back shroud full diameter to prevent stringy material from winding around the shaft and reducing efficiencies. **913/888-5201; www.smithandloveless.com.**



STAR ONE non-clog pump from Smith & Loveless

SPX FLOW COMBISUMP

The CombiSump pump from SPX FLOW's Johnson Pump's Combi system provides modular solutions using common components shared across different models. It is a vertical long-shaft sump pump designed for usage with thin liquids. It has a minimum submersible depth and

ensures increased reliability with silicon carbide axial and radial bearings, which are lubricated by the pumped liquids. The electric motor is situated at a distance from the pumped liquid, and pump depth can vary using multiple pump shafts with intermediate bearings to meet specific application requirements. It is designed for low net positive suction head values with optimized hydraulic performance. It has easy maintenance in a compact form and can meet a wide span of duties. Its base plates are designed to meet existing support arrangements for easy installation. Shaft-sealing options are available with lip seal, mechanical shaft sealing EN12756 or API682/685. **800/252-5200; www.spxflow.com.**



CombiSump pump from SPX FLOW

STENNER PUMP COMPANY SVP SERIES

The SVP Series from Stenner Pump Company is an adjustable, variable-speed peristaltic metering pump that can accept a 4-20mA signal to pace the pump, making it suitable for industrial applications and municipal water and wastewater treatment plants. It has a DC motor and an LED keypad to adjust the output by increasing or decreasing the motor speed. The turndown ratio is 20-to-1 with 1 percent increments. They offer a maximum of 40 gpd with pressures to 100 psi. The SVP1 is manually adjusted using the keypad. The SVP4 is designed



SVP Series metering pump from Stenner Pump Company

to respond directly to a 4-20mA input signal from water treatment controls, including pH and ORP monitors to maintain proper water chemistry and treatment of effluent discharge water. The SVP4 includes an external port to accept the signal, or it can override the 4-20 mode and be adjusted manually with the arrows on the keypad. **800/683-2378; www.stenner.com.**

TACO SFI

SFI self-sensing, variable-speed end-suction pumps from Taco, with integrated VFDs, permit fast, accurate balancing. They help to reduce balancing contractor costs, eliminate expensive wiring and the need for external sensors. They meet the latest standards for hydraulic performance and dimensional characteristics for quiet, dependable performance. Their SelfSensing bypass option is an advantage for engineers who seek to bypass the variable-speed control. Customers can order either a NEMA 1 drive with an ODP motor or a NEMA 12 drive with a TEFC motor. An easy-to-replace, slip-on shaft sleeve facilitates easy field maintenance. Their dry shaft design protects the pump shaft by eliminating contact between the shaft and the circulating fluid. Flush-seal line taps allow installation of a filter to protect the seal from noncondensable particles in the system. Pressure tapings on the suction and discharge connections are standard. **401/942-8000; www.taco-hvac.com.**



SFI pumps from Taco



Standby pump units from Thompson Pump

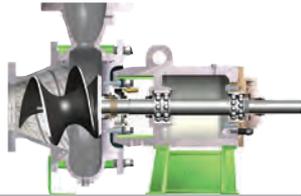
THOMPSON PUMP STANDBY PUMP UNITS

Permanently installed standby pump units from Thompson Pump continue pumping despite power loss or primary pump failures. The automatic self-priming pumpset can meet system demands during wet weather, routine maintenance, new construction or emergency repair.

Operating as a complete backup pump station, this system includes the Enviroprime System, which actively prevents sewage spills. It uses programmable electronic controls, which make use of sensors that monitor levels in the wet well and initiate backup pumping as programmed. In addition to these SCADA-capable controls that send an alarm to alert the operator, these pumps are available with the Silent Knight canopy that reduces sound levels for residential areas. **800/767-7310; www.thompsonpump.com.**

VAUGHAN COMPANY TRITON

Triton screw centrifugal pumps from Vaughan Company handle thick biosolids, large or stringy solids, shear-sensitive fluids, and delicate or highly abrasive materials. They have non-overloading power characteristics, heavy-duty power frames and a flushless mechanical seal. A water-flushed mechanical seal or packing is available. **888/249-2467; www.chopperpumps.com.**



Triton screw centrifugal pumps from Vaughan Company



2100 Series pump from Vertiflo Pump Company

VERTIFLO PUMP COMPANY 2100 SERIES

The 2100 Series trash and solids-handling self-primer pump from Vertiflo Pump Company is offered in a variety of materials, including cast iron, 316 stainless steel fitted, all 316 stainless steel, CD4MCu fitted, and CD4MCu. With several model sizes available, customer requirements for

pumping clear and corrosive liquids can be satisfied with capacities ranging up to 1,300 gpm, heads of 112 feet, suction lifts up to 25 feet and 3-inch spheres. **513/530-0888; www.vertiflopump.com.**

WANNER ENGINEERING VECTOR MODEL 2006

The Vector Model 2006 peristaltic pump from Wanner Engineering can handle difficult or challenging fluids without altering their composition. The pump can move high-viscosity fluids and pasty, pulpy, thick, abrasive and corrosive solutions, as well as fluids containing compressible solids up to 1 inch in size. It can be used to pump process fluids such as acids, slurries, sewage, chemicals, cosmetics, pigments, dyes, paints and inks, plus a variety of foodstuffs. It has a maximum flow rate of 14.1 gpm and maximum discharge pressure of 60 psig. Its suction lift capability is 24 feet.



Vector Model 2006 peristaltic pump from Wanner Engineering

It compresses and relaxes a hose to pump fluid, and has a roller mechanism instead of a rigid shoe to push the fluid through the hose. This isolates the fluid being pumped within the hose so it can handle difficult fluids without contamination and to help ensure longer service life with less downtime and maintenance. **612/332-5681; www.hydra-cell.com.**

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Seals

HOFFMAN & LAMSON MAX SEAL

The MAX Seal from Hoffman & Lamson, Gardner Denver Products, reduces fugitive emissions by up to 67 percent compared to traditional seal options, while extending the mean time between failures. It is a dry-running mechanical axial seal, constructed of 316 stainless steel with replaceable wearing components. The seal does not require a gas purge, reduces lubricant contamination and eliminates bearing contamination from process gas. It is available as a field upgrade for multistage centrifugal blowers, and can be installed on site without replacing any major blower components. It is ideal for landfill gas and applications where toxic and potentially explosive gases are handled, improving the safety of an operation while extending bearing life and lowering total cost of ownership. **724/239-1500; www.hoffmanandlamson.com.**



MAX Seal from Hoffman & Lamson, Gardner Denver Products

INPRO/SEAL COMPANY SMART SHAFT GROUNDING

Smart Shaft Grounding from Inpro/Seal Company combines Current Diverter Ring technology with features to increase reliability and decrease maintenance costs. They increase motor reliability by providing voltages a low impedance path to ground away from the bearings while monitoring grounding effectiveness. They provide permanent protection from conduction-inhibiting shaft oxidation and offer continuous monitoring and feedback of shaft grounding performance. With conductive filaments and a bearing-bronze sleeve design, they integrate Current Diverter Ring technology and the VBXX Bearing Isolator to protect against contamination ingress and lubrication loss as well as stray currents. Isolated conductive filaments and a zero-maintenance conductive bronze rotor provide connectivity in harsh conditions. The Smart Ground Monitor alerts users in real time of non-optimal contact between the filaments and shaft. **800/447-0524; www.inpro-seal.com.**



Smart Shaft Grounding from Inpro/Seal Company

Valves

FORCE FLOW/HALOGEN ECLIPSE

The Eclipse emergency valve shut-off system from Force Flow/Halogen instantly closes the container valve when a signal is received from a leak detector, panic button or from SCADA. The actuator quickly installs on the tank without the use of any tools and allows manual operation of



Eclipse emergency valve shut-off system from Force Flow/Halogen

the valve while in place. During an emergency shutdown event, the system measures the actual torque applied to the valve to ensure that the valve is closed to Chlorine Institute-recommended standards and provides remote confirmation that the emergency close operation successfully closed the valve. **925/893-6723; www.halogenvalve.com.**

HENRY PRATT COMPANY TRITON RUBBER SEATED BUTTERFLY VALVES

Triton rubber seated butterfly valves from Henry Pratt Company are used in the water and wastewater industries and conform to AWWA C504 requirements. They are available in sizes ranging from 24 through 162 inches in flanged and mechanical joint ends. The flow-through disc design on 30-inch and larger valves provides more strength with less weight and a greater free flow area that results in lower pump costs. Their E-Lok seat-in-body design allows the seat to be adjusted or even replaced in the field, without dewatering the pipeline. **877/436-7977; www.henrypratt.com.**



Triton rubber seated butterfly valves from Henry Pratt Company

LINED VALVE COMPANY BONNETED KNIFE GATE VALVE



Bonneted knife gate valves from Lined Valve Company

Bonneted knife gate valves from Lined Valve Company have the ability to instantly shut off in solid materials without clogging, as the body cavity, seat configuration and beveled gate of bonneted knife gates are designed for this function. The design specifically addresses fugitive emissions and packing leakage, as round-shaped stems are easier to seal, plus the packing area is greatly reduced, producing a better seal. Their durability and corrosion resistance extends valve life and reduces total cost of ownership. They have a stainless steel body, gland, yoke, gate and stem. **888/256-5779; www.linedvci.com.**

OCV CONTROL VALVES MODEL 22

Model 22 control valves from OCV Control Valves have rectangular-shaped, soft-seat seals that provide a drip-tight Class VI closure. Their throttling seat retainers create flow and pressure stability, preventing water loss and system-damaging surges. They allow supply facilities to vary pressures and/or flow based on external factors, such as time of day. They are registered to ISO 9001 and are certified to the most comprehensive NSF/ANSI 61 listing in the automatic control valve industry. **918/627-1942; www.controlvalves.com.**



Model 22 control valves from OCV Control Valves

PROCO PRODUCTS PROFLEX STYLE 750

The ProFlex Style 750 inline check valve from Proco Products is designed for heavy-duty water/wastewater applications where elements such as abrasive slurries or sludge are present. The enclosed body check valve has a maintenance-free design with no hinges or seals to bind or freeze. No external power sources are required. It has low headloss with a full port design, which opens with minimal head pressure and closes with any back pressure exerted on the valve. It is provided with two clean-out ports and is



ProFlex Style 750 inline check valve from Proco Products

made of carbon steel with an epoxy coating. The bolting dimensions are in accordance with ANSI 125/150 patterns. **800/344-3246; www.procproducts.com.**

SCHIEBEL ACTUATORS ELECTRIC SPRING- RETURN ACTUATOR

Electric spring-return actuators from Schiebel Actuators are electric actuators with a purely mechanical safety function. The working principle is based on a non-self-locking actuator with a pretensioned disc-spring package connected without couplings. In the event of a power outage or triggering of the safety function, the actuator moves into a preset position so that no hazards are posed to humans or the environment. They come with integrated controls with a Bluetooth interface and an app with which remote control of actuators is possible. Operation and configuration data can be sent for online diagnosis, making preventive maintenance as well as swift remedying of malfunctions possible. **770/349-6308; www.schiebel-actuators.com.**



Electric spring-return actuators from Schiebel Actuators

VICTAULIC AWWA VALVES

The Series 365 Vic-Plug and Series 317 check valve from Victaulic are quickly and easily installed with Style 31 couplings. With just two bolts per coupling, the valves can be installed up to three times faster than flanged valves. The couplings also simplify access to the valve and piping system, enabling quicker maintenance and reducing system downtime. The check and plug valves are designed to ANSI/AWWA standards. The end-to-end dimensions, materials and general design of the Series 317 check valve conform to AWWA C-508; the Series 365 Vic-Plug valve conforms to AWWA C-509 standard end-to-end dimensions. The grooved ends of both valves conform to AWWA C-606. They are available in 3- to 12-inch sizes, and can be used in applications with maximum working pressures of 175 psi. Bidirectional sealing to 25 psi is standard for the Series 365 plug valve; full bidirectional sealing to 175 psi is also available. **610/559-3300; www.victaulic.com. tpo**



Series 365 Vic-Plug and Series 317 check valve from Victaulic

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Valve positioner provides boost to effluent quality

Problem

An Illinois wastewater treatment plant needed to improve valve position on each of its three drainage doors, then send the information to an Emerson Process Delta V plant control system for monitoring. Because each door had different opening characteristics, plant personnel had to be able to modify the analog output signal for each unit. To complicate matters, the valve actuator housings were small and located in challenging environments.

Solution

The plant purchased field-programmable **Kinax 2W2 Angular Position Transmitters** from **Absolute Process Instruments**. Each transmitter is 1.95 inches in diameter and 1.1 inches deep, small enough to be installed in the actuator housings. They use relative capacitive sensing technology and create no drag on the valve gearing.

RESULT

The transmitters gave the plant an accurate and repeatable linear 4-20 mA signal for the valve position that was easily interfaced with the plant's control system. This allowed the operators to accurately control the drainage doors for better flow control, resulting in improved effluent quality. **800/942-0315; www.api-usa.com.**

Drive technology keeps water flowing

Problem

The Public Utilities in Mooresville, North Carolina, needed to control a new water plant's 800 hp pumps. The system needed to prevent the higher-power pumps from overpowering an older facility.

Solution

The plant worked with **Eaton** to design and install an **adjustable-frequency drive (AFD) system**. A compact integrated control gear solution close-coupled the new drive with the plant's existing Eaton Ampgard medium-voltage motor control. By integrating its SC9000 encapsulated powerpole (EP) AFD and motor control with a bus connection, the new drive was installed without moving cables and equipment. The design kept the AFD in one room with no modifications and tied it back to the plant's existing communications system.



RESULT

The system controlled water flow, enabled a lower speed and made it possible to use new and old treatment plants for increased capacity and redundancy. "As a representative responsible to the citizens of Mooresville, we wanted to find a way to implement the equipment we had on hand," says Barry McKinnon, Public Utilities director. "Eaton's AFD drive solution has performed with no problems, helping us ensure water treatment services for our customers." **877/386-2273; www.eaton.com.**

Pumps tackle large bypass project, allowing infrastructure upgrades

Problem

The 54-inch concrete sanitary sewer line in Greenwich, Connecticut, was being attacked by hydrogen sulfide and deteriorating. After a condition assessment, it was determined that the critical pipe should be rehabilitated as soon as possible.

Solution

To complete the rehab without disturbing daily operations, a 40.9 mgd temporary bypass system diverted the flow from three areas of town to the wastewater treatment plant. The town rented 20 **diesel-drive pumps (Godwin, a Xylem brand)** and 11,000 feet of 18-inch HDPE pipe. The sewer bypass flowed out of five separate suction locations and was set up to handle low and high flows. The pumps automatically turned on or shut off as flow varied. An additional pump was placed at each location for backup. Two factory-trained mechanics were on site 24/7 with service vehicles fully stocked with parts.



RESULT

The engineers helped guide the process from start to finish. The 35-day installation process went off without a hitch, as did the eight-week bypass while the sewer line was rehabilitated. **877/959-9881; www.xylem.com/dewatering.**

Piston pumps enable plant to increase amount of biosolids handled

Problem

After two major expansions, the City of Glens Falls (New York) Wastewater Treatment Plant staff decided to supplement its solids with outside waste and opened a receiving facility. Today, the plant accepts a broad range of materials. However, the benefits were moot without the ability to effectively incinerate what was collected.

Solution

By upsizing to a larger pair of **Schwing Bioset piston pumps**, the plant increased pumping capability to deal with increased biosolids handling. The pumps take cake dewatered to 24 to 26 percent solids and pump it for incineration, where a 32-ton load (an 18-wheel trailer full) can be reduced to 100 pounds of ash.



RESULT

The long-term performance of the pumps has helped the plant remain viable in serving the city and surrounding areas. **715/247-3433; www.schwingbioset.com.**

New valve configurations help maintain water pressure at plant

Problem

Patoka Lake, Indiana, nearly doubled its water treatment plant's capability with a complex network of pipes, booster pumping stations, elevated tanks and reservoirs. To keep water flowing smoothly, the plant needed different control valve solutions to maintain the pressure in each district-metered area.

Solution

Two bypass **pump control valves** from **Singer Valve** were put between the pump discharge and check valve to prevent surges when starting the pumps and increase the pipeline flow. Two 12-inch flow-metering valves with internal drop check were installed downstream of the pumps to prevent reverse flow and eliminate a downstream check valve. Coupled with a multi-process control panel, these valves can measure and control the flow, making it possible to program varying flow setpoints during the day.

Finally, a 24-inch control valve partnered with an EPC-4XF control panel and X156 position transmitter for valve position indication handles additional flows to multiple water plants equally.



RESULT

The right valves for each application and the ability to tweak each valve with various backup features and remote control options gave Patoka Lake the flexibility to manage water distribution effectively. The upgrades allow the city to grow and welcome new residents with reliable water flow. **604/594-5404; www.singervalve.com.**

Water plant replaces chemical feed system with efficient upgrade

Problem

The Coastside County Water District (CCWD) in northern California provides treated water to the scenic town of Half Moon Bay and several unincorporated communities in the area. The system is served by two treatment plants, the Nunes Water Treatment Plant (4.5 mgd) and Denniston Creek Water Treatment Plant (1 mgd), and water is distributed through about 100 miles of transmission and distribution pipe. Part of a plan to modernize and upgrade water treatment capabilities focused on the elimination of 1-ton chlorine gas cylinders at Nunes and 150-pound pressurized gas cylinders at Denniston. Aside from the obvious improvements in operator and community safety, the cost savings related to the risk management plan and emergency scrubber maintenance made sense.



Solution

CCWD ultimately chose the **Process Solutions Microclor OSHG system** from **UGSI Solutions** for both plants, with Denniston installing a 40-pound-per-day system first and Nunes utilizing a 100-pound-per-day system about a year later.

RESULT

Both systems have performed according to spec, with minimal maintenance needed. **858/218-3745; www.ugsicorp.com. tpo**



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2. KOHLER TIER 4 FINAL DIESEL MOBILE GENERATORS

The Tier 4 Final 90REOZT4 and 120REOZT4 diesel-powered mobile generators from Kohler Power Systems are EPA emission certified for non-road use and equipped with a DOT-certified trailer with durable enclosure for easy maintenance. Nothing is attached to the enclosure; all wiring and connections are through the back of the unit, making it easy to remove the entire enclosure for fast engine access. Both units use John Deere Tier 4 Final 4.5L engines that help lower operating costs with efficient performance and fuel savings. The 90REOZT4 is capable of a 78-85 kW standby rating, 70-76 kW prime rating and 62-69 kW continuous rating. The 120REOZT4 achieves a 95-105 kW standby rating, 90-96 kW prime rating and 79-89 kW continuous rating. **800/544-2444; www.kohlerpower.com**

3. A.Y. McDONALD BOTTOM SUCTION PUMP

The bottom suction pump from A.Y. McDonald is designed to provide maximum drawdown in cisterns or tanks. Available with a 1/2 or 3/4 hp, 115-volt motor, it pumps 15 gpm. Features include quiet operation and corrosion-resistant material for clean and dirty water, rainwater or pond water. **800/292-2737; www.aymcdonald.com.**

4. ENDRESS+HAUSER LIQUID MEASUREMENT RADAR

The Micropilot NMR81 radar from Endress+Hauser utilizes 79 GHz technology for high-accuracy custody transfer applications. Designed for level measurement applications in liquids, the sharply focused microwave beam angle ensures safe and reliable measurements without any interfering signals, even in narrow tanks with baffles. Measurements to the bottom in very tall tanks are easier because the beam does not hit the tank walls prematurely. The technology permits measuring ranges of up to 70 meters. **888/363-7377; www.us.endress.com.**

5. BINMASTER CONTINUOUS FLOAT LEVEL SENSORS

Magnetostrictive MPX-R and MPX-E level sensors from BinMaster feature Class 1, Division 1 hazardous location approvals. Designed to deliver accurate, repeatable level readings in hard environments, the MPX-R sensor has a large, buoyant, robust float and is typically unaffected by temperature. The MPX-E sensor has a compact design for constrained spaces. It can be configured for taking one or two measurements at both the interface level measurement and a total volume level. Both

sensors are compatible with any Modbus controller or PLC. 800/278-4241; www.binmaster.com.

6. PARK PROCESS BIG TIPPER DEWATERING BOX

Big Tipper dewatering boxes from Park Process are available in a multitude of capacities and tipping heights. Mounted on permanent stands to eliminate hauling containers to the landfill, where they can become damaged in transit and when emptying, the units include handrails, walkways and stairs or ladders. 888/611-7275; www.parkprocess.com.

7. AMERICAN-MC OUTDOOR WATER-SAMPLING STATION

The model EZ-02CFW stainless steel sampling station from American-MC is designed for evaluating water quality in inclement weather conditions. In addition to reducing false positives, the unit is specifically designed for the safe collection of bacteriological samples from a designated point that is fed directly from the water main. Features include a built-in, full-flow flushing valve and weathertight sealing closure that contains protective wind/rain guards. Between sampling intervals and during the sampling process, the three-position, self-sealing lid works in concert with the EZ-02FCW's wind/rain guards to produce the best possible sample. 805/642-9924; www.american-mc.com.

8. ELECTRO STATIC TECHNOLOGY VOLTAGE DIVERTERS

AEGIS PRO Series rings from Electro Static Technology are designed to divert harmful VFD-induced shaft voltages safely to ground, protecting large AC and DC motors from bearing damage. Available for motor shafts up to 30 inches in diameter, the rings, available in solid and split versions, are specially designed for high-current applications such as generators, turbines and medium-voltage motors. Solid rings are made for installation on new or repaired motors prior to their installation. Split rings come in mating halves that simplify field installation around the shafts of in-service/coupled motors. The PRO SLR Ring features O-ring barriers that prevent the ingress of dust, debris and excessive contamination that could lessen contact of the ring's conductive micro-fibers with the motor shaft. 866/738-1857; www.est-aegis.com.

9. BIONOMIC INDUSTRIES FLUIDIZED BED SCRUBBER

The RotaBed fluidized bed scrubber from Bionomic Industries is designed to handle gas capacities from 500 through 250,000 acfm. The scrubber's turbulent, packless, highly plug-resistant mass transfer bed is up to 99 percent open in the fluid contact scrubbing zone and delivers ultrahigh-efficiency gas absorption and particulate collection of over 99 percent on most applications. A two-stage chevron mist eliminator ensures complete droplet removal from the gas exiting the scrubber. Typical applications include acid gas removal from high-temperature thermal oxidizers, odor control and VOC removal from process operations, product dryers and waste treatment operations. 800/311-6767; www.bionomicind.com.

10. ASA WASTEWATER ALKALINITY ANALYZER

The ChemScan alkalinity analyzer from Applied Spectrometry Associates provides consistent, reliable chemical analysis for process control and optimization in multiple-stream process monitoring and/or difficult or dirty samples. The analyzer is easy to operate and maintain, even by novice users with minimal chemical background or training. Simple menu-driven, graphical display with instructions guides the user every step of the way. A proprietary sample capture and delivery system ensures precise, repeatable sample volume. Wide-bore sample-inlet tubing minimizes blockages, allowing even high-turbidity samples to be handled readily. 262/717-9500; www.asaanalytics.com. tpo

wastewater: product spotlight

Gorman-Rupp end-suction pumps designed for high flow, greater head

By Ed Wodalski

The 6500 Series line of horizontal end-suction centrifugal pumps from Gorman-Rupp Com-

pany are based on Prime Aire and Prime Aire Plus technology for high-level performance in the handling of solids and water in wastewater treatment plants.

Designed for up to 4-inch solids, the pumps offer automatic priming and re-priming for sewage bypass operations and other applica-

tions where intermittent flow can be a problem.

"The 6500 Series can be used on plant processes like return activated sludge and waste activated sludge," says Vincent Baldasare, sales manager, engineered systems, Gorman-Rupp. "Other processes include influent equalization, effluent pumping, dewatering, sludge loading and non-potable utility water applications."

Pump sizes range from 3 to 16 inches with the 16-inch pump capable of delivering flows up to 15,000 gpm and the 10-inch model capable of 540 feet of total dynamic head.

Features include ductile iron casing, oversized bearings for longer life, alloy steel shafts with stainless steel options and sight gauges on both sides of the bearing and seal cavities.

"If the pump is installed against other equipment or against a wall and the sight gauge happens to be on either the left side or the right side of the pump, it might be in a spot that is not easily viewable," he says. "We chose to put the sight gauges on both sides of the bearing housing and the oil cavity. It's your eyes inside the bearing cavity or seal cavity to see if there's enough oil in there and it's in good condition. If that oil would appear milky in color, it would be indicative of potential seal failure or potential lip seal failure. It's a maintenance feature that we provide."

Other features include oversized bearings for longer life, double volute on larger models, atmospheric vent, side access inspection port (solids handling models) and Smart Scroll indexable discharge locator.

"We're able to move the discharge location in almost any position from 180 degrees on the left and right side of the pump," he says. "That's important from a retrofit application. If you're replacing another brand pump, you can rotate the discharge location to match the existing piping, which would eliminate having to do any major re-piping of the system."

The 6500 Series pumps require minimal maintenance.

"Some of the things we offer are a replaceable wear ring, which is secured to the suction head," Baldasare says. "We supply pusher bolt holes for easy removal of the wear ring. We also have pusher bolt holes for removal of the suction head to access the wear ring as well." 419/755-1011; www.grpumps.com.



6500 Series line of centrifugal pumps from Gorman-Rupp Company

water: product spotlight

Force Flow scales safely monitor chemical usage

By Ed Wodalski

The **IBC tote scale** and electronic **Chem-Scale** from **Force Flow** enable operators to safely track chemical usage and comply with reporting regulations. Both scales warn of dangerous over- and underfeed conditions, prevent systems from running empty and offer remote monitoring that reduces the risk of chemical exposure.

“In a treatment plant, probably the No. 1 thing that is monitored with the tote scale is polymer,” says Mike Townsend, sales and marketing manager for Force Flow. “Polymer is typically the most expensive chemical a treatment plant purchases.”

Using a weigh scale for polymer helps operators fine-tune the amount being fed to achieve maximum removal of suspended solids. If you over-feed, not only are you throwing money away, you can be reducing the effectiveness of the polymer.

The tote scale utilizes weighing technology to create a reliable, non-contacting chemical monitoring system that avoids problems other monitoring technologies face caused by irregular tank shapes, corrosive chemical fumes, fluctuating temperatures and changes in specific gravity.

“By tracking the weight, not only do you know when you’re running out and need to switch totes, you also know at all times the status of your chemical inventory,” Townsend says. “You could use other technologies like level probes or ultrasonic sensors, but when you’re talking about IBC totes, a scale is perfect because you don’t need to insert anything into the tote. Simply place it on the scale deck.”

Unlike the tote scale, the Chem-Scale is designed for nonportable ves-



IBC tote scale and electronic Chem-Scale from Force Flow

sels. It can monitor sodium hypochlorite, poly-orthophosphate, sodium bisulfate, fluoride, caustic and alum, as well as polymer.

“The tote scale has a backstop that makes it easy for the operator to quickly position the tote,” Townsend says. “A Chem-Scale has a tank-restraint clip in each corner to hold the tank stationary.”

Chem-Scales are designed to handle from about 55- to 500-gallon tanks and can send signals to a PLC or SCADA system, enabling operators to remotely monitor the chemical and limit exposure. Options include auto-refill, 316 stainless steel and MaxSense high-accuracy models for special applications, such as monitoring brine tanks.

Instrumentation options enable operators to view basic weight information or more advanced data such as how much has been fed over a 24-hour period, current feed rate and how many days until the tank needs refilling.

“Usually you’ll have a metering pump attached to your day tank,” Townsend says. “If that vapor locks or has a problem, you might still be getting a signal from your pump saying you’re feeding and the system is running, but there’s no loss of weight on the scale. So you can go and address that. It’s another line of knowledge in the process.” **800/893-6723; www.forceflow.com.**

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industry news

Aqua-Aerobic Systems releases product brochure

Aqua-Aerobic Systems published a 12-page cloth media technology brochure highlighting the features and benefits of OptiFiber technology, its available mechanical configurations including AquaDisk, AquaDiamond and Aqua MegaDisk, application profiles, piloting units and continued research and development. Visit www.aqua-aerobic.com to view or download the brochure.

KROHNE becomes comprehensive instrument provider

KROHNE has become a comprehensive instrument provider, offering a full range of measurement solutions for process measurement applications. Its North America operations include a service and repair facility and extensive calibration facilities. A technical application support center provides 24/7/365 post-sale support, installation and wiring assistance, configuration and troubleshooting. A field service division supplies factory-authorized and trained technicians throughout North America.

WesTech adds Digabit's software platform

WesTech Engineering, provider of water treatment technology and solutions, signed an agreement to deploy Digabit's Documoto software platform. WesTech aims to expand aftermarket part sales revenue and provide more accurate parts information to resellers and other customers. Company leaders chose Documoto's flexible cloud-based publishing solution as the quickest path toward achieving those goals. A large share of WesTech's equipment sales involve uniquely customized machines installed at globally dispersed locations, making parts identification a critical task for aftermarket sales and service personnel.

Virginia water treatment plant project begins second phase

Meurer Research Inc.'s inclined plate settlers and hoseless cable-vac sludge collectors are being installed to replace aging equipment, improve effluent quality and enhance solids removal at the Richmond, Virginia, water treatment plant. The MRI system is designed for a maximum peak flow of 140 mgd. To retrofit the four sedimentation basins, MRI equipment is being installed in one basin per year over a four-year period. The phased approach enables the Richmond plant — one of the largest water producers in Virginia — to be upgraded without interrupting operations. Retrofitting of the second basin will be completed this year. Installation in the first basin was completed in 2015. The final two basins will be completed in 2017 and 2018. **tpo**

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people/awards

The **Fayetteville (North Carolina) Public Works Commission** received a Wastewater Collection System of the Year award from the North Carolina AWWA-WEA.

The **City of Bisbee** received the Clean Water Project of the Year award from the Water Infrastructure Finance Authority of Arizona for a solar addition at the San Jose Wastewater Treatment Plant.

Clearford Water Systems won the 2016 Corporate Innovation Award from the Ontario Onsite Wastewater Association for its innovative Pay for Performance financing model.

The **Massachusetts Maritime Academy Wastewater Treatment Plant** in Buzzard's Bay and the **Burrillville (Rhode Island) Sewer Commission** received 2015 Regional Wastewater Treatment Plant Excellence Awards from the U.S. EPA.

George Michael Coley of Somers received the Wastewater Operator Certification Governance Council Award from the New York WEA. Coley is first deputy commissioner of the Westchester County Department of Environmental Facilities in New Rochelle. He serves on the NYWEA Member Education Committee and the Succession Task Force and is a licensed professional engineer.

Robert K. Fullagar, director of distribution with Middlesex Water Company, received the Harold V. Florence Meritorious Operator Award from the AWWA New Jersey Section.

The **City of Norwalk's wastewater treatment plants** received \$351,824 through the Connecticut Department of Energy and Environmental Protection's Nitrogen Credit Exchange Program. The money will go to the Norwalk Water Pollution Control Authority.

The **Town of Greentown** received a Merit Award for Engineering Excellence from the American Council of Engineering Companies of Indiana, recognizing the efficiency of the town's wastewater treatment plant expansion. Working with Wessler Engineering, the town used energy-efficient technology and equipment to expand capacity, supporting economic and residential growth while saving money on energy and disposal costs.

The **Grand Rapids Public Utility** received a 2015 Wastewater Treatment Facility Operational Award from the Minnesota Pollution Control Agency.

The **Le Center Wastewater Treatment Facility** received a Certificate of Commendation from the Minnesota Pollution Control Agency for perfect compliance in 2015.

Bruce Johnson, global technology leader for wastewater simulation with CH2M Hill, was named an IWA Fellow by the International Water Association.

John Douglas, operator at Rural Water District No. 2, Trego County, was named Rural Water Operator of the Year by the Kansas Rural Water Association.

Kina Patterson, customer service and sales representative with American Water Resources, received the Customer Engagement Professional Award from the Professional Association for Customer Engagement (PACE).

Jeffrey H. Staul of the Greenville Water Authority received the Water Operator of the Year award from the Pennsylvania Rural Water Association.

Kim Benjamin, who has served 33 years with the Bradford City Water Authority, will retire as executive director in August. He received the Guy E. Shaffer Lifetime Achievement Award during his last conference with the Pennsylvania Rural Water Association.

Harold Legge was named water operator of the year in the volunteer category at the 15th Annual Clean and Safe Drinking Water Workshop in Gandar, sponsored by the Newfoundland and Labrador Department of Environment and Conservation. Legge was chosen for his work maintaining the Flat Bay West/Birchy Brook water supply.

events

July 10-13

Georgia AWWA Section Annual Conference, Savannah. Visit www.gawwa.org.

July 10-13

Nutrient Removal and Recovery Specialty Conference, presented by the Water Environment Federation, International Water Association, Rocky Mountain WEA and Water Environment Research Foundation; Hyatt Regency, Denver, Colorado. Visit www.wef.org.

July 17-20

Kentucky-Tennessee WEA Conference, Knoxville (Tennessee) Convention Center. Visit www.kytnwea.org.

July 17-20

Kentucky-Tennessee Section AWWA Annual Conference, Knoxville Convention Center. Visit www.kytnawwa.org.

July 26-29

AWWA 2016 Summer Workshop & Education Summit, downtown Denver, Colorado. Visit www.awwa.org.

Indiana American Water recognized employee Charles Kelley for 60 years of service. He started with Gary-Hobart Water Corporation in 1956 and now works as a field services representative. He is American Water's longest-tenured employee.

The **Menlo Park (California) Municipal Water District** earned a Silicon Valley Water Conservation Award for its cumulative 47 percent water savings since Gov. Jerry Brown ordered a statewide reduction of water use in June 2015.

Geneva Kaiser of Jamestown received the Outstanding Water Works Employee award from the North Dakota Rural Water Systems Association.

The **Glasgow Water Company** water treatment plant at Lucas was recognized as the top water treatment facility in its state by the Kentucky Water and Wastewater Operators Association.

Daniel Nix, utilities operations manager for the Wichita Falls (Texas) Public Works Department, received the American Public Works Association's Charles Walter Nichols Award for Environmental Excellence.

Michigan State University professor **Joan Rose** received the 2016 Stockholm Water Prize. Rose, a global water science expert and Homer Nowlin Chair in Water Research, is recognized for her research on microbial risk to human health in water, her successful translation of the science to policy-makers, and her leadership in developing the tools and guidelines required to give policy and regulatory life to the science.

The **City of Weatherford Water/Wastewater Department** received the the Municipal Wastewater Treatment Plant of the Year award from the Water Environment Association of Texas.

Two employees of Leitchfield Utilities received awards from the Kentucky Water & Wastewater Operators' Association. **Angel Saltsman** received the 2015 J.C. Chambers Award for Wastewater Operator of the Year. **Robin Strader**, chief wastewater plant operator, received the 2015 Nicholas Award for designing and implementing a field-only lab certification training.

The **Village of Perry**, New York, was named Water System of the Year by the New York Rural Water Association.

Tim Doersam will replace **Ernie Hinkle** as water and gas manager in Jasper, Indiana. Doersam has been with the water department since 1994, and in 2007 became water filtration foreman. Hinkle was applauded for his more than 30 years of service to the city.

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

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

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

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

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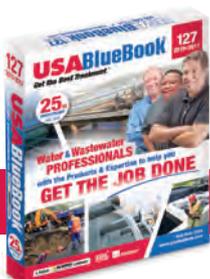
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