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DECEMBER 2018

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on the cover

Residents of the Las Campanas subdivision near Santa Fe enjoy beautiful neighborhoods, amenities and scenery. They also benefit from an award-winning water and sewer cooperative. The Las Campanas Water and Sewer Cooperative and its staff make sure the community receives top-notch services.
(Photography by Roberto Rosales)

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A Year in Retrospect

WHAT DID THE PAST YEAR TEACH YOU?

BEFORE LETTING 2018 SLIP INTO OBLIVION, IT CAN HELP TO LOOK BACK AND REFLECT ON THE YEAR'S EVENTS AND ANY LESSONS THEY MAY CARRY.

By Ted J. Ruleh, Editor



“Yesterday it was my birthday. I hung one more year on the line.
I should be depressed. My life's a mess.
But I'm having a good time.”

Paul Simon

I tend to think of that song by Paul Simon, *Have a Good Time*, around birthdays and around year's end. So we're all about to hang one more on the line. But what does that mean?

I'm not a big one for New Year's resolutions, but I do believe in going back over the year just passed, not for nostalgia, but for the same reason it would pay to go back immediately over notes from a lecture when I was in college, or still pays to review right away the notes from a meeting at work.

Timely reminders are good for the memory banks. What we don't revisit, we quickly forget. It's better not to forget things that can teach us worthwhile lessons. That's why certain books are worth rereading at various stages of life — one such book for me is Dale Carnegie's *How to Win Friends and Influence People*. How many times have I got in trouble because I ignored or forgot one of Carnegie's rules?

MAKING IT A TRADITION

For a number of years, my wife and kids and I made it a ritual on or around New Year's Eve to glance back over the year. My wife would pull out the diary she kept, and we would touch on the notable events — the highlights and the lowlights. It was mostly a pleasant way to revisit and remember our blessings.

I've done something similar to that on a few occasions with my work life. It's not difficult. You just take your planner or whatever you use to record appointments and page on through, front to back or back to front. Odds are you'll encounter reminders of things you did that helped make you successful and mistakes you wish you could take back. Such items come in all shapes and kinds.

Let's see. Here's a time where I had a nasty flare-up with a colleague. It was so out of character for both of us that on reflection I decided just to erase it from memory — in much the same way, when compiling statistics, you throw out the one or two figures (outliers) that simply don't make sense.

In the words of a Spanish-speaking acquaintance, "No pasó nada. That didn't happen." It was a good decision.

Here's a Friday where I had planned a fishing trip, but later put a big "X" through the calendar square because I thought I was "too busy." I should have taken the long weekend: I was a burnout case in the office that Friday. With the break I would have come back refreshed on Monday. Lesson: When you need some free time, take it.

A LOT TO LEARN

How about your calendar? What can it teach you? Growth and wisdom are not just the sum of momentous events. More often they're the slow accumulation of small lessons, the kind that we'll forget if we're not careful, and as they say, when we forget the past, we're doomed to repeat it.

A look back can restore to memory those smaller teachable moments and help us make the learning part of who we are. So, one day before this month expires, consider taking a little quiet time to reflect. Find a comfortable spot, at home or at the office. Grab a coffee. Shut the door. Page through the year, whether on paper or digitally.

Have a notepad with you. Maybe you'll recall a morale-building idea you wanted to roll out, but never did. Or a new technology that you saw demonstrated and never pursued, but that you still think would be helpful. Or a new supplier you'd wanted to check out. Write it all down and resolve to act on it.

You just take your planner or whatever you use to record appointments and page on through, front to back or back to front. Odds are you'll encounter reminders of things you did that helped make you successful and mistakes you wish you could take back.

Besides reviewing your own year, maybe it's worthwhile to share the exercise with your team, the way I used to do with my family. It could be a great experience if you keep it light and keep it positive. Who knows what good things your people may remember — ideas you can use that otherwise might have been lost forever.

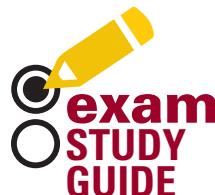
When you're done, before hanging that one more year on the line, you'll have wrung a little more value from it than you might otherwise have lost. **tpo**



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WASTEWATER

By **Rick Lallish**

It is generally accepted that the sludge blanket depth in secondary clarifiers should not exceed 2 feet (0.6 meters). By allowing a deeper sludge blanket, what undesirable outcome may occur?

- A. Nitrification may occur in the secondary clarifier.
- B. Deeper blankets inhibit settleability of the sludge.
- C. Premature digestion will occur in the secondary clarifier.
- D. Solids may be washed out and into the effluent flow.

ANSWER: D. Monitoring of the sludge blanket is a key process control parameter. The rule of thumb is never to allow the sludge blanket to reach more than 25 percent of the clarifier sidewall. By allowing a deeper sludge blanket, operators may encounter troubles with blanket washout due to excess flows (heavy rain event) or denitrification (sludge too long in the clarifier). Either condition could affect effluent solids readings and violate NPDES permit limits.

DRINKING WATER

By **Drew Hoelscher**

Feeding aluminum sulfate as a coagulant will cause the raw water alkalinity to:

- A. Decrease
- B. Increase
- C. Stay the same
- D. Dissolve

ANSWER: A. Primary coagulation is commonly achieved by dosing the water with metallic salts such as aluminum sulfate, ferric sulfate or ferric chloride. The chemical and physical reaction that takes place between the cationic metallic salts, alkalinity, and suspended solids happens very quickly, resulting in micro-sized sticky particles called floc. Floc particles gain mass and become heavy enough to settle out during sedimentation. If the source water is too low in alkalinity to produce aluminum hydroxide precipitation, an operator may choose to add lime to enhance the floc-forming ability of the aluminum sulfate. However, it is important to note that aluminum sulfate has specific pH ranges for optimal performance, and lime will raise the water's pH.

ABOUT THE AUTHORS

*Rick Lallish is water pollution control program director and Drew Hoelscher is program director of drinking water operations at the Environmental Resources Training Center of Southern Illinois University Edwardsville. **tpo***

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TREATING EVEREST'S WASTE

Solar-Powered Digester

Finding a way to handle 12 tons of waste using local equipment might not seem like a huge challenge — unless the region in question is a small village on the slopes of Mount Everest. The mountain has enamored climbers as the pinnacle of achievement for decades, and today the amount of human waste dumped annually has reached an all-time high. That's why Garry Porter and Dan Mazur started the Mount Everest Biogas Project to develop a solar-powered, modular biogas digester to deal with the massive amount of human waste collecting on the mountainside.

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UTILITY COSTS

Operating Expenditures Rise

Operating expenditures for water and wastewater utilities continue to climb at a steady clip, according to Bluefield Research's recent 2018-2027 forecast. Over the last 10 years, utility expenditures have risen 15 percent, reaching the \$79 billion mark in 2017. At this current pace, Bluefield Research forecasts the 10-year total will surpass \$872 billion from 2018 to 2027, topping \$93.8 billion by 2027.

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CAPITAL IMPROVEMENT PROGRAM

Past and Present Converge

The Charleston (South Carolina) Water System has a historic past. The first cement-lined grey iron pipe was installed there by American Cast Iron Pipe in 1922. Its Hanahan Water Treatment Plant is built on the site of a steam pumping station that dates back to 1903. Its first water supply was an 1879 artesian well. Today, a well-planned capital improvements program is helping the utility keep up with growth in the Charleston area and rehabilitate critical infrastructure.

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Water Palooza!

A DAYLONG EDUCATION FAIR HELD IN CONJUNCTION WITH WEFTEC TEACHES ELEMENTARY AND MIDDLE SCHOOL STUDENTS ABOUT THE VALUE OF WATER

By Sandra Buettner

Joseph A. Craig Charter School was host for the 2018 Water Palooza educational fair, sponsored by the Water Environment Federation in conjunction with WEF's Technical Exhibition and Conference.

It's an annual event where volunteers from businesses and organizations teach elementary and middle schoolers about the value of water through hands-on activities and demonstrations. Some 20,000 water professionals attend the conference, and Water Palooza enables them to give something back to the host cities, according to Carol Kinzer, chair of WEF's Water Palooza subcommittee.

Not all schools have water-related curricula; Water Palooza helps young students take an interest in protecting water resources and learning about water careers. Kinzer notes that the kids go home and tell their parents, thus spreading the word.

GETTING ENGAGED

Since Water Palooza started in 2013, six schools have taken part, three each from Chicago and New Orleans, for a total of 3,100 students.

Each year, the six-hour Friday program kicks off with a half-hour pep rally, often led by a local government official and a WEF spokesperson to get the students excited about the day's activities. Local vendors, organizations, consultants, and WEF sponsor booths that teach students about their local water environment, the value of water, and how they can protect water resources at home, in their school, and in the community.

Typically, about 15 booths present water activities. At a water Q&A booth, students learn water facts and how to be good stewards. Other activities include a poster session that the students create, and a career station where students are quizzed on their interests and receive an introduction to various jobs in the water industry. Afterward, the kids get uniforms for the professions they choose and have their pictures taken.

More than 300 students from grades K-8 rotate through the stations. "Niles the Crocodile, the WEF mascot, makes a visit every year and is a big hit with kids," says Megan Livak, student and young professionals manager for the WEF association engagement team.



PHOTO BY CAROL KINZER

Water Palooza is a regular event during WEFTEC conferences and generally includes an appearance by the WEF mascot.

Students are taught in creative ways. "Engineers from a water treatment plant at last year's event provided microscopes hooked to TV screens so students could see the microorganisms moving in the water," Kinzer says. "Then they used a sponge to show how the water could be filtered and cleaned." It was the first time some students used a microscope.

The Water Palooza toolkit, which is incorporated into the day's event, and downloadable from the WEF website, is used throughout the year at other events around the country including Earth Day, World Water Day, and WEF Member Association conferences.

BEING OF SERVICE

On the Saturday after the 2018 Water Palooza in New Orleans, students took part in a community engagement project around creating a bioretention cell for the Treme Community Center across the street from the school.

The project was chosen from several submitted to address stormwater runoff at the center. At present, an old 1,450-square-foot concrete planter collects rainwater from a slanted roof on the building. The water then has nowhere to drain, and it creates a flooding problem.

"The area around the center is very developed, and consequently, there aren't a lot of parks with vegetation or grasslands to absorb the water," Livak says. "To address the problem, the planter will be replaced with a bioretention cell of native plants."

In addition, a large green infrastructure graphic will be designed on the side of the community center to educate students and the community on a water-related topic. Once it's outlined, about 200 volunteers including students, adults, and WEF Young Professionals will complete and paint it.

Kinzer says, "Water Palooza and the service project are a great way to add to the WEFTEC experience and to leave a positive effect on the host city. It's gaining more traction each year among WEF attendees and the students as they participate and see its value." **tpo**

FIT AND FINISH

IF YOU ASK HATFIELD AWARD WINNER PAUL RAY, A PLANT DOESN'T HAVE TO BE 'OLD'
JUST BECAUSE IT HAS BEEN IN SERVICE FOR A NUMBER OF YEARS

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Jay Anderson**

THE NORTH CARY (NORTH CAROLINA) WATER RECLAMATION Facility has been in service since 1974, but to the casual observer, it doesn't look its age.

Equipment is rigorously maintained. Aging equipment gets replaced under a capital improvement plan. Housekeeping is impeccable. Buildings and equipment are kept freshly painted. Most of all, the plant consistently releases effluent that complies with strict nutrient limits for the Lower Neuse River Basin.

Paul Ray, plant manager, gives a simple reason for the facility's success: "A great staff and a very good employer." In reality, Ray significantly shares in the credit, according to Jamie Revels, director of the Town of Cary Utilities Department.

"Paul has always believed in the power of a great maintenance program to support plant operations," Revels said in nominating Ray, successfully, for a 2017 William D. Hatfield Award. "He has established an innovative and efficient approach to operations and maintenance, producing an exceptionally high-quality effluent that protects the natural environment."

UPGRADE AND EXPANSION

The North Cary facility (12 mgd design, 7.2 mgd average) is one of three water reclamation facilities in the town. The others are South Cary (12.8/5.3



Paul Ray, plant manager, North Cary (North Carolina) Water Reclamation Facility

mgd) and Western Wake Regional (18/4.5 mgd). Together, the three serve about 215,000 residents.

Ray joined the North Cary team in 1988 after serving in the Army. He signed on as a maintenance worker and went to night school at Wake Technical Community College. Along the way, he earned promotions to mechanic and chief of maintenance. After finishing his associate degree in electronics engineering technology, he became chief of operations and maintenance, and in 2012 he assumed his current position.

While Ray progressed in his career, the North Cary plant expanded. "When I started, we were a 4 mgd extended aeration facility with tertiary filtration and chlorine disinfection," he recalls. "Because we discharged into the small Neuse River tributary that is Crabtree Creek, we knew we would be required to meet more stringent limits, primarily for nutrients."

In 1997 the town commissioned a new biological nutrient removal facility running two oxidation ditch trains using the Bio-denitro process (Veolia Water Technologies). To meet growing demand, a third train was added in 2002. DynaSand filters (Parkson Corp.) provide tertiary treatment, followed by two TrojanUV4000 disinfection units. A reclaimed water distribution system delivers 0.5 to 1 mgd to customers for irrigation.



Ray and his team strive to eliminate noise and odors. Part of that success comes from a biofilter at the influent pumping station (BIOREM Technologies).

“ [Paul] has established an innovative and efficient approach to operations and maintenance, producing an exceptionally high-quality effluent that protects the natural environment.”

JAMIE REVELS



Ray takes pride in keeping a sharp appearance at the facility. That includes keeping interiors and outside structures neatly painted.

Paul Ray, Town of Cary, North Carolina

POSITION: | Plant manager, North Cary Water Reclamation Facility

EXPERIENCE: | 30 years in the industry

EDUCATION: | Associate degree, electronics engineering technology, Wake Technical Community College

CERTIFICATIONS: | Grade IV Wastewater Operator, Spray Irrigation, Land Application

MEMBERSHIPS: | North Carolina American Water Works Association and the North Carolina Water Environment Association (NC AWWA-WEA)

GOALS: | Continue treating water to the highest level achievable

GPS COORDINATES: | Latitude: 35°50'7.49"N; Longitude: 78°46'33.87"W



The upgraded facility was designed to meet limits of 6 mg/L total nitrogen and 2 mg/L total phosphorus. Later the town joined the Lower Neuse Basin Association, and the total nitrogen limit was converted to a total poundage requirement while retaining the total phosphorus limit of 2 mg/L. In 2013, the North Cary plant earned Exceptional Quality Effluent status from the state Department of Water Resources for consistently low effluent nutrients and years of compliance. The plant maintains a state-certified laboratory led by Jason Parker, senior analyst, and Alyssa Benson, analyst.

Biosolids from all three of the town's facilities are dried and processed into Class A Exceptional Quality pellets at South Cary (rotary drum dryer from Andritz Separation) and Western Wake Regional (two belt dryers from Veolia Water Technologies). Finished material is sold in bulk to a contractor for sale to farmers.

ATTENTION TO DETAIL

In maintaining the plant, Ray applies the watchword: "original fit and finish." He observes, "If something was intended to be there, it still should be, unless we have a reason for it not to be. There's a tendency over time to say, 'Well, we just don't need that anymore,' and it goes away. Somebody had a reason for putting it there, for designing it. We need a reason for it to go away — otherwise we need to maintain it."

The same concept applies to keeping a sharp appearance: "The facility had a nice paint job at the time it was constructed. We maintain that nice paint job. We routinely paint equipment, and we paint the new equipment that we replace older equipment with."

A computerized maintenance management system helps keep routine tasks on track. That is augmented

"We have a capital program so we can fund the upgrades we need, when we need them. Are there things we have to do right now? Are we going to need maintenance in one year? Five years? Ten years? Then we put some dollars with that and get the repairs scheduled."

TRAINED AND DEDICATED

It's an extensively cross-trained and highly certified team that takes care of the maintenance and keeps the plant producing high-quality water. Jonathan Bulla is team leader for operations and the lab supervisor, and Brian Cartwright is team leader for the maintenance side. Team members are:

- Senior mechanic/operators Jim Bridges, Mike Dismuke, Leonard Hill and Rick Sellars.
- Mechanic/operators Brian Pittman, Ryan Smith, Jon Stimach, Kenny Morris, John McDonald and Bernard Royal.
- Tammy Coppedge, administrative assistant.

A formal career ladder program encourages team members to advance in their careers. "We promote our employees to better themselves, and they provide better job performance for the town," Ray says. "The career ladder



The North Cary Water Reclamation Facility team includes, from left, Jason Parker, senior lab analyst; Paul Ray, plant manager; Mike Dismuke, senior mechanic/operator; Brian Cartwright, team leader, maintenance; Jim Bridges, senior mechanic/operator; and Ryan Schmidt and Bernard Royal, mechanics/operators.

“I've seen the facility grow and the people grow. I've been privileged to see people come in relatively green and develop into highly capable operators."

PAUL RAY

by extensive predictive maintenance using vibration analysis and infrared thermography, along with routine sight, sound, touch, and smell inspections of equipment.

"We have a facility condition assessment team that meets routinely so that all the divisions within the utility can compare notes and talk about issues," Ray says. "At North Cary, we do an overall equipment condition assessment. We look at wear points and assess potential failures. Much of the equipment is tied to a SCADA system. For items that have variable-frequency drives, we have data connections through digital links. We can read a lot of what's going on with those drives and can see what the end source is doing."

covers the laboratory, operations, and maintenance. It's a voluntary program, but virtually everybody participates."

Meanwhile, the town provides funding for the training that team members need to attain higher-level licenses. "As a result, we get much more competent and skilled individuals," Ray says. "As they progress through Grade II, III and IV and other certifications, we end up with better-qualified, more well-rounded employees."

As head of the team, Ray believes in leading by example: "If it's a miserable, dirty job, I'm probably going to be the first person out there because I want people to understand that I know what they're going through."

"Whatever we do, we plan it out as much in advance as we can. We try to foresee as much as humanly possible. The people I surround myself with jump in when they need to. Nobody is afraid of getting dirty. We all work with the same goal to accomplish the same task, making sure that water quality is maintained and everybody is safe."

TACKLING CHALLENGES

Among Ray's proudest accomplishment is continuous improvement in total nitrogen removal, and here he credits the staff for initiating a significant change in the re-aeration zone of the secondary treatment process, the last stage before the secondary clarifiers.

“We have a capital program so we can fund the upgrades we need, when we need them. Are there things we have to do right now? Are we going to need maintenance in one year? Five years? Ten years?”

PAUL RAY

"In an effort to reduce the effluent total nitrogen, the staff evaluated the BNR process," Ray says. "A re-aeration zone after each set of second anoxic tanks follows the BNR reactor basins. We hypothesized that too much air was being added in these zones before discharge to the secondary clarifiers. Thus, the surplus air was causing residual ammonia bound deep within the biomass to nitrify further, causing higher nitrate levels in the secondary clarifiers."

The re-aeration zones consisted of positive displacement blowers driven by pulleys using 1,800 rpm single-speed motors. The first test was to change the pulleys and belts in one BNR basin to reduce the speed. The result was a noticeable reduction in nitrate leaving the re-aeration zone.

"We repeated that experiment with a second BNR basin with similar results," Ray says. "The staff then devised a longer-term solution, pairing variable-frequency drives with the original belt-and-pulley combinations to cover a broad range of dissolved oxygen requirements. We installed DO meters and tied them back to a plantwide SCADA system.

"After considerable testing, we found that a DO setpoint of 1 mg/L was optimal for the desired nitrate levels leaving the zone. We added controls to the SCADA system to allow the operations group to adjust that number as

necessary. The overall result was an effluent total nitrogen reduction of 1 to 2 mg/L. This relatively simple modification led to improved effluent quality while using less energy."

Aside from process improvements, Ray has been challenged with a variety of construction projects as the plant has evolved and takes pride in bringing them in on time and on budget. "On most of the ones I'm responsible for, the budgets are in the range of \$500,000 or less," he says. "It's about getting engaged and involved from the time we decide we're going to do something until the contractor is no longer on site and we're running it.

"You have to remain engaged all the time. You should be continuously providing feedback to the engineers and whatever team is working on the project. I've spent countless hours going through blueprints and working out details ahead of time, with the idea that by doing so we can eliminate most change orders associated with jobs.

"The more people who look at it, the more years of experience are brought to bear, the less likely we are to have a lot of significant changes while we're doing construction. It's all public money. We need to make sure we spend it as wisely as we possibly can."

SOURCE OF PRIDE

Looking back over his career, Ray is proud of the North Cary plant and his team: "The town of Cary has grown enormously. It's a beautiful community. I've seen the facility grow and the people grow. I've been privileged to see people come in relatively green and develop into highly capable operators. It's the same with the facility. It started out pretty small and has become much more expansive. I know I've had a significant part in making it successful."

His plan for the future? "Continue to do what we are doing. We always treat to the highest level we can. We by far exceed the minimum standards on our permit. If the permit limit is 10, we still try to get as close to zero as possible. We've always done that, and I want to continue to do that. I think it pays back in many ways." **tpo**

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NO ODOR. NO NOISE.

Paul Ray and his team at North Cary aim for zero impact from their facility beyond the property boundary. "We basically have a zero tolerance for noise and odor offsite," Ray says.

"We are the in-town facility. We're located right next to some Fortune 500 companies and residential areas. We're right off a parkway. Apartment complexes have been built directly across the road from us. We're also near a large trailhead that is the center point for three park systems. We've done quite a bit over the past decade to ensure that people for the most part don't know we're here."

Plant staff members stay in touch with businesses nearby to make sure there are no issues. They've introduced themselves to the apartment complex managers so they know whom to contact. "We're extremely proactive in ensuring that there are no impacts outside the fence line to any of the citizens or businesses within the town of Cary," Ray says.

A BIOREM Technologies biofilter is installed at the influent pumping station, and a Monashell odor scrubber (Bord na Mona) is at the distribution box that feeds the biological treatment process. The headworks is equipped with a carbon odor scrubber. The influent pumping station structures, the flume, and the influent distribution box at the headworks are covered, and the interior concrete is epoxy-coated.

Noise hasn't been an issue. The plant doesn't use large blowers for aeration; the brush rotors that serve that purpose are relatively quiet. "We've also concentrated on keeping our light profile down," Ray says. "In recent years, we've switched most of the facility to LEDs, and this coming year, we'll switch the remainder. Most of our exterior fixtures project light downward instead of outward. We are cutting down the light that travels offsite."

Bridging the Divide

JEREMY CRAMER APPLIES HIS LONG EXPERIENCE IN PLANT OPERATIONS TO HELPING ENGINEERS AND PLANT TEAMS CREATE EFFECTIVE DESIGNS THAT WORK IN THE REAL WORLD

By Ted J. Rulseh

On clean-water plant projects, from new construction to upgrades, there can be tension between the design engineers and plant operations teams. The complaint — and it doesn't always hold true — is that engineers come in with great ideas but don't consider the needs of the people who run the plant day to day.

In a Wisconsin-based operations career that spans nearly 20 years, Jeremy Cramer had many contacts with engineers, some more satisfying than others. Now, as a senior process specialist with the Donohue & Associates consulting firm in Sheboygan, Wisconsin, he works to improve communication between the design and operations sides, with the aim of making sure that plants and equipment are effective, efficient, and operator-friendly.

Cramer earned a biology degree from the University of Wisconsin-La Crosse and later an MBA from Cardinal Stritch University. After five years at small lagoon and activated sludge treatment plants in Wisconsin, he spent 11 years at the 3 mgd Stevens Point Wastewater Treatment Plant, working up to wastewater superintendent. He then served in that role with the 8 mgd Fond du Lac Regional Wastewater Treatment Facility for three years.

In between, he worked for a time as a representative for a wastewater equipment manufacturer. He joined Donohue in 2017. Cramer talked about his relatively new career in an interview with *Treatment Plant Operator*.

tpo: What made you decide to make a career move to the consulting side of the clean-water profession?

Cramer: I love to learn, and I wanted to understand that side of the industry. I had worked with Donohue on projects for quite a few years. In Stevens Point, we worked together on a biogas project, a facilities master plan, and a major lift station project. In Fond du Lac, we did a modeling of the plant on the biological nutrient removal side to help decide whether to go to an anammox process.

tpo: What does your role look like day to day?

Cramer: I work at the interface between the engineers and the facility operators. Sometimes engineers have amazing ideas and great designs that just aren't practical operationally. I get involved in the upfront design phases of projects, working right with the engineers and saying, "Yes, that makes sense," or "No, that doesn't make sense — maybe we should move equipment

over here so the operators can work on it better." I bring up all the things the engineers should consider from an operations perspective.

tpo: Do you also get involved in projects outside the design phase?

Cramer: Yes. I do startups at wastewater treatment plants that Donohue has designed and put together standard operating procedures and operations and maintenance manuals. Another area I work in is troubleshooting and technical assistance. It might be a facility with anaerobic digesters where the plant team wants to know how much high-strength waste they can add to increase biogas production. Or it might be a facility facing a process challenge.

tpo: From an operator's perspective, what makes the difference between a positive and a not-so-positive interaction with engineers?

Cramer: In my career, the great experiences were the ones where the engineers really listened to the operators — where they would come in before the design, walk the plant, talk to the staff, and see firsthand what the oper-

“In my career, the great experiences were the ones where the engineers really listened to the operators — where they would come in before the design, walk the plant, talk to the staff, and see firsthand what the operators see day to day.”

JEREMY CRAMER

ators see day to day. A bad experience was an engineer on a project who never even came to the plant, never asked for my input, and then when I did give input, I was pretty much ignored.

tpo: Did you ever have differences of opinion with engineers related to technology?

Cramer: I did have an experience with an engineer who was not willing



Jeremy Cramer

to look at cutting-edge technology. I wanted a certain piece of equipment, but this firm was not comfortable with it. They liked the tried and true and wanted to stick with that. I understand, because engineers want to make sure a project works, but there has to be a middle ground where a plant superintendent has done the research and wants something different and the newer technology makes sense.

tpo: How do you approach a plant in the design phase of a project?

Cramer: I look at things differently from most engineers. First, I want to find out what the operators' challenges are. What do they like? What do they dislike? What kinds of problems do they think they might encounter?

“Don't be afraid to talk to your engineers and consultants.

If you see something and you don't like it, or if you do like it, talk to the engineer about it. Usually, the best projects are the ones that have the most open communication.”

JEREMY CRAMER

Is this going to affect any other areas of the plant? It's about listening to them, walking around and talking. I'm not afraid to talk about any part of the plant because I've done it. I've fixed equipment. I've changed mechanical seals. I've pulled rags out of lift stations and cleaned float trees. I've done all of that, and I'm not afraid to talk about it.

tpo: Do you also offer the operations team a longer-term perspective?

Cramer: Yes. The staff may see things one way, but I also bring up considerations for the future. What if things change a little bit — different permit limits, different loadings, different employees? I want to make sure they are set up to handle those things, or at least consider the potential changes.

tpo: In general, how do plant operations teams respond to you?

Cramer: Almost all the time it's easy for me to talk to a wastewater treatment plant staff. I almost always feel welcome. When people at a facility realize that I've done what they do, they usually open right up and there is good communication.

tpo: Are there others in your firm who have roles similar to yours?

Cramer: Yes. I have a couple of colleagues who do basically the same things that I do. In addition, many of our process engineers had internships at wastewater treatment plants when they were in college, so they have hands-on experience. In fact, one of the original principals of the firm, Ken Sedmak, was not an engineer, but an operations guy who worked at treatment plants early in his career. That's how important the operations side has been to Donohue.

tpo: How do your engineer colleagues in the firm respond to you?

Cramer: There is communication almost daily. Engineers from our various offices around the Midwest are constantly asking questions, even though I haven't even met some of them. Will this work? What do you think about this? They pull me into different projects, wanting to know how the operations piece is going to fit in.

tpo: What advice would you give to operators who might be considering career options beyond the traditional roles in treatment plants?

Cramer: There are opportunities out there if you're willing to take a step away from the 7 a.m. to 3:30 p.m. shift, and if you're willing to travel and see different facilities. I love that I'm able to see so many wastewater treatment plants and meet so many different people. If you're willing to share

your good and bad experiences, if you're willing to work with engineers on a daily basis, if you like variety, then this can be an exciting career path. It's about being able to make a difference on projects, shaping them from the operations and maintenance side.

At the same time, I don't blame anybody for not wanting to leave a plant because there are so many good things about being in one place and working with your team. You encounter daily hardships and work through them together, and you become like a family.

tpo: What advice would you give to your peers in treatment plants about dealing with engineers and consulting firms?

Cramer: Don't be afraid to talk to your engineers and consultants. If you see something and you don't like it, or if you do like it, talk to the engineer about it. Usually, the best projects are the ones that have the most open communication. Even if bad things happen, as long as you work through them as a team, usually those turn out to be great projects.

tpo: In general, what would you say to current and prospective operators about the wastewater professions?

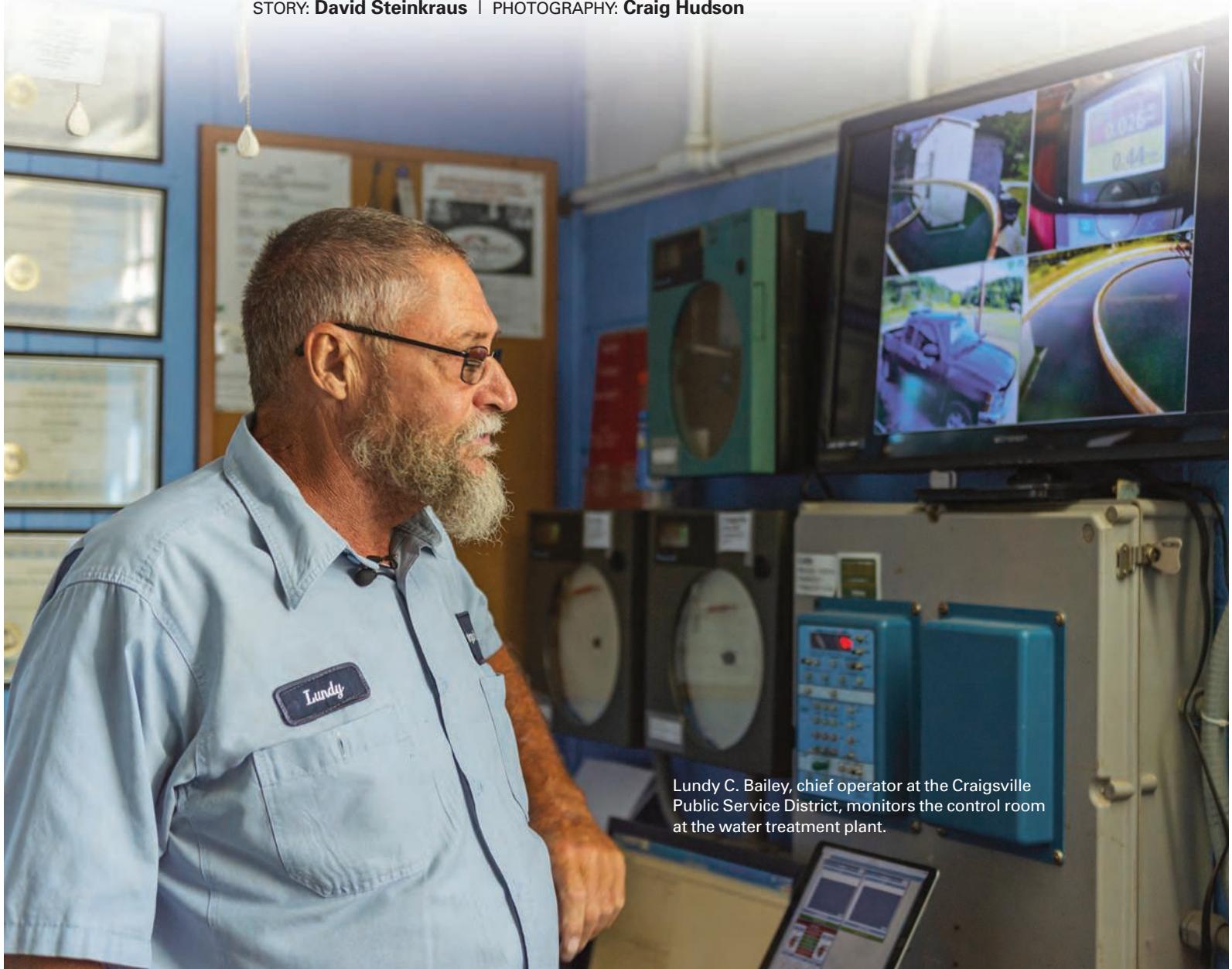
Cramer: Whether you call it wastewater treatment or resource recovery, this is an exciting field. There's so much to it, and there's so much technology at work. It's a great feeling to be involved with keeping water clean, protecting fish and wildlife, keeping people and the environment healthy, and looking out for future generations. This is a great field, and I'm glad to be a part of it. **tpo**



Seeing Red

DEALING WITH A TINT FROM AN UNKNOWN SOURCE IS JUST ONE EXAMPLE OF HOW THE CRAIGSVILLE TEAM EXPERIMENTS AND ADAPTS ITS WAY TO QUALITY WATER

STORY: David Steinkraus | PHOTOGRAPHY: Craig Hudson



Lundy C. Bailey, chief operator at the Craigsview Public Service District, monitors the control room at the water treatment plant.

“I can treat high-turbidity water. I can treat 300 NTU easier than I can treat four units of this stuff.”

LUNDY C. BAILEY

ANYONE CAN SEE THE MAIN CHALLENGE

confronting the team at the Craigsville (West Virginia) Public Service District. It's the red-tinted water that comes down the Gauley River toward the plant intake.

“I can treat high-turbidity water. I can treat 300 NTU easier than I can treat four units of this stuff,” says Lundy C. Bailey, chief operator and Class 3 water operator. Many people have opinions about the source of the red water, but no one has proof of what causes it.

Much of the water just upstream of the Craigsville intake comes from the Monongahela National Forest. Some say the red tint is a byproduct of logging in the backcountry. Others say it comes from the marshes upstream.

“I'm leaning to think it's due to heavy rains in the headwaters of the river,” he says. “I feel that water overflows from those marshes and runs down the tributaries of the Gauley.” Other operators farther upstream on the Gauley don't experience the red water, and years ago the red tint wasn't present at Craigsville.

Most of the time the Gauley is clean: Raw water has only 2 to 3 NTU. Under disinfection byproduct controls, his team has learned to treat a little higher to remove more turbidity. They use DelPAC (USALCO) for coagulation at 13 mg/L. They could drop to 8 mg/L, but the extra 5 mg/L adds some insurance in case heavier rains bring turbidity spikes.

“To learn to treat it was hard because we'd do a jar test and everything we did on the jar test says it should work, but the basin wouldn't do what the jar shows,” Bailey says. “So we finally went to the settings we use. The floc will have a pretty gold tint to it and it will look like you have mashed potatoes, but by the time it runs through the spiral in the sedimentation basin, it will drop right out.”

OLDER, YET MODERN

The Craigsville plant is both old and new. The machinery is manual. “We can even backwash with 8-inch valves that we turn by hand,” Bailey says. But the telemetry is all automated, some on a satellite link and some through the cellular phone network. The distribution pumps and pressure relief valves are automated.

When the plant is running, it starts the in-line pressure booster to fill the main storage tank, and that triggers a second pump to maintain water pressure



at higher elevations, up to 400 feet above the plant. SCADA equipment (AGM, Trimble, High Tide Technologies) provides real-time data from the system. The plant runs 13 to 15 hours per day.

From watching service technicians, Bailey's team has learned to solve some SCADA system problems. Now the team keeps an inventory of parts, such as transducers and data handlers, so they can service the equipment themselves.

The plant feeds water not only to Craigsville, but also to nearby Camden-on-Gauley, about a mile upstream on the river. When that community rebuilt its distribution system a few years ago, the project included a new 6-inch PVC feed line that comes directly to the Craigsville plant and supplies the entire Camden-on-Gauley system. Typical demand is 12,000 to 15,000 gpd for Camden-on-Gauley. Flows are 810,000 gpd design/500,000 gpd average. Average production is 450,000 gpd and 15,000 gpd for Camden-on-Gauley.

INSIDE OPERATIONS

At the Gauley River, there is a gravity feed through a 10-inch line to a 24-foot deep well containing two raw water pumps (Wilo USA and Pentair Water - Hydromatic). Only one runs at a time; the other serves as a backup.

The pumps feed the sedimentation basin by way of a chemical injection pit. The pit can feed chlorine, aluminum sulfate, soda ash and the DelPAC. If the alkalinity is too low, the team can add sodium bicarbonate through the soda ash line. A tap in the pit feeds raw water to the lab on the second floor of the building.

Craigsville (West Virginia) Public Service District Water Treatment Plant



BUILT: | 1962, several upgrades

SERVICE CONNECTIONS: | 2,200

EMPLOYEES: | 4 operators

FLOWS: | 810,000 gpd design/500,000 gpd average

SOURCE WATER: | Gauley River

SYSTEM STORAGE: | 986,000 gallons

DISTRIBUTION: | 7 miles of water mains

ANNUAL BUDGET: | \$800,000 (operations)

KEY CHALLENGE: | Red tint in source water

WEBSITE: | www.craigsvillepsd.com

GPS COORDINATES: | Latitude: 38°21'26.39"N; longitude: 80°36'38.12"

“We’re in the process right now of preparing for a new water system. They’re going to build us a 900 gpm plant.”

LUNDY C. BAILEY

The sedimentation basin holds about 50,000 gallons. A single mixer there is needed only when the raw water exceeds 14 NTU. Detention time is about 1 hour and 20 minutes before the water reaches the rapid sand filters. As water gravity feeds to the clearwell, there is pH adjustment and chlorine adjustment. A low chlorine residual in the basin reduces disinfection byproducts. Another feed line sends water to the lab for continuous chlorine monitoring.

MORE CAPACITY COMING

The original water plan design was 250 gpm; that’s when there were only about 400 customers. Upgrades over the years increased pumping capacity from 400,000 to 800,000 gpd, but the capacity of the sedimentation basin, clearwell, and other treatment components were not increased.

“We’re in the process right now of preparing for a new water system,” Bailey says. “They’re going to build us a 900 gpm plant.” It will include a new sedimentation basin, new filters, a new clearwell, and a new 2,500-square-foot building to hold the filters and the lab. The plan is to open the new plant by fall 2020.

A field on the existing plant site is large enough to accommodate the new plant. The existing building will become the pump station for the new system. “I actually planned on retiring this coming April, but I’m going to hang on a little longer,” Bailey says. He wants to wait until the new plant is open.

The engineering firm designing the plant talked extensively to the Craigsville team, so the new facility will be set up in a way that makes sense to the operators.

The Craigsville team includes:

- Kristina Ward, Class 4 operator, who also handles data management
- Jerry Fazenbaker and Mark Jackson, Class 2 operators
- John Crites, outside crew foreman and holder of a water distribution license
- Ernie Gardner (water distribution license) and Danny Russell, outside workers
- Gary Robinson, general manager.

“This group of operators — and the way everybody gets along and can flex their schedules to help other workers — it’s a very good group of people,” Bailey says.

ALL ABOUT CLEAN

Bailey received the West Virginia American Water Works Association’s



The team at the Craigsville Public Service District Water Treatment Plant includes, from left, Kristina Ward, Class 4 operator; Lundy C. Bailey, chief operator; and Jerry Fazenbaker and Mark Jackson, Class 2 operators.

2017 Perkins-Boynton Award for exemplary water plant operation ability and desire to increase knowledge of water treatment (category for systems serving more than 3,300 people). As Bailey tells it, it was a matter of solving a set of problems.

When he took over as chief operator, the plant was exceeding its limits on disinfection byproducts. To fix the problem, Bailey began working with the state’s district engineer, Chris Farrish.

“He likes doing studies, and we would go through every study he wanted us to,” Bailey says.

They began cleaning the sedimentation basin four times a year. There are no rakes in the basin; it needs to be cleaned manually after draining.

The Craigsville plant uses a combination of manual and automated controls. The distribution pumps and pressure relief valves are automated.



OPERATORS WANTED

When Lundy C. Bailey talks about the future of the Craigsville water plant, he also talks about the future staff. Almost the entire staff is nearing retirement. Bailey counts off the people — this person could leave in five years, another has two years.

"Me, I could go within the year," Bailey says. Usually that would spur a recruiting effort, but Bailey faces a problem: "There's nobody interested in it."

A woman from a neighboring community had her training at Craigsville and donated her training hours to the plant, but she is now a licensed operator in the neighboring community.

Small districts have the work, but they don't have the funds to pay an operator in training to sit with the experienced people in a plant. "In West Virginia," Bailey says, "there's a great shortage of operators."

Disinfection byproducts are generated when chlorine contacts organic matter: "If you have 2 or 3 feet of organic sludge in your sedimentation basin, you're doing nothing but creating disinfection byproducts."

Another result of more frequent basin cleaning is that less chlorine is needed because there is less organic matter to treat. The plant now does robotic cleaning of the clearwell and one of the tanks. Once the cleaning is done, the team will drain about half the water from a tank through hydrants until the water matches the pH and other measurements at the plant. Then the system will be refilled with freshwater.

Customers then have freshwater instead of water that's two or three weeks old, and the flushing helps reduce disinfection byproduct generation. It's just another way the Craigsville team collaborates to deliver a high-quality product. **tpo**

Chief operator Lundy C. Bailey and his team have the challenge of treating red-tinted water from the Gauley River. The cause of the color is a source of debate.



“ If you have 2 or 3 feet of organic sludge in your sedimentation basin, you're doing nothing but creating disinfection byproducts.”

LUNDY C. BAILEY

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A Way to Shine

PLANT OPERATORS SHARE PHOTOS OF THEIR SIGNS AND THE HISTORY BEHIND THEM

The old saying is that you only get one chance to make a good first impression. Four clean-water operators responded to *Treatment Plant Operator's* request to share pictures of the welcome signs that give visitors an immediate positive vibe about their facilities.

West Basin Municipal Water District (Carson, California)

This new sign was installed in July at the West Basin district's Juanita Millender-McDonald Carson Regional Water Recycling Plant. This district is a wholesale water agency that provides imported drinking water to 17 cities and unincorporated areas of Los Angeles County in a 185-square-mile service area. The district is a leader in the production of recycled water and in conservation and education programs.

The 3.5 mgd Juanita Millender-McDonald plant further treats Title 22 recycled water from the district's 40 mgd Edward C. Little Water Recycling Facility through microfiltration, reverse osmosis, and nitrification treatment to provide high-quality recycled water to a refinery for boiler feedwater and cooling tower applications.



The new sign, designed by district personnel, was created to increase the facility's visibility, helping contractors and drivers of chemical delivery trucks. The previous sign was hidden alongside a fence upon entry to the building. The new free-standing sign faces the main public street and includes the district's logo, facility name and address.

Beloit (Wisconsin) Water Pollution Control Facility

"This sign was designed in the late 1990s with help from a local sign design firm," says Harry Mathos, director of water resources with the city Department of Public Works. "The original sign was installed and planted by our staff. Our logo held firm until 2018, when the city rebranded itself, and that included a new logo."

The facility (5.5 mgd average flow) was commissioned in 1991; the sign's colors reflect the plant color scheme. "The teardrop was designed by the staff and was the original logo for the Water Resources Division," Mathos says. "We paid homage by including it in the sign. We have since upgraded the base using a professional landscaping firm — money well-spent. Recent construction behind the sign partially obscures it, so we will be relocating it soon."

New Hartford (Connecticut) Wastewater Treatment Plant

There's history behind the sign at the New Hartford plant, a 0.4 mgd (design) sequencing batch reactor facility, operated by Aquarion Water Co. that discharges to the West Branch of the Farmington River (a federally designated Wild and Scenic River).

"As a former geologist, I can appreciate the unique bedrock geology in northwestern Connecticut," says Derek Albertson, chief operator. "The sign was the brainchild of the New Hartford Water Pollution Control Authority upon completion of the plant in December 2010."

The rock is a piece of the local bedrock, known as the Satan's Kingdom Formation, Breezy Hill Formation. "It's metamorphic rock

of medium-grained schist/gneiss and was placed as a reminder of the natural environment the plant is charged with protecting," Albertson says.

He characterizes New Hartford as "a small, close-knit community." The Farmington River cuts through the downtown, and fly fishermen can be seen casting lines there. Meanwhile, kids experience the thrill of riding the rapids on a tube or in a kayak.

Washington Suburban Sanitary Commission

This sign at the WSSC's Seneca Water Resource Recovery Facility in Germantown, Maryland, recognizes the commission's 100th anniversary. WSSC is one of the nation's largest water and wastewater

utilities in the nation, with a network of some 5,700 miles of drinking water pipeline and over 5,500 miles of sewers, serving about 1.8 million residents. The commission made the name change for its facility to reflect more accurately what its facilities do.

"We agree that plant signs should be a priority. Customers pass by, and team members enter each day. Signs can have a dramatic impact on customer satisfaction and employee morale. Don't be afraid to shine — post a sign!" **tpo**



WHAT DOES YOUR SIGN SAY ABOUT YOU?

You can still submit a photo of your water or wastewater treatment plant sign. Send to editor@tpomag.com.



Around-the-Horn *Training*

OPERATORS IN CRYSTAL LAKE GET A COMPLETE PERSPECTIVE ON TREATMENT PLANT AND LIFT STATION OPERATIONS AND REGULARLY ROTATE DUTIES BETWEEN THEM

STORY: **Jim Force**
PHOTOGRAPHY: **Rob Hart**



“ Our guys are the boots on the ground and the reason for our success.

We let them learn hands-on, not just identify problems, but what to do, what to try, what's the best solution.”

DAN LANGGUTH

THERE'S CROSS-TRAINING. AND ON-THE-JOB TRAINING. And hands-on training.

And then there's around-the-horn training. That's what they practice at the Crystal Lake (Illinois) Wastewater Treatment Division. "We're responsible for two wastewater treatment plants and 30 lift stations," says Dan Langguth, division superintendent.

"When the lift stations were assigned to us in 2014, it made sense and we decided to divide our staff into three teams and rotate them every four months between the plants and the lift stations. Three staff members were promoted to facility operators to fulfill leadership roles at their assigned facilities." The leaders of the three facilities rotate every six months.

That way, everyone gets trained and gains experience on all aspects of the division's operations. "It gives us a fresh set of eyes every quarter," Langguth says.

TERTIARY PROCESS

Crystal Lake is a pleasant community of 44,000, just an hour northwest of downtown Chicago by commuter train. Both wastewater treatment plants underwent recent upgrades to improve hydraulic capacity and solids handling, following a master plan developed by the engineering firm HR Green.

Plant 2 is the larger of the two, with a design flow of 5.8 mgd and an average flow of 4.3 mgd. Two influent wet well stations feed new wastewater into the headworks, which houses a pair of rotating fine screens (Lakeside Equipment), a backup manually cleaned bar screen, and an aerated grit chamber.

A pair of ultrasonic flowmeters (Fuji Electric Corp. of America Model Delta-C) is installed on the influent pipes. Alum is added at that point to

remove phosphorus and barium, which occurs naturally in the groundwater. The alum is added after the primary clarifiers and again in the secondary clarifier drainpipe, which flows back to the head of the plant.

After primary settling, the wastewater flows to 13 aeration basins, operating in series and equipped with fine-bubble diffusers (SSI Aeration). APG-Neuros turbo blowers generate the air.

The flow settles in a series of five circular clarifiers, all with Spiral covers (Walker Process Equipment, A Div. of McNish Corp.). Four Infilco-Degremont low-head automatic backwash sand filters (SUEZ) polish the effluent before it is disinfected in a TrojanUV4000 UV system. From November through April, the plant is exempt from the disinfection requirement.

Crystal Lake (Illinois) Wastewater Treatment Division

FOUNDED: | 1919

AREA SERVED: | City of Crystal Lake and Village of Lakewood

POPULATION SERVED: | 44,000

TREATMENT LEVEL: | Tertiary

TREATMENT PROCESS PLANT 2: | Activated sludge, sand filtration

TREATMENT PROCESS PLANT 3: | Packed-bed reactor towers, sand filtration

RECEIVING STREAM: | Crystal and Sleepy Hollow creeks (Fox River tributaries)

BIOSOLIDS: | Land-applied

ANNUAL BUDGET: | \$3.1 million (operations)

WEBSITE: | www.crystallake.org

GPS COORDINATES: | Latitude: 42°12'36.57"N; longitude: 88°20'11.75"W



Communications and team spirit are vital to effective operations at the Crystal Lake plant, which uses a rotating assignment system built on extensive cross-training.

SOPHISTICATED CONTROL

The receiving streams are the Crystal Creek and Sleepy Hollow Creek, tributaries to the Fox River. Concern from environmental groups about the effluent temperature prompted the city to construct a cooling pond so the water can reach the ambient temperatures before release.

The plant employs a state-of-the-art Allen-Bradley SCADA system (Rockwell Automation) that enables operators to remotely monitor operations. The plant also has a dual power feed and a 1.5 MW standby generator (Caterpillar) that can run the entire plant in the case of a power failure.

The on-site laboratory, managed by Emma Kohl, has won numerous awards for accuracy and efficiency. It includes a flame atomic absorption unit for metals detection. Lab technicians from other locations often come to learn procedures.



The team at the Crystal Lake Wastewater Treatment Plant is credited for the success of the plant. Ongoing communication is considered vital to their effective operations.

Crystal Lake Wastewater Treatment Plant 2 PERMIT AND PERFORMANCE

	INFLUENT annual average	EFFLUENT annual average	PERMIT daily maximum
BOD	256.3 mg/L	2.61 mg/L	20 mg/L
TSS	355.6 mg/L	3.18 mg/L	24 mg/L
Ammonia	15.6 mg/L	0.07 mg/L	3.0 mg/L
Phosphorus	5.59 mg/L	0.27 mg/L	1.0 mg/L*
Barium	8.65 mg/L	1.76 mg/L	4.0 mg/L

* Monthly average

Crystal Lake Wastewater Treatment Plant 3 PERMIT AND PERFORMANCE

	INFLUENT annual average	EFFLUENT annual average	PERMIT daily maximum
BOD	295.8 mg/L	3.81 mg/L	20 mg/L
TSS	317.7 mg/L	4.51 mg/L	24 mg/L
Ammonia	25.8 mg/L	0.29 mg/L	3.0 mg/L
Phosphorus	5.79 mg/L	0.45 mg/L	2.0 mg/L
Chlorides	322 mg/L	287 mg/L	500 mg/L

Plant 2 also maintains the only U.S. EPA-approved pretreatment program in the county. Ken Krueger, pretreatment coordinator, monitors the city's industrial discharges and leads an ongoing program of inspection for fats, oils and grease.

The team also includes Sam Ferraro, wastewater supervisor; Adam Behrns, Brian Campion and Russ Hornung, facility operators; and Jeff Lundy, Mike Wisinski, Kelsey Snell, Bill Martenson and Dan Oates, maintenance personnel.

SOLIDS HANDLING

The new solids handling additions have given the plant redundancy, Ferraro says, wastewater supervisor. "Previously, we had a single anaerobic digester, one centrifuge (Centrisys/CNP) and a gravity belt thickener," he says. If the



Jeff Lundy skims a primary clarifier.

equipment was out of service, the plant was overloaded with solids, and staff often had to be creative to manage the solids inventory: "We would store them in the aeration basins."

The new \$5.8 million configuration includes a second anaerobic digester and a new centrifuge (Alfa Laval). The Centrisys/CNP unit was rebuilt with new bearings, bowls and scrolls. Both digesters have floating covers (Walker Process Equipment, A Div. of McNish Corp.).

A key addition was a climate-controlled solids-handling building. Standing in what's left of the old dewatering structure, Langguth and Ferraro can point out deterioration in the walls caused by hydrogen sulfide and moisture. "We took a problem and turned it into an upgrade," Langguth says.

Crystal Lake can run the digesters in the parallel or series mode. "We primarily run the digesters in series," Ferraro says. "We send primary sludge and waste thickened sludge to Digester 1. We heat and mix this digester and most of the volatile solids destruction happens there. Then we transfer the sludge to Digester 2, which we don't heat or mix. The material is allowed time to settle and we decant water off the top. The secondary digester has very little biological activity, but we get the benefit of thickening there."

BOOSTING SOLIDS CONTENT

Typical solids content in the first digester is 1.7 percent; it increases to 3 percent solids in the second digester. "We benefit by not having to run the centrifuge as often as we would have to if we went with lower total solids," Ferraro says. "We've also seen a decrease in polymer usage in the centrifuge."



GOOD CHEMISTRY

It might seem odd that wastewater odor specialists would travel around the globe to smell nothing. But that's the situation at Plant 2 in Crystal Lake, Illinois, where a new odor-control system is eliminating foul smells at key points around the facility. With neighbors right across the fence line, that's important.

The plant upgrades included an innovative dry fog system (OMI Industries) using a proprietary chemical compound, Ecosorb. The chemical mixes with air and is distributed around the plant through a network of 6-inch PVC piping. Critical areas include the headworks, primary tanks and solids handling building. The fog is released through small ports in the pipes. Through a chemical reaction, it neutralizes odorous compounds in the air.

If you place your hand over one of the holes, you can feel the gentle flow of air, but you smell nothing. Dan Langguth, Wastewater Division superintendent, says wastewater specialists from a number of countries have visited in the last couple of years to check out the system.



“Everybody rotates, including maintenance. Not only do we get a new look at things, the rotation aids in knowledge transfer and can lead to different or more efficient ways to operate.”

DAN LANGGUTH

Dan Langguth,
Wastewater Treatment
Division superintendent

“We used to feed sodium hypochlorite for disinfection, but it was causing permit violation issues for dichlorobromomethane,” Ferraro says. “Once we switched to peracetic acid, we haven’t had an issue. The plant achieves maximum bacteria kill, and there is no trace of the acid in the effluent.”

Like Plant 2, Plant 3 has an automated alarm system that contacts on-call operators via cellphone and tablet. A SCADA and advanced data system informs operators of problems with equipment or plant operations and monitors maintenance requirements.

ROTATING DUTIES

With the three staff teams rotating through the plants and lift stations, communications are vital and esprit de corps can make or break the day. Langguth has absolute confidence in the rotating assignment system and the operators’ ability to function as a team. “Everybody rotates, including maintenance,” he says. “Not only do we get a new look at things, the rotation aids in knowledge transfer and can lead to different or more efficient ways to operate.”

“We meet every morning as a whole group for 20 to 30 minutes. We go over operations and spend a few minutes on a particular safety topic — confined space, weather conditions, safe driving or first aid.”

Quarterly, the group reviews a special set of emergency guidelines, outlining procedures to be followed in case of events like multiple lift station power outages, contact and communication with the general public, or high flows at the treatment plants.

Langguth believes strongly in learning by doing: “Our guys are the boots on the ground and the reason for our success. We let them learn hands-on, not just identify problems, but what to do, what to try, what’s the best solution. If it’s not related to safety or a permit violation, it’s OK if they make mistakes. We trust people. That’s how we roll.” **tpo**

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The second centrifuge gives operators extra thickening capability in case the gravity belt thickener should be out of service. Dahm Enterprises hauls cake at 22 to 26 percent solids and spreads it on farm fields.

A SECOND FACILITY

At the time of the facility master plan, the city considered bringing all wastewater flows to Plant 2. “But the cost numbers were stifling,” Langguth says. So Plant 3, in the growing northwest area of the city, was kept in the plan and upgraded as well.

The flow (1.7 mgd design, 0.54 mgd average) passes through a mechanical bar screen and compactor (Headworks International) at the main pumping station about a quarter-mile away from the plant. Biological treatment is accomplished in two packed-bed reactor towers, each 29 feet high and 60 feet in diameter. The towers are operated in series, and a portion of the flow is constantly recirculated to be sure the filter media stays wet. New media replaced the old media in the towers.

After the towers, alum and polymer are added to the flow, which then settles in two Spiral-covered secondary clarifiers. Settled sludge is pumped to aerobic digesters, powered by three new rotary screw blowers (Aerzen). A pair of Infilco-Degremont traveling bridge sand filters (SUEZ) follow, operating in parallel. Disinfection is provided by 15 percent peracetic acid.



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No Sweat

MANUAL SURFACE PREPARATION AND HUMIDITY-TOLERANT COATINGS ENABLE IN-SERVICE REHABILITATION OF EQUIPMENT IN A WATER PLANT PIPE GALLERY

By Kevin Morris

The pipes were sweating so much they looked like they had just finished running a race."

That's how David Van Zee, co-owner of Carolina Management Team (CMT), described the steel pipes serving the filter pipe gallery at the Kerr Lake Regional Water Treatment Plant in Henderson, North Carolina.

Located inside a temperature-controlled building, the pipes sweat nearly continuously as cool water pulled from the John H. Kerr Reservoir (Kerr Lake) runs through the plant. The warm environment is ripe for condensation on the pipes and surrounding equipment. The condensation was an obstacle Van Zee and his infrastructure rehabilitation team had to overcome as they planned to restore protective coatings on the pipe gallery equipment.

The Kerr Lake Regional Water System last restored the gallery's pipes, valves, pumps, motors and other equipment in 1996. After 20 years in the humid environment, the coatings had begun to deteriorate and flake, showing visible signs of substrate corrosion. Without preventive steps, corrosion would continue.

Full rehabilitation was needed, from removing existing coatings to priming and topcoating the surfaces, and the 10 mgd facility needed to stay in full operation throughout the project to serve some 50,000 customers. No part of the pipe gallery could be taken out of service for maintenance, meaning condensation would be ever-present. Furthermore, the ideal surface preparation method of abrasive blasting was not an economical option.

Faced with these challenges, the crew performed manual surface preparation and then applied two moisture-tolerant coating technologies from Sherwin-Williams Protective & Marine Coatings. This ensured minimal disruptions to plant operations, while providing a quality, durable finish. The successful restoration earned CMT and the City of Henderson an honorable mention in the 2017 Sherwin-



Existing coatings on pipes and equipment had begun to deteriorate and show signs of substrate corrosion.

ture-tolerant coating technologies from Sherwin-Williams Protective & Marine Coatings. This ensured minimal disruptions to plant operations, while providing a quality, durable finish. The successful restoration earned CMT and the City of Henderson an honorable mention in the 2017 Sherwin-

PHOTOS COURTESY OF CAROLINA MANAGEMENT TEAM



ABOVE: For the first step of the restoration, CMT crew members performed solvent cleaning. BELOW: Applied as a primer coat, moisture-tolerant Dura-Plate 301K epoxy enabled CMT to coat sweating pipes and other equipment.

Williams Impact Award program, which recognizes outstanding water and wastewater projects.

MANUAL PREPARATION

Due to numerous hardware connections and sharp edges on the assets being restored, abrasive blasting would have been ideal for surface preparation. However, blasting in an operational water plant requires an extensive temporary containment system to protect equipment and plant personnel. The time-intensive setup was impractical.

Instead of sandblasting, the four-member crew followed a two-step surface preparation process. First, they soda-blasted the surfaces following SSPC-SP1 Solvent Cleaning guidelines, removing a significant amount of rust and the existing coating. The slurry of water and baking soda lightly abraded any coating that remained on the surfaces to provide a good bonding profile for the adhesion of new coatings.

Next, the crew used hand and power tools to clean the many pipes, nuts, bolts, and flanges, removing all loose mill scale, rust, and coatings to leave an SSPC-SP2/SP3 surface. The crew also lightly abraded and profiled any



remaining coatings to create smoother transitions from uncoated to coated areas so that the new coatings would provide a smooth finish with sufficient film builds and edge retention.

COATING THE WET ASSETS

After surface preparation, the crew next had to prime and coat the pipe gallery assets, some with damp exteriors due to condensation. The best way to stop the condensation would have been to shut the systems down, but that was not an option.

The next option was to dehumidify the pipe gallery and reduce the temperature to 5 degrees below the dew point to mitigate the condensation. However, this would be costly and potentially ineffective during February, with the plant drawing in cold lake water.

To overcome the challenge of coating the wet substrates, CMT selected two moisture-tolerant coatings from Sherwin-Williams. The products react with moisture in the air and on substrates, curing in place to form a durable protective coating film. They require moisture to cure, making them highly suitable for the conditions within the gallery.

"You typically don't coat an asset when it's wet, so we came up with a system to address this environmental issue," Van Zee says. "Using two moisture-tolerant technologies enabled us to restore the pipes and surrounding components with minimal disruptions to plant operations."

For the primer coat, CMT selected Dura-Plate 301K, a surface- and moisture-tolerant epoxy product that

can be applied with no dew-point restrictions over marginally prepared surfaces, including damp steel and flash-rust. CMT specified the high-solids epoxy for its ability to be used on damp substrates. In addition, its high edge-retention properties (70 percent) helped ensure a sufficient film build on the sharp edges of numerous nuts, bolts, and flanges. The crew applied this base coat at 4 to 8 mils dry film thickness.

METAL PROTECTION

Before applying the subsequent coating layers, CMT needed to protect the exposed steel between multiple flanges throughout the pipe gallery. The steel in these zones where pipes are bolted together needs to be left uncoated to permit future maintenance. In those voids, crew members applied Stampede polyurethane sealant, a caulking material with 100 percent solids that resists shrinking.

Finally, CMT applied two coats of Corothane I HS at 3-5 mils DFT per layer for the intermediate coat and topcoat. The moisture-cured urethane is designed for high-humidity applications. The single-component, high-gloss coating offers high color and gloss retention to provide a durable, aesthetically pleasing look. The coating allowed CMT to color-code equipment, including coating valves orange and pumps and piping blue.

"The Corothane I HS coating has a wet look that doesn't dull out, almost like an automotive finish," Van Zee says. "The completed filter pipe gallery looks very professional. The coating looks as good as it protects."

Because CMT did not set up a containment system for surface preparation, the crew applied the coatings manually to avoid overspray that could potentially be taken up by running motors or fans. Brushing on the coatings also ensured 100 percent coverage on surfaces throughout the gallery.

COMPLETE RESTORATION

Despite the inability to use best practice surface preparation methods and the need to coat sweating pipes and equipment, CMT restored the filter pipe gallery to like-new condition while the plant stayed in operation.

"Carolina Management Team delivered a coating restoration project that was minimally disruptive to our operations, while overcoming significant

surface preparation and moisture challenges," says Christy Lipscomb, water system director. "The plant now has a filter pipe gallery that is visually stunning with a high-gloss, wet-looking finish. We look forward to showing it off during future plant tours."

ABOUT THE AUTHOR

*Kevin Morris is market segment director, Water & Wastewater for Sherwin-Williams Protective & Marine Coatings. He is a NACE Level III Certified Coatings Inspector, a Certified Concrete Coatings Inspector with the Society of Protective Coatings, and an instructor for the Society of Protective Coatings – Concrete Coatings Basics and Concrete Coatings Inspector Programs. He can be reached at kevin.l.morris@sherwin.com. **tpo***



CMT restored pipes, valves, pumps, motors, and other equipment that showed signs of coating deterioration and substrate corrosion.



Share Your Ideas

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

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

CMT applied two coats of Corothane I HS, leaving a durable, high-gloss finish on the restored assets. For easy identification, the team color-coded various equipment, including coating valves orange and pumps and piping blue.



Skilled operators and innovative technologies make an unbeatable combination in water and wastewater treatment plants. Explore the possibilities in this special Plant Proficiencies section.

plant proficiencies

2018

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All-New Ultimate Chemical Feed Sensor

The all-new ProSeries-M MS-6 Chemical Feed Sensor uses the latest ultrasonic technology to accurately measure chemical feed from your metering and dosing pumps, ensuring proper dosing to critical water and wastewater treatment systems.

Until recently, the means available for measuring chemical output from a metering pump have been chemical weighing scales, magnetic meters or flow switches, but some of the challenges associated with those methods inspired the design of Blue-White's Pro-Series-M metering pumps.

The MS-6 ensures precision accuracy when measuring flow, and the sensor's patent-pending design provides a wide flow range from 10 to 10,000 mL/min (0.158-158.5 gph). The sensor provides the operator with an almost immediate indication if there's a problem with metering pump operations. The MS-6 has low-pressure drop of less than 1 psi.

QUALITY DESIGN

Because the MS-6 sensor is equipped with wetted parts constructed of PVDF and PEEK, it will handle harsh and corrosive chemicals associated with water and wastewater treatment. The end fittings are included with the unit and allow for more than 14 inlet and outlet configurations.

MS-6 has been engineered to require minimal effort to install, including thoughtfully designed inline pipe fittings, which provide quick and easy setup. The unit is designed to allow the operator to set the flow rate and total setpoint triggers, with flow-rate readings as low as 10mL/min.

ProSeries-M pumps also feature smooth, quiet, low-velocity injection, which is easy on piping systems. There is no need for pulsation dampeners or expensive piping systems. The gentle squeezing action of the valveless peristaltic pump head design results in near-continuous injection of chemical.

The MS-6 is equipped with the latest technology and is configurable via the company's exclusive Blue-Central desktop software. Blue-Central features easy-to-follow setup menus that make setup fast and efficient. It will automatically update the latest software version.

The sensor has fully a configurable isolated 4-20 mA output and 0-10000 Hz pulse output. The built-in LED status light allows for quick visual inspection.

The MS-6 Sensor is rated NSF 61, and Blue-White is ISO 9001:2015 certified.



Blue-White Industries was founded in 1957 and is a leading manufacturer of metering pumps (diaphragm, peristaltic), flowmeters (variable-area, paddlewheel, ultrasonic), and water treatment accessories. The company has a CNC department with lathes, mills and savs; a pump department with diaphragm and peristaltic pumps, assembly and testing; and a new computer-enhanced flowmeter calibration facility. Its products serve a wide range of industries, including swimming pools and water parks; agriculture and irrigation; car washes; food processing; mining; and water treatment.

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Large Diesel Generators Ideal for Water Treatment Applications

Introduced in late 2016, the Kohler KD Series large diesel industrial generators have been well received by targeted industries around the world, including water treatment facilities. The KD Series generators feature powerful, technically advanced Kohler engines and are highly customizable to match an end user's specific requirements. Multiple options are available to ensure optimal performance for the most demanding applications.

OPTIMAL PERFORMANCE

The Kohler KD Series generators are available in nodes ranging between 800 kW and 4000 kW. The entire line is backed by a comprehensive three-year warranty, a full complement of genuine Kohler aftermarket parts, and a global service and support network. Designed to deliver extreme durability and ultimate reliability in a variety of emergency and prime applications, the KD Series is ideally suited to modern wastewater facilities.

"Losing power really isn't an option for water treatment plants," says Jim Rummel, senior product manager for Kohler industrial generators. "Operators today need a highly efficient solution that will deliver power when it's needed — a fully integrated power system designed to meet the exact requirements of their facility. The Kohler KD Series checks all of these boxes and so much more."

EFFICIENT SERVICING

An entirely new line of G-Drive engines was developed to power the Kohler KD Series. The compact and powerful diesel models incorporate a modular design with common components, allowing for efficient servicing, reduced spare parts inventory and more streamlined technician training. They were designed to provide good performance and reliability in the field.

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Founded in 1873 and headquartered in Kohler, Wisconsin, Kohler Co. is one of America's oldest and largest privately held companies. With more than 55 manufacturing locations worldwide, Kohler is a global leader in the manufacture of engines and power systems; kitchen and bath products; and owner-operator of two five-star hospitality and golf resort destinations in Kohler and St Andrews, Scotland. For additional details about the Kohler G-Drive engines or the new line of KD Series diesel industrial generators, contact Kohler.

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Efficient Screenings Removal Possible With Lakeside's Raptor TalonRake

Operators are excited about Lakeside's new Raptor TalonRake Bar Screen, which offers high performance, low maintenance, and rapid removal of solids.

The Raptor TalonRake Bar Screen is designed and engineered for optimum performance and durability, and is manufactured in the USA. This screen is suitable for wastewater treatment plants, pump stations and combined sewer systems to effectively prevent the harmful effects of inorganic solids to downstream equipment.

SCREEN OPERATION

When wastewater flows through the screen, solids are captured on the face of the screen bars. As debris collects and blinding occurs, the upstream water level rises to a high level setpoint, which then activates the drive mechanism to start a cleaning cycle.

Multiple rakes — attached to cast stainless steel links — provide rapid debris removal from the bar screen. Drainage occurs while material is transported up the screen and dead plate. Located near the top of the machine, a scraper assembly wipes debris from the rake head and into a discharge chute. Material falls from the chute into a conveyor, washer compactor or dumpster for disposal.

HIGH HYDRAULIC CAPACITY, LOW HEADLOSS

The heavy-duty design of the Raptor TalonRake Bar Screen provides durability and long life in the most severe conditions. With multiple rakes cleaning the screen and rake teeth penetrating the bar openings, captured material is removed rapidly and efficiently in all applications with a high screenings load.

DESIGN AND CONSTRUCTION

The Raptor TalonRake is engineered using all stainless steel materials to resist corrosion for optimum performance. There is minimal headroom needed above the operating floor, and it features rectangular trapezoidal screen bars with $\frac{1}{4}$ -inch minimum bar spacing.

Other features include replaceable rake teeth; no lower chain guide or lower sprocket assembly; automatic reversing feature; optional stainless steel cover for odor control; optional hinged support to pivot screen out of the channel; and optional explosion-proof design or weather protection system.

APPLICATIONS

Operators and consulting engineers say the Lakeside Raptor TalonRake Bar Screen provides superior performance in continuous cleaning and removal of inorganic solids in municipal and industrial wastewater treatment plants, pump stations, surface water intake structures and combined sewer overflows.



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Lakeside Equipment Corp. is an engineering and manufacturing company concentrating on helping to improve the quality of water resources. Lakeside started engineering water purification systems for municipalities and companies throughout North America in 1928. Today, the company operates globally. For more details on the design and performance of Lakeside's Raptor TalonRake Bar Screen, contact Lakeside Equipment Corp.
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Compliance with the U.S. EPA and the World Health Organization's maximum contaminant level of 10 parts per billion for arsenic affects thousands of water systems throughout the United States and other countries.

The dangers of arsenic are masked by its colorless, odorless appearance. It is a carcinogen that occurs naturally in groundwater and is known for leading to dangerous health conditions such as cancer, neurodevelopmental disorders and heart failure.

AdEdge offers multiple water treatment solutions rated from 5 gpm to more than 12 mgd. The right option depends upon flow rates, arsenic concentration, the presence of co-contaminants, and site-specific conditions or limitations. Upon receiving a complete water quality analysis, AdEdge determines the best treatment for a plant's needs based on years of experience and an accurate, predictive model.

Options include adsorption using Bayoxide E33 granular ferric oxide media; coagulation/filtration with iron augmentation; and oxidation/filtration.

Pre-engineered AdEdge Packaged Units are the ideal solution for public water systems, schools, subdivisions and more. The company also offers a line of modular treatment systems that arrive assembled, ready for hook-up. These solutions can incorporate the adsorption, oxidation/filtration and/or coagulation/filtration treatment processes with pre- and post-treatment for a complete integrated system.

ADSORPTION PROCESS

In the adsorption process, contaminants break their bond with water molecules and chemically adhere to a filter media. This is accomplished by directing water flow through pressure vessels that contain the adsorptive media at a specific rate that allows the right contact time for adsorption.

Bayoxide E33 adsorption media is the industry standard for arsenic removal. This granular ferric oxide media reduces up to 99 percent total arsenic, including arsenic (III) and arsenic (V).

OXIDATION AND FILTRATION PROCESS

Oxidation/filtration is a precipitative process that removes naturally occurring arsenic (if it coexists with high levels of iron), as well as — iron, manganese and hydrogen sulfides. The process oxidizes the insoluble forms of these



contaminants into their soluble forms and then removes them via filtration.

Oxidation/filtration media has a high catalytic and oxidation capacity, superior handling properties, NSF 61-certification, does not require permanent or coagulant addition, and has low operating and capital costs.

COAGULATION AND FILTRATION PROCESS

Coagulation/filtration introduces a coagulant, typically an iron or aluminum salt, to pretreat water contaminated with arsenic, iron, manganese and/or sulfides. The process allows for significantly higher flow rates per square foot of media, creates less backwash water than other conventional treatment approaches, and has a smaller footprint that allows for lower operating and capital costs. This process involves chemical addition and automated processes to decrease operator involvement and expense. It does not generate hazardous waste.



AdEdge Water Technologies specializes in the design, development, manufacturing and supply of innovative water treatment solutions that remove contaminants from process or aqueous streams. For more information, **866-823-3343 | sales@adedgetechnologies.com | www.adedgetech.com**

Vaughan Rotamix System Features Steady, Consistent Digester Mixing Technology

Digester mixing is a dirty job, but someone — or something — has to do it. As treatment plant operators know, the absence of pit mixing leads to thick sludge and difficult-to-pump slurries. To solve this problem, some chopper pump manufacturers offer mechanical hydraulic mixing systems. For example, the Vaughan Company's Rotamix system pairs a chopper pump and a set of high-velocity nozzles to mix the tank while handling any tough solids, resulting in a homogenous-state pit.

THE SYSTEM'S SPECS

Rotamix is available in single- and double-nozzle configurations, depending on tank diameter and depth. All fittings are ductile cast iron and glass-lined for abrasion resistance, reduced friction and to eliminate struvite adhesion. The tapered nozzle barrels are 1-inch thick for long-term wear protection. The entire assembly is white metal sandblasted and powder coated with 3M Scotchkote Fusion Bonded Epoxy Coating — a one-part, heat-curable, thermosetting epoxy coating for superior surface protection.

HOW ROTAMIX WORKS

The Rotamix system incorporates several basic principles of physics and hydraulics, including uniform and vortical fields of flow, induced flow and surface contact. Combined, these concepts create a mixing system that optimizes homogenization and pumping of treatment plant contents.

Combining both uniform and vortical fields of flow creates an efficient “dual-zone” mixing pattern. In a uniform field of flow, the entire contents rotate as a solid unit with the highest velocity at the outside. In a vortical field of flow, fluid velocities are the greatest at the center, thus creating a vertical-axis vortex. The Rotamix system combines both uniform rotation (outer vortex) and a vertical-axis vortex (inner vortex), creating unique dual-rotational zones.

To provide the necessary power for dual-zone mixing, the average velocities of the nozzles are increased for a steadier, consistent flow. This additional power also prevents solids from settling in the center of the vortexes.

Induced flow through high-velocity nozzles increases the effective mixing volume by inducing entrained fluid. High velocity nozzles induce flow over a long distance and generate an overall mixing effect over a large volume.



Vaughan Company specializes in durability. As the originators of the chopper pump, and with more than a half-century of experience, its customers benefit from the company's commitment to providing outstanding service and dependable products. By combining cutting-edge technology with a history of pump durability, Vaughan pumps and pump systems are engineered to handle whatever your job requires.

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Rechargeable Technology Revolutionizes Liquid Level Data Loggers

For applications from CSO monitoring to well drawdown tests, liquid level data loggers have proven valuable. In recent years, several low-cost versions have emerged, designed to enable more cost-effective monitoring. However, these devices have technological shortcomings that limit their lifespan and increase overall system cost.

Traditionally, low-cost level loggers were powered by internal lithium batteries with lifespan potentially limited to five years, depending upon the logging rate. Once the battery is depleted, most of the devices are rendered ineffective because the battery is not replaceable. Although some are powered from the surface after the battery's expiration, the application versatility is significantly limited.

Additionally, older rechargeable battery technologies are not suitable for use in devices requiring long-term deployment, as older rechargeable batteries slowly self-discharge even when a device is not drawing power.

POWER CELLS WITHOUT LIMITATIONS

New technologies promise to alleviate these shortcomings and make the devices more attractive. Accumulator power cells — a new rechargeable technology — are now used to make low-cost data loggers with indefinite lifespans. These new accumulator power cells do not self-discharge.

The power cell is charged via USB connection during data retrieval at a rate of 100 mAh. An AC power adapter also is provided to facilitate faster charging of the power cell at a rate of 800 mAh. With a fully charged battery, the device can operate up to three years, depending upon logging rates.



AUTONOMOUS DATA COLLECTION WITH RECHARGEABLE APPEAL

The DCX-ECO by Keller uses accumulator power cell technology to provide a rechargeable autonomous liquid level logger. It is also available in absolute, sealed and vented versions. The vented gauge format uses a vent tube integral to the signal cable, allowing the device to compensate for changes in atmospheric pressure in real time. This negates the need for a data logging barometer, which is necessary for reporting accurate data compensating for changes in atmospheric pressure when using an absolute level logger. The sealed and vented versions also allow for communication with the device without removing it from the water.



Keller America specializes in pressure measurement solutions, offering a complete line of pressure transmitters, gauges and loggers. For more information on how the DCX-ECO can provide accurate and reliable data logging: **877-253-5537 | sales@kelleramerica.com | www.kelleramerica.com**

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Rushville Installs AquaPrime Cloth Media Filter to Treat CSO Discharge

The City of Rushville, Indiana, had to remedy a consent order filed in 2007 for its untreated combined sewer overflow (CSO) discharges that were polluting the Flatrock River, a violation of the Clean Water Act. The city originally planned to install a 1 mgd stormwater storage tank, but was approached by Aqua-Aerobic representatives with a pilot test proposal utilizing a new technology.

The pilot proposal featured the AquaPrime Cloth Media Filter using 5-micron microfiber cloth media, which would be tested during five wet-weather events. This study captured events from May to July 2015, and produced impressive results.

The pilot test prompted the city to request a design for an AquaPrime filtration system in February 2016 with two stipulations: the filters were to treat both dry and wet weather conditions, and alum coagulant was to be injected upstream of the filters to meet future effluent phosphorus limits and eliminate fine CSO particles.

SYSTEM STARTUP

Startup of the 14-disk AquaPrime filtration system began in July 2017 with a design average flow rate of 1 mgd in dry conditions and peak wet weather flow rate of 12.6 mgd. Each cloth media disk is 6.6 feet in diameter and provides an effective filtration area of 53.8 feet squared, for a total filtration area of 1,506.4 feet squared.

The filters were retrofitted into the plant's existing, abandoned sand media filter structures, saving the city considerable capital costs. In addition, the new filtration system cost \$1 million less than the original, conventional storage tank design.

The AquaPrime cloth media filters experienced the first wet-weather events shortly after startup in October and November 2017. Due to the continuous treatment capacity, no untreated overflows have occurred.

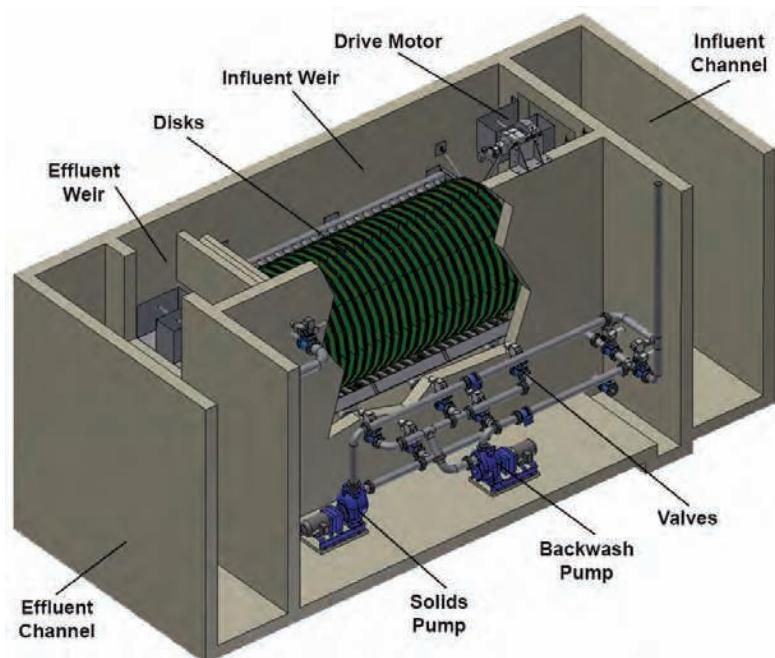
Rushville's new tertiary/wet-weather filtration system also included replacement of its existing gas chlorine disinfection system with a UV disinfection system. The UV system was installed in the existing tank, which also provided significant project cost savings.

Completion of the filtration/disinfection phase of the city's upgrade project was achieved five years earlier than required by the state regulation agency. This project is the first AquaPrime filter installation in the nation for dual tertiary/wet-weather treatment and will keep approximately 50 million gallons of raw sewage from entering the nearby Flatrock River, annually.

"With the addition of the AquaPrime Filter System and new UV disinfection system, Rushville is discharging the best quality of water to our receiving stream, Flatrock River, than in years past," says Les Day, utilities director.

AQUAPRIME FILTER PROCESS

The AquaPrime filter features a disk configuration and an outside-in flow path, which allows for three zones of solids removal. These zones are



especially critical in wet-weather applications due to the high solids typically associated with the first flush after wet-weather events.

The top zone is the "floatable zone" where materials collect; the middle zone is the "filtration zone" where solids are removed; and the bottom zone is the "solids zone" where settling occurs.

DESIGN CHARACTERISTICS

In order to remove 85 percent or more of TSS and CBOD₅ in CSO discharges, the AquaPrime filters are designed for upstream alum addition. The system is also designed to treat for the duration of a wet-weather event, which can last for several days.



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The AquaPrime® filtration system utilizes OptiFiber PF-14® pile cloth media in a disk configuration with three zones of solids removal to effectively filter wet weather flows without the use of chemicals. The system is designed to handle a wide range of flows in a fraction of space compared to other treatment methods.

AquaPrime is ideal for CSO, SSO and stormwater applications due to its proven removal efficiencies and high quality effluent, even under varying influent conditions.

- Low level TSS and BOD effluent
- Designed with floatable and settled solids removal zones
- Dual use flexibility for tertiary and wet weather applications
- Simple start-up and shut-down with unattended operation for remote locations



City of Rushville, IN

- Tertiary/CSO application
- Wet weather TSS and BOD effluent less than 10 mg/l



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Resource Intensification Portfolio Offers Alternatives to Conventional Processes

The Centrisys/CNP Resource Intensification Portfolio is an integrated process solution and individual equipment approach to biosolids handling that leverages proven technologies to provide alternatives to conventional treatment processes.

One such process is the PONDUS (TCHP) Process that was used when the Kenosha (Wisconsin) Wastewater Treatment Plant produced more gas than it needed, but not enough to justify installing another gas engine.

By using the PONDUS process on the waste activated sludge, it increased gas production by more than 20 percent, allowing for the installation of a combined heat and power (CHP) unit.

The CHP's engine runs on methane gas, turning a generator to create power. The heat produced by this engine is used to heat the waste-activated sludge to make the PONDUS system work, creating more gas. It's a symbiotic relationship that allows the plant to produce about one-third of its overall electrical consumption.

PONDUS has a heat exchanger, reactor, two pumps and sodium hydroxide. Temperatures are maintained around 140 degrees F, therefore no additional safety precautions are necessary.

In Kenosha, sludge is thickened to nearly 7 percent solids, making it difficult to pump. PONDUS utilizes a thermochemical reaction to change the viscosity of the sludge turning it into a "chocolate milk" consistency for easy flow.

THK SERIES SLUDGE THICKENERS

The basis of the THK design is what Centrisys is known for — centrifuges — but this sludge thickener is not a modified dewatering centrifuge. The THK is engineered specifically to thicken primary and waste activated sludges using the fundamental principles of a centrifuge: Dissolved air flotation thickener (DAFT) and rotary drum thickener. THK thickeners are simple to operate, require minimal operator attention and have a low cost of ownership.

"Kenosha installed a Centrisys THK200 in 2011," says Melissa Arnot, Kenosha Water Utility director of operations. "This one THK replaced four DAFTs, operated 24/7 using no polymer, achieved 5 percent TS cake and 95 percent capture. In 2015, we upgraded our plant and now have an additional



THK200 for primary sludge. This THK200 doubled our solids concentration and cut in half the amount of water sent to the digesters."

CALPREX PRE-DIGESTION PHOSPHORUS RECOVERY

CalPrex maintains a 6.5 pH, recovers phosphorus as a brushite crystal with up to 41 percent P_2O_5 and can minimize digester and sidestream phosphorus loading by over 50 percent. CalPrex uses no ammonium, diverts over 50 percent of the soluble phosphorus from the digester along with 60 percent solubilization of phosphorus in Bio-P sludge.

AIRPREX POST-DIGESTION PHOSPHORUS RECOVERY

AirPrex removes struvite while improving treatment efficiency. It's an affordable option to control struvite and recover phosphate for all sized plants. AirPrex improves sludge dewaterability, reduces polymer consumption up to 30 percent, reduces maintenance costs up to 50 percent, and reduces disposal costs up to 20 percent with no sodium hydroxide required, according to the manufacturer.

HYDROGRAV ADAPT VARIABLE INLET SYSTEM

The Hydrograv Adapt is a process that adjusts to current loading. When loads are low, it shifts the inlet elevation and opening height to a low position, introducing the mixed liquor below the sludge blanket. When loads increase, it shifts to a higher elevation and opening height.



Centrisys/CNP is a U.S.A. manufacturer of dewatering centrifuges, sludge thickeners and also provides repair and parts for all centrifuge brands. CNP, a division of Centrisys, designs and supplies nutrient-recovery and biosolids treatment optimization systems.

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Resource Intensification

The Centrisys/CNP Portfolio Supports Global Sustainability

① THK Series | sludge thickener

High-performance for waste activated sludge (WAS) and primary sludge

② Passavant® hydrograv® adapt System | inlet process

Increase clarification capacity with consistent and continuous adjustments

③ PONDUS™ | Thermo-Chemical Hydrolysis Process (TCHP)

④ LIPP America Tank Systems | digester + storage tanks

⑤ CS Series | dewatering centrifuge

The most efficient pre- and post-digestion dewatering centrifuge

⑥ CalPrex™ | pre-digestion P-recovery

⑦ AirPrex® | sludge optimization and P-recovery

⑧ Compact-Dry | low-temperature belt dryer

Meets Class A requirements

Additional Capabilities

- Mobile Dewatering and Thickening Systems
- Skid Mounted and Containerized Systems
- Rental Centrifuges
- Pilot and Lab Testing
- Design-Build Experience
- Service | Repair | Optimization*
- Service Agreements*
- Rotating Assembly/Scroll Exchange Program
- Parts*

*For all brands

Do more with less at your plant.

ZeeLung Offers Sustainable Solution to Augment WWTP Performance

Upgrading wastewater treatment plants for capacity expansion or nutrient removal is challenged by process complexity, the need for larger tank volumes and increased energy consumption. ZeeLung is an innovative solution that maximizes the treatment capacity from existing tank volumes while also reducing energy consumption.

While conventional solutions require the construction of new tanks and other process intensification technologies can be complex and energy-inefficient, ZeeLung is a simple solution that increases treatment capacity with existing assets and reduces energy.

ZeeLung technology employs a gas-permeable media to deliver oxygen to a biofilm that is attached to the surface of the media. Oxygen is delivered to the biofilm by diffusion without the use of bubbles, resulting in lower energy consumption.

Pollutants — such as ammonia and organics — diffuse from the bulk solution into the biofilm where bacteria in the biofilm have optimal conditions to remove them.

PROCESS INTENSIFICATION WITH ZEELUNG

Installing ZeeLung cassettes into an activated sludge reactor increases the inventory of biomass in the system without increasing the mixed liquor concentration. As a result, the same reactor volume has more treatment capability.

The process interaction of oxygen and pollutants is different in a ZeeLung system compared to conventional active sludge and biofilm processes. With ZeeLung, oxygen and substrates such as ammonia and organics enter the biofilm from opposite sides in a counter-diffusion configuration. This creates conditions that favor the growth of nitrifiers in the biofilm due to the high diffusivity of ammonia into a biofilm, as compared to organic substrates, and the availability of dissolved oxygen, which is highest at the media surface.

Preferential growth of nitrifiers versus heterotrophs means that the ZeeLung biofilm “supercharges” nitrification in an activated sludge system. Simultaneous nitrification and denitrification can be achieved by installing ZeeLung cassettes in an anoxic zone.

KEY BENEFITS

Some of the principal benefits to operators using ZeeLung are process intensification with up to 50 percent more treatment capacity and/or performance in existing tank volumes; attached-growth biofilm that is resilient to load variations and upset conditions; simple installation into existing bioreactor tanks; and significant energy savings on oxygen transfer compared to fine bubble aeration.



ZeeLung cassette being installed into an activated sludge reactor.



SUEZ has operations in 130 countries and employs more than 10,000 people worldwide. The company has a comprehensive set of chemical, equipment and digital-enabled services and products, helping customers optimize water resources and overcome process challenges. SUEZ works with customers across numerous industries, including food and beverage; metals and mining; power; chemicals and pharmaceutical; oil and gas downstream and petrochemicals; upstream oil and gas; pulp and paper; and utilities.

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Reduce Operating Costs and Reclaim Footprint by Retrofitting Aerated Grit Basins

Everyone wants their plant to run smoothly and efficiently while keeping their operating costs down. Plants with aerated grit basins (AGB) have a big obstacle to achieving this. A legacy of the 1980s, AGBs aren't designed to capture fine grit particles, they use a significant amount of energy and they take up a lot of valuable plant space. Retrofitting an outdated AGB to a high-performance grit removal system is a cost-effective solution that will rapidly pay for itself.

OPERATIONAL EXPENSES

The electricity required to run blowers for massive aerated grit tanks is a major operational expense for wastewater treatment plants. Submerged diffusers need to be inspected and replaced periodically. This requires taking the system offline at unpredictable intervals as well as the need for excess capacity to divert flows during maintenance.

MISSING GRIT

Typical aerated grit basins are only designed to capture grit 212 micron and larger and their flow capacity is dependent on the size of the basin. Grit that is finer than 212 micron can often be 60 percent or more of the total amount of grit entering a plant.

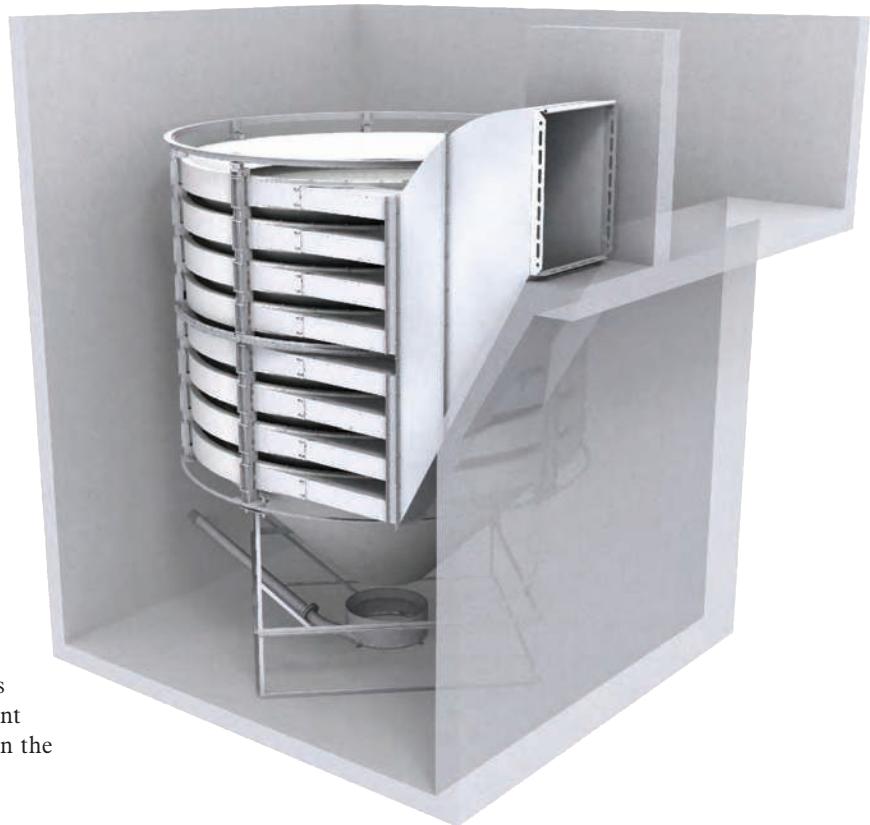
Measured independent analysis at a number of different sites has shown AGB systems capturing as little as 18 percent of the total influent grit load. This allows 82 percent of grit the freedom to wreak havoc on the rest of your plant.

REUSING EXISTING STRUCTURES

In wastewater treatment projects, costs resulting from construction, permitting, financing and civil design work can be as much as 75 percent of total project costs, according to a representative from Hydro International. With equipment costs of only 25 percent, maximizing the use of existing structures significantly lowers overall project costs. When plant space is at a premium, one of the best options for many plants is to use existing tankage for alternative uses.

UNIQUE CONFIGURATION, CUSTOMIZABLE FIT

The unique stacked-tray configuration of the HeadCell makes it the ideal technology for retrofitting into existing structures to significantly increase performance. The HeadCell's small footprint and flexible design options allow it to be retrofitted into many different tank configurations and maximize the use of existing concrete and channels, reducing overall construction costs. The number of trays and tray diameters can be varied to fit in your existing tanks without sacrificing performance.



As many plants look to upgrade their grit removal process, reusing aerated grit chambers for retrofit with the HeadCell system is an excellent option. Using stacked, conically shaped trays allows a significant increase in settling surface area. Increasing surface area allows higher hydraulic capacity in a given footprint while also targeting finer grit particles.

Depending on the system configuration, grit particles as fine as 75 micron can be effectively removed in the same space as the original aerated grit chamber with lower energy costs.



Hydro International is the leading supplier of advanced grit management systems engineered to ensure operator satisfaction and protect your plant.
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Hydro
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Delta Treatment Systems' ECOPOD-D Solves Wastewater Treatment Challenges

Delta Treatment Systems ECOPOD-D Advanced Wastewater Treatment Units offer treatment capacities from 1,500 to 100,000 gpd in pre-engineered treatment plants for commercial or decentralized wastewater treatment needs. The ECOPOD-D technology has been tested under Standard 245 of ANSI/NSF International and exceeds Class 1 requirements with an average effluent quality of 6 mg/L BOD₅ and 8 mg/L TSS, according to the manufacturer.

The ECOPOD-D disposes of wastewater quietly, efficiently and with no odor. It has no inner tank filters, screen or diffusers to service.

Its total nitrogen-removal capabilities and simple operation make it ideal for small cities, rural communities, schools, high-strength commercial facilities, and retail and office developments.

UP TO THE CHALLENGE

The small town of Section, Alabama, is in the northeast corner of the state and has a population of 770. Its 30,000 gpd system was designed to treat the domestic waste produced by both residential and commercial entities for the town.

The project was designed for a two-phase installation. The first phase was designed to treat 30,000 gpd domestic waste at a strength of 300 mg/L of both BOD and TSS. It is also designed to handle an average daily flow fluctuation over a range of 50 to 100 percent.

To ensure efficient, optimum system operation, the ECOPOD units were shipped directly to the site complete and ready for installation, including all the component equipment. The units were installed in poured-in-place concrete tanks equipped with aluminum hatches.

A flow equalization tank was installed before the ECOPOD treatment reactor tanks at a volume of 14,208 gallons. The purpose of the flow equalization system is to store the wastewater and evenly dose it to the ECOPOD treatment system throughout a 24-hour period, as the biology is most efficient when being fed consistently throughout the day. The flow equalization tank includes duplex pumps to ensure flow surges do not reduce the efficiency of the treatment system.

A 19,190-gallon primary tank precedes the flow equalization tank. The effluent also passes through a UV system for disinfection of fecal coliform to concentrations below permit levels. A drip disposal system, also supplied by Delta Treatment, includes an effluent pump chamber, headworks, tubing, controls, and all necessary valves and fittings. A concrete building was erected on site by the project contractor to house electrical controls and equipment.



Delta Treatment Systems LLC is a wholly owned subsidiary of Infiltrator Water Technologies. The company has more than 25 years of engineering design, technical expertise and quality-controlled products and offers a variety of product lines to meet a wide range of residential and commercial system specifications. Infiltrator Water Technologies is an onsite wastewater treatment industry leader. The company manufactures a variety of revolutionary products and innovative, environmentally friendly alternatives to traditional stone and pipe leachfield and concrete septic wastewater system components. The company's products are available through wholesale distribution across the United States and Canada. Infiltrator Water Technologies is a leader in environmental stewardship and recycling. The company operates ISO 9001 accredited manufacturing facilities and is committed to resource conservation and globally sustainable wastewater management.

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- Designed with the same technology utilized in our NSF/ANSI certified unit



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1,000-year flooding tests 3DP Model belt press

When it's time to replace dewatering equipment, the options can seem endless, with newer designs claiming increased performance and reduced O&M. Although larger plants traditionally choose centrifuge technology to achieve high-end dewatering at high loading rates, the three-belt filter press has become a viable option. By using an independent gravity belt in conjunction with a heavy-duty pressure section, the three-belt filter press has proven it's in a different league than traditional two-belt units.

NATURAL DISASTER REVEALS CAPABILITY

In May 2010, Tennessee was hit with 1,000-year flooding. At Nashville Metro's Dry Creek Wastewater Treatment Plant, many buildings flooded, including the dewatering building that housed four 2.2-meter belt filter presses. Emergency dewatering services were provided with belt presses on mobile trailers. BDP provided a 1-meter three-belt unit on a trailer and then a 1.5-meter 3DP trailer-mounted belt press, which operated at the facility until September 2011.

Initially the 1-meter BDP unit processed 200 gpm and produced better results and a drier discharge consistency than the existing four units combined. When the 1.5-meter 3DP arrived on site, it processed 300 gpm while still providing drier discharge solids. Because of the success of the mobile units over almost 18 months, the Dry Creek plant purchased a 1.5-meter press to operate permanently.



BDP Industries is a leading supplier of dewatering, thickening and composting equipment with hundreds of installations throughout the world. The company's main products include belt filter presses, screw presses, gravity belt thickeners, rotary drum thickeners, and in-vessel composting systems.
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Delta Hybrid Compressor Prioritizes Efficiency, Reliability

Aerzen's Delta Hybrid rotary lobe compressor is an innovative solution in compressor technology, and it's among the most efficient machines by far in the vast 25 to 100 percent control range. The Delta Hybrid brings together the benefits of blower and compressor technology in one single unit with energy savings of up to 15 percent.

DESIGN AND FEATURES

Some of the key features of the Delta Hybrid are exceptional energy efficiency, reduced life-cycle costs, increased range of applications and pressures, high levels of reliability and long service life, reduced maintenance needs, and processed air 100 percent free of oil and absorption material.

Its flexible modular design means that the Delta Hybrid can be designed or retrofitted for all rotary lobe compressors and belt-driven motor sizes within a range of nominal widths if a standard solution won't do the job.

There's no absorption material to interrupt operation. Absorption materials can cause wear or reduce operational safety. To solve this, Aerzen's research and development team came up with a solution: A discharge silencer completely free of absorption material. It decreases noise purely by rerouting airflow, guaranteeing that downstream process systems won't be contaminated. In sewage treatment technology, this avoids clogs in the aeration system, and with them operational constraints and high maintenance costs.



LET'S TALK

Tom McCurdy, ENV Sales Team Leader
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IPC CLEANERS	pH	TYPICAL SOILS REMOVED
ALKALINE CLEANER MICRO-90®	9.5	Greases, Oils, Metals
BIODEGRADABLE CLEANER MICRO® GREEN CLEAN	9.5	Greases, Oils
CITRIC ACID CLEANER MICRO® A07	3.0	Hard Water Salts, Scales
ENZYME CLEANER ZYMIT® PRO	7.5	Biological, Protein, Polysaccharides

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and Lubricants since 1923



plant proficiencies



Set Up a Cleaning Regimen to Make Your Membranes Last

Cleaning membranes on a regular basis restores membrane flux, which aids in prolonging membrane life. Since membranes are so expensive, it's important to save money by keeping them clean and functional.

When selecting a membrane cleaner, look for a manufacturer that provides a range of proven products and offers free technical support, free product samples, customer referrals and on-site assistance. International Products Corp. (IPC) offers a full line of membrane cleaners that have been proven to restore 100 percent membrane flux and extend membrane life, according to the manufacturer.

A CASE STUDY

One of IPC's customers treats industrial wastewater generated by a major automotive manufacturer. At this facility, up to 168,000 gpd of wastewater is treated using an ultrafiltration (UF) membrane system. They've used IPC's Micro-90 Concentrated Cleaning Solution to clean membranes for over 14 years with 100 percent flux recovery.

Prior to using Micro-90, the facility's initial two-step process used caustic materials and acids. A 1 percent solution of Micro-90 not only removes the organics and metals that blind the membranes, but it provides savings through reduced energy, reduced chemical use and less downtime. They did not need to replace any of their membranes for over 14 years, representing a cost savings of over \$500,000, according to an IPC spokesperson.



International Products Corp. has provided cleaners to the filter membrane industry for over 30 years. Our formulated detergents work effectively at restoring 100 percent flux at safe pH ranges and is compatible with UF, RO, ceramic and NF systems. Our on-site research and development laboratory offers free technical support and assistance. Contact IPC and request the "CIP Guidelines for Membrane Cleaning" for help setting up a cleaning regimen.
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Replacing a Primary Clarifier With a Mechanical Fine Screen

Microscreening systems pose an interesting alternative to primary clarifiers for several important reasons. First, microscreens perform at or above clarifiers and settling tanks in terms of removal rates, but with a smaller footprint. Microscreening systems also provide good process control during unexpected influent conditions or storm events and reliable operation, according to manufacturers. Finally, microscreening can be undertaken with low investment cost.

MICROSCREEN FEATURES

The characteristic feature of a microscreen is its simple screen basket, horizontally installed in a channel or tank where water flows through the screen from inside to outside. This horizontal position of the screen drum creates a large filter surface that can be utilized while a very high maximum possible upstream level is also possible. As the water level upstream of the machine increases and more material is accumulated, a filter carpet is developed on the filter mesh.

The filter carpet accumulation creates a deep-bed filtration effect, where particles retained are much smaller than the nominal aperture size of the mesh. When the water level upstream of the drum screen reaches its maximum permissible level, the screen basket rotates and a fixed spray bar cleans the basket surface, from outside to inside, with wash water at a pressure of 90 to 100 psi.

The fine screenings (primary sludge) accumulate in a trough below the spray bar, where they are conveyed by gravity to downstream treatment processes using a closed sluice channel.

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HUBER Technology, Inc. is an industry leader in solid separation technology. The company develops and manufactures innovative solutions, with over 40,000 installations worldwide.

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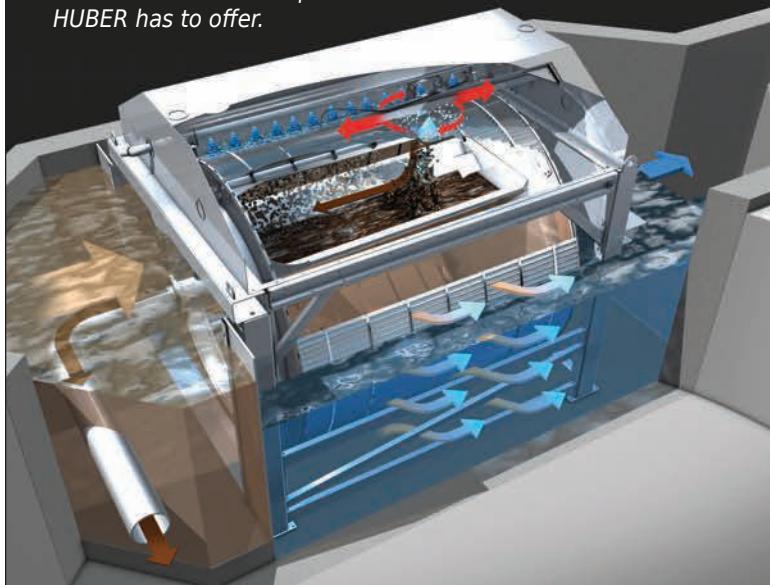
Design flexibility with Drum Screen LIQUID

Designed to scale perfectly with your needs, the Drum Screen LIQUID can handle up to 20 MGD in a minimum of space.

By fully leveraging the deep-bed filtration effect, the drum screen liquid is able to remove a significant quantity of screened material. So much so, it can even replace a primary clarifier.

To learn more about the Drum Screen Liquid, visit our website, or contact us directly at huber@hhusa.net.

For over a century, HUBER has focused on crafting high-quality machinery, so precise, it's visibly distinctive. Visit us online at www.huber-technology.com to see the full line of wastewater products that HUBER has to offer.



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WASTE WATER Solutions



Tideflex Overflow System Prevents Rodent Intrusion While Offering Dechlorination

Discharging chlorinated water from storage tank overflows into a stormwater system or land can be toxic and harmful to plant and aquatic life. In order to address environmental concerns and potential regulatory penalties, Tideflex Technologies — a division of Red Valve Co. — has created an overflow and drainpipe assembly that prevents bird and rodent intrusion, increases tank security and completely removes chlorine and chloramine residual during overflow pipe and drainpipe discharges.

HOW IT WORKS

The Dechlorinating Overflow Security Assembly (DOSA) is constructed of dual Tideflex Nozzles and an internal adjustable dechlorination tube enclosed in an epoxy-coated steel or stainless steel body.

During an overflow, the upper Tideflex Nozzle discharges an elliptically shaped jet down onto the fixed dechlorination tube. The adjustable internal tube can be rotated to different slot opening sizes to maximize removal efficiency and minimize tablet erosion. A calculated portion of the water passes through the tubes, making contact with the dechlorination tablets.

Fast and slow dissolving dechlorination tablets are available for increased adjustability. The rest of the water deflects around the tubes. The water then combines in the blending trough to ensure it has been thoroughly mixed and dechlorinated prior to discharging out of the DOSA through the lower Tideflex Check Valve.

The DOSA is available in 2- to 24-inch sizes, with some larger sizes available. A lower flanged pipe spool is optional for in-line installations.

Red Valve®

An Extra Dose of Protection for Your Community.



Introducing the Dechlorinating Overflow Security Assembly (DOSA), an innovative system for water tank overflow and drain pipes.

The non-clogging DOSA Overflow Pipe Assembly prevents intrusion of birds, rodents, insects and cold air drafts, increases tank security and automatically removes chlorine residuals during discharges. DOSA is constructed of dual Tideflex® Nozzles and an internal adjustable dechlorination tube, completely encased in an epoxy coated steel or stainless steel body. Call us today to learn more.

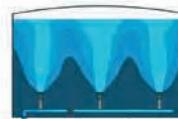
Tideflex®
Check Valves



Tideflex® Standpipe
Mixing System



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Mixing System



Tideflex® Elevated Tank
Mixing System



Red Valve Company, Inc.

Tideflex
Technologies

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DOSA is also available for horizontal overflow pipes. The assembly is low headloss, nonclogging and won't freeze in cold weather. Overflow hydraulic analyses are available.

Red Valve

Red Valve Co. is a leading provider of valve products and engineering services founded on significant experience in elastomer design and manufacturing.
412-279-0044 | support@redvalve.com | www.redvalve.com

AWWA's New Standard: Progressive Cavity Chemical Metering Pumps

The American Water Works Association (AWWA) has released the first edition of the ANSI/AWWA E200-18 standard for progressive cavity (PC) chemical metering pumps. This standard demonstrates the quality and reliability of PC pumps for chemical metering applications.

All AWWA standards are developed in a rigorous, defined manner with due process to interested parties and stakeholders to ensure all views and objections are considered. The result is a true industry consensus that can be trusted and widely accepted.

COMPLETE PROCESS CONTROL

SEEPEX BRAVO Chemical Metering Systems are equipped with NSF/ANSI 61-certified SEEPEX PC chemical metering pumps. PC pumps are self-priming and dose accurately with low-shear, laminar flow and no vapor lock. Pulsation dampeners can be eliminated due to minimal pulsation. Chemical consumption is reduced, and slip is minimized even if fluid temperature, viscosity or discharge pressure fluctuates. PC pumps also wear predictably without risk of catastrophic failure.

BRAVO is used in a variety of industries for disinfection, pH control, flocculation, corrosion inhibitors, oxygen scavengers and containment elimination. The plug-and-play packaged skids minimize time and cost associated with engineering, procuring, assembling and installing flow control systems.

BRAVO is fully integrated, modular and scalable. Systems can be adapted to any layout and are available in simplex, duplex or triplex pump configurations for floor or wall mounting. BRAVO incorporates user-customized, color-display touch-screen controls. Systems handle pressure ratings up to 175 psi with flow rates from 0.1 gph up to 250 gph.



SEEPEX.

ALL THINGS FLOW

SEEPEX Inc. is an ISO 9001-2015 certified manufacturer and a leading international supplier of PC pumps, systems, accessories and services. SEEPEX takes a consultative approach to offering innovative products and customized solutions for fluids handling and processing applications in nearly every industry.

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Low internal velocities and continuous cavity means low pulsation and greater material flow accuracy.



BENEFITS

- Minimal pulsation with no dampeners
- Reduced chemical consumption
- Will not vapor lock
- Reduced energy consumption
- Lower NPSHA

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Staying in Control With REXA Actuators

REXA actuators offer reliable control of any valve or gate service. Its electroaulic technology operates like an electric actuator that employs a hydraulic transmission without the use of an actively pressurized reservoir system.

The technology eliminates maintenance burdens, liability concerns and high costs of ownership. The result is a hydraulically driven actuator designed to modulate accurately and reliably over long periods without attention.

SUPERIOR CONTROL

REXA can turn any valve or gate into an accurate flow control device. Specifically, REXA can modulate a butterfly valve close to the seat, dramatically improving the efficiency of processes such as aeration or filtration. The company can also modulate gates in collections and UV systems.

RELIABLE OPERATION

REXA is designed to reliably operate in demanding applications and during worst-case scenarios, easing worries about collections system gates moving during wet-weather events. The technology can offer operators peace of mind, assuring them that critical valves and gates will operate when called upon.

DRAMATIC COST REDUCTION

Products that operate reliably over long periods eliminate unnecessary costs. REXA can eliminate unexpected failures on demanding valve or gate services, helping users' bottom line.



REXA is a custom-designed, American-made product designed to solve problems through retrofits of existing infrastructure or in new construction. For more information: 508-584-1199 | sales@rexa.com | www.rexa.com

Rely on REXA to Solve Your Actuator Problems

REXA delivers the **reliability** you need to move your gates during wet weather events.

REXA offers the **control** required to manage your collection system during high flow scenarios.

REXA provides you **maintenance-free** service that reduces downtime and eliminates cost of ownership.

REXA is **custom designed** to ensure worry-free services for any valve or gate.

Visit www.rexa.com to learn about our Water & Wastewater Solutions



Arizona Water Plant Finds Solution to Valve Issue With Flowrox

A drinking water plant in Arizona recently experienced an issue with its plastic ball valves on pipelines that were transporting 12.5 percent sodium hypochlorite. The plastic ball valves had problems with the rubber liners swelling, and thus the valves wouldn't shut off completely. The ball valves' packing also had problems leaking hypochlorite to the floor.

Plant personnel decided to replace the failing ball valves with numerous Flowrox PVEG polyamide-bodied pinch valves. Flowrox supplied the valves with EPDM rubber sleeves. The sleeve is the only component that is in contact with the flowing medium, and all other components in a pinch valve are isolated from the chemical by the sleeve.

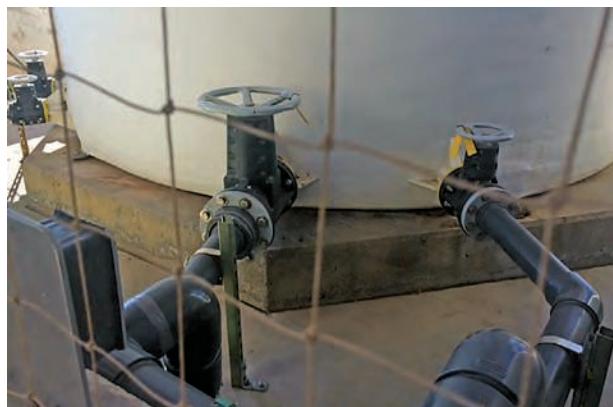
Flowrox pinch valves also do not have stem packing, so sodium hypochlorite will not leak out of Flowrox valves, according to the manufacturer.

PRODUCT SPECS

Polyamide-bodied pinch valves are great due to their light weight. A 2-inch Flowrox valve only weighs 17 pounds, and a 6-inch valve weighs fewer than 60 pounds. Flowrox valves are also full port.

The Cv of a 6-inch Flowrox pinch valve is 3,500, which can translate to energy savings for water plants.

Finally, the Flowrox pinch valves are easy to open and close. The torque requirements of a pinch valve can be one-tenth the requirements of a plug valve. The Flowrox valves have been operational with no repairs or leakage for more than two years at this Arizona water plant.



FLOWROX

Flowrox was the first pinch valve manufacturer in the world to get awarded the ISO9001 Quality Certificate in 1997. This certification covers Flowrox's products, marketing, product development, sales, manufacturing/delivery, maintenance services, customer service and customer support.

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Flowrox valves have proven their superior performance e.g. in:

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More facts about the OPTISONIC 6300 P:
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How Portable Flow Instruments Can Benefit Your Plant

Accurate flow measurement is critical for process control or regulatory compliance, and portable flow instruments can prove beneficial in many circumstances.

For instance, when operational or process changes are made, it sometimes results in flow rates that don't match the installed instrument's optimal performance range. A portable instrument provides a stopgap measure until a permanent solution can be procured, according to Joe Incontri, director of marketing for KROHNE Inc.

"If flow rates are steady, data can be manually entered into a monitoring or control system," he says. "Otherwise, real flow data can be used to procure a new permanent flowmeter that matches the actual process requirements. Using real data from a portable instrument avoids over- or undersizing instruments based on faulty process engineering data."

Verifying that a flowmeter is performing properly is a good idea, even if it's not required for compliance, says Incontri. "Where existing flowmeters need verification, use of a portable instrument avoids the need to take an existing flowmeter offline or shut down a process since the portable unit can be installed on the existing pipe next to the target meter."

A portable meter also provides flow data at the proposed point of measurement to help inform the purchase of a permanent flowmeter.

Portable instruments also help identify problems at treatment plants since they're equipped with data loggers. Correlating the data with the time of upset may reveal pertinent issues leading to resolution.

KROHNE
► measure the facts

KROHNE Inc. is headquartered in Beverly, Massachusetts, and serves its North American markets through a network of representatives, distributors and sales personnel. Contact KROHNE to learn more about the company's OPTISONIC 6300 P range of portable ultrasonic flowmeters.

800-356-9464 | www.us.krohne.com | info@krohne.com

Reliability, Ease of Operation, Define Komline-Sanderson's Product Line

Since 1946, Komline-Sanderson has supplied reliable equipment solutions that are easy to maintain and exceed expectations.

- The K-S Kompress Belt Filter Press is ruggedly designed and used for dewatering municipal biosolids and industrial sludge. It is easy to maintain and exceeds production goals.
- The K-S Biosolids Drying System operates with full integration of all components. The company has successfully installed systems for more than 20 years, which illustrates the equipment's durability and the company's commitment to supporting customers over the long haul.
- The K-S Gravabelt gravity belt thickener is available for very small to extremely large flows and includes Roto-Kone performance enhancing technology. With several models available, the unit can meet specific requirements and exceed performance expectations.
- K-S Plunger Pumps continue to perform after 40 years of operation.

These rugged pumps are the workhorse of the industry.

K-S employs highly skilled and technical field service engineers who know the equipment and listen to and respond to customer needs and concerns, which results in installations that perform well. The company provides factory-made original equipment parts and filter fabrics for belt filter presses, gravity belt thickeners and more, and it works with customers to ensure that equipment exceeds expectations.

The company's experience ranges from simple one-machine installations to complex multistep processes and systems. Reliability, ease of operation, rugged design, proven performance and superior customer service are hallmarks of Komline-Sanderson installations.



Komline-Sanderson

Since its incorporation in 1946, **Komline-Sanderson Engineering Corporation** has provided quality equipment for process/production filtration, drying, wastewater treatment, sludge processing and pollution control.

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- produce Class A product
- high efficiency

Belt Filter Press



- sludge dewatering
- high cake solids
- low polymer cost

Gravity Belt Thickener



- sludge thickening
- high rates
- low polymer cost

Dissolved Air Flotation



- sludge thickening
- wastewater clarification
- high float solids

Rotary Vacuum Filter



- sludge dewatering
- wastewater clarification
- continuous operation

Plunger Pump



- sludge transfer
- positive displacement
- high suction lift



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- Twin-auger design eliminates material bridging
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- Optional scales for precise monitoring and nutrient tracking

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FEED

IT!

The Eagle Microsystems VF-100 Dry Chemical/Polymer Feeder is rugged, simple to use, and very versatile. Available with a wide range of options and accessories, the VF-100 can fit any dry feed application!

FEATURES:

- Direct drive
- Flex-wall agitation
- Accurate SCR speed control
- Stainless steel construction
- 2 year warranty
- Multiple configurations



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Kuhn Knight SLC 100 Series Spreaders Provide Fast, Efficient Spreading

The Kuhn Knight SLC 100 Series ProTwin Slinger Commercial manure spreaders set the standard for efficient spreading. They provide an ideal combination of efficiency, versatility and durability to give maximum return on equipment dollars.



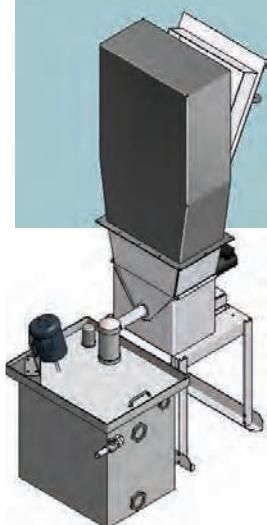
The twin-auger design and body construction allow the Slinger to handle a variety of wet and dry materials. The all-new, fully adjustable discharge results in faster unloading and improved material breakup for more consistent, accurate spreading.

A new hammer design provides more wear surface on the bottom edge to extend hammer life. The heavy-duty drive requires minimal maintenance and provides years of reliable service.

Optional scale systems are available to track and record applied nutrients. These new manure spreaders are available in 2,600- to 5,000-gallon capacities, along with truck and trailer configurations.



Kuhn North America is a leader in the field of agricultural and industrial equipment. For more information:
608-897-2131 | www.kuhnnorthamerica.com



Reliability Is Paramount for VF-100 Volumetric Feeder

As an operator, you want all the features you can get in a dry chemical feeder to ensure good accuracy, reliability and long life. Eagle Microsystems' VF-100 volumetric feeder offers all this in a durable, user-friendly build.



EASY MAINTENANCE

There is no lubrication, greasing or oiling required, and there are no belts, gears, sprockets or chains to maintain. The VF-100 is a hassle-free product designed specifically to meet the requirements of the water and wastewater treatment industry.

Features of the VF-100 include a rugged drive for reliable operation, feed rates from 0.04 to 17 cubic feet per hour; an electronic SCR speed control; stainless steel construction; gravimetric control option; and a two-year warranty.



Eagle Microsystems has been an active industrial weighing specialist for nearly half a century. Founded as manufacturers representatives, the company has grown into a full-service developer of high-quality mechanical and electronic scales.

800-780-8636 | www.eaglemicrosystems.com

A New Angle on an Existing Design

Many wastewater treatment plants are facing a dilemma. They're trying to handle increased flows without increasing the size of their channels and, at the same time, achieve higher debris capture to support new downstream processes.

A retrofit solution that increases the wetted area of the screen but still fits an existing footprint does exist. An installation in Wisconsin recently increased capacity from 8.2 mgd to 11.1 mgd per screen within the same hydraulic gradient by installing an FSM perforated plate Filterscreen multi-angle design.

ALL ABOUT ANGLES

To achieve greater throughput with minimal channel length available, FSM utilizes a 30-degree angle for the submerged portion of the screen and then transitions to a 75-degree extraction angle to transport the screenings from the channel. This combination doubles the wetted screen area, reduces velocity through the screen for better capture and provides an operating floor footprint that does not change the solids discharge point.

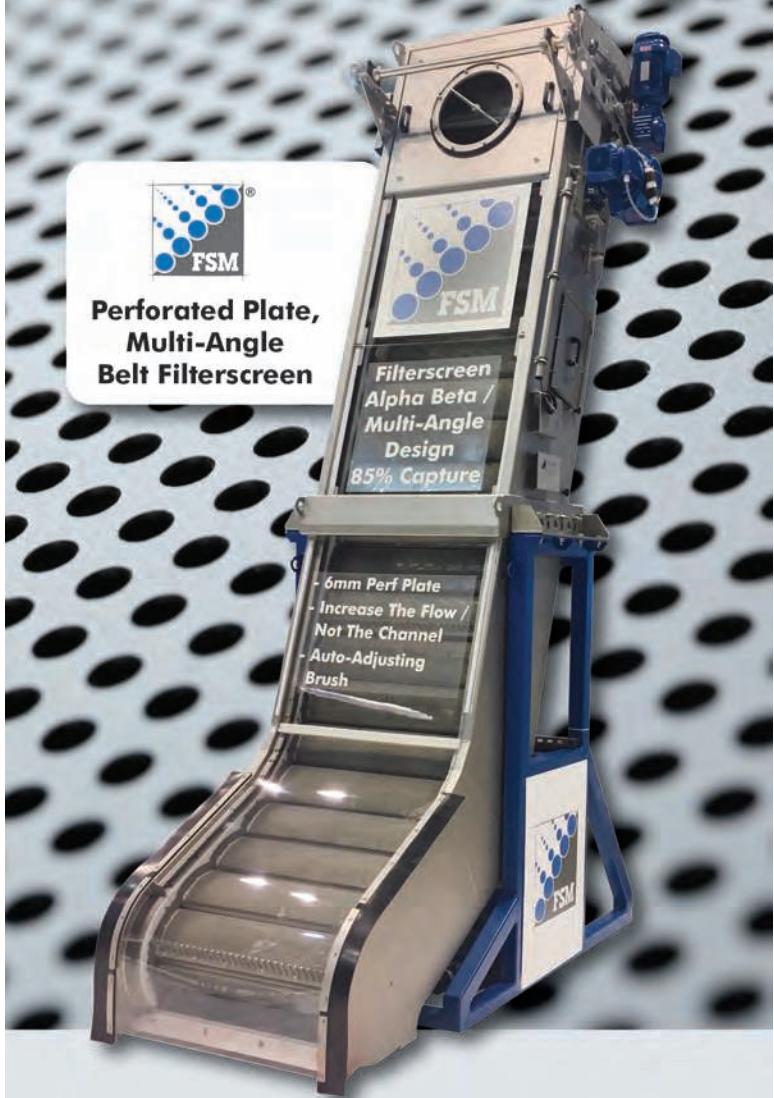
The multi-angle design uses the same features of the FSM single-angle perforated plate screen, which is independently verified to achieve 85 percent debris capture.

As with the single angle Filterscreens, a continuous screen belt of perforated plate panels traps debris on the surface of the panels and moves it to discharge where a brush cleans the debris from the panels.

The proprietary, self-adjusting brush acts as the primary cleaning mechanism, which keeps water usage to a minimum. The self-adjusting brush requires no manual adjustment.



A Whole New Angle on Screening



**Perforated Plate,
Multi-Angle
Belt Filterscreen**

**Filterscreen
Alpha Beta /
Multi-Angle
Design
85% Capture**

- 6mm Perf Plate
- Increase The Flow / Not The Channel
- Auto-Adjusting Brush

- Reduces velocity through the screen.
- Doubles wetted screen area.
- Maintains original footprint.
- Achieves 85% capture.



Soon to be SAVECO North America, Inc.

Enviro-Care Company, a member of the WAMGROUP, supplies screening and solids/grit management equipment to the North American water and wastewater markets. Brands include SAVI, SPECO, WAM and FSM Frankenberger. Contact Enviro-Care for a copy of the white paper titled *Balancing Channel and Screen Velocities*.

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- Wash Water Booster Pump
- Cake Solids of 35% Solids
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- 23" diameter aluminum pontoons - #5052 x .080 wall thickness
- Heavy duty outboard motor mount for small gasoline or electric motors

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- Protective lower rail (keeps tools on board)
- Safety chains
- Welded lifting eyes at each corner

OPTIONS:

- > Battery box with solar charger
- > Boarding ladder
- > 1000-lb. capacity crane
- > Galvanized trailer
- > Life ring
- > Pivot arms (Used to secure barge to aerator tubes when service is being performed on diffuser drop tubes.)

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989.685.2697

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Bright Technologies' Dewatering Equipment Helps Overcome Disposal Problem

Officials at a wastewater utility in Louisiana recently faced a sludge disposal problem and knew they couldn't afford to pay for 5,000-gallon tankers to haul it to a land application site.

But by using dewatering equipment by Bright Technologies, the utility was able to make a stackable, dry solids cake that allows it to haul 30,000 gallons worth of sludge in a single 30-cubic-yard container.

Since roll-off trucks are less expensive and more fuel-efficient than semi tankers, each load costs less than a single tanker would have otherwise.

One of the key equipment features the utility praised is the sludge-retention manifold of looping pipes, which gives the polymer contact time and gentle mixing before it's introduced to the press. This is a unique feature to Bright Technologies skid-mounted belt press systems.



Bright Technologies, a division of Sebright Products, Inc., manufactures high-quality recycling equipment as well as equipment for dewatering and solidification of wet materials. The company also offers integrated recycling and solids waste-disposal solutions through Sebright Products including hydraulic compactors, cart dumpers and custom waste carts.

800-253-0532 | www.sebrightproducts.com



Utility barges from American Pleasure Products provide operator stability

When it comes to maintenance work or routine inspections on ponds, lagoons or reservoirs, utility service barges from American Pleasure Products provide a safe, stable working environment for treatment plant operators. The Aqua Cycle 8-by-12 utility service barge offers stability, thanks to two 12-foot-long by 23-inch-diameter pontoons. The barge includes aluminum-frame construction with stainless steel hardware and pressure-treated, marine-grade plywood flooring.

Cleanup is a breeze because of the barge's vinyl decking. A protective heavy-duty handrail keeps employees stable, while a protective lower rail secures tools on board.

Depending on your plant's needs, the utility service barge is available with optional solar chargers, boarding ladder, 1,000-pound-capacity crane or a galvanized trailer. Additionally, the barge can be equipped with life-ring pivot arms that can secure the barge to aerator tubes when servicing diffuser drop tubes.



American Pleasure Products provides American-made paddleboats, rafts and service barges. The Michigan-based company produces its own tubing, using 5052-H32 aluminum.

989-685-2697 | aquacycleusa@gmail.com | www.aquacycleusa.com

Nozzle mix system increases efficiency with dual-zone mixing

The JDV Nozzle Mix System is a patented dual-zone mixing technology that provides uniform mixing patterns to produce even distribution and a stable environment.

The JDV Nozzle Mix System optimizes solids suspension and contact, which increases efficiency in a wide range of applications. The system is designed for easy maintenance, with pumps installed outside the tanks. The pumps are typically chopper pumps, or pumps with inline grinders, which prevent fibrous materials from accumulating and causing plugging problems. Various pumps can be used, depending on application. The high-velocity nozzles are mounted inside the tank and are positioned to discharge in a flow pattern that completely mixes the tank contents.

The mix system can be used for anaerobic digestion, bio-solids storage, blending tanks, excess flow tanks, septic or leachate, anoxic zones, CSO handling, aerobic digestion, assisting secondary treatment and biosolids holding ponds.



JDV Equipment Corporation is a leading manufacturer and provider of safe, environmentally friendly processing equipment and services for water treatment, wastewater treatment, industrial and agricultural applications. The company has more than 50 years of experience and has completed more than 10,000 equipment installations.
973-366-6556 | sales@jdvequipment.com | www.jdvequipment.com



JDV LEVEL LODOR™

*Design for Even Distribution
&
Odor Control*

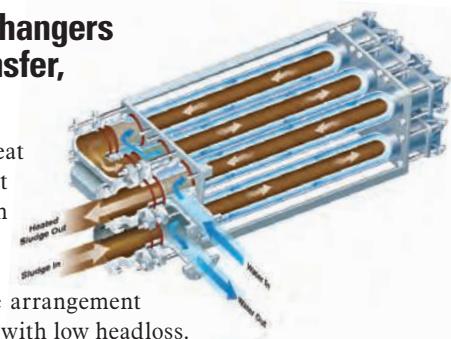
www.jdvequipment.com



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Tube-in-Tube Heat Exchangers Offer Quality Heat Transfer, Low Headloss

A concentric tube-in-tube heat exchanger is a design that utilizes counter-flow circulation in one direction and sludge flow in the opposite direction. This counter-flow tube-in-tube arrangement provides superior heat transfer with low headloss.



The Walker Process heat exchanger includes a sludge tube, and the end castings are removable for cleaning without draining the waterside. The end castings include built-in water backflushing connections.

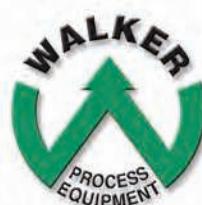
These exchangers comply with ASME pressure vessel code requirements and are stamped with the ASME "U" symbol. Special high-pressure units are available for use with egg-shaped or large-depth digester tanks.

Controls include nonflow restrictive temperature sensors and glass tube or dial thermometers to measure inlet and outlet sludge temperatures, along with a thermocouple and Resistance Temperature Detector (RTD) for remote indication of control.



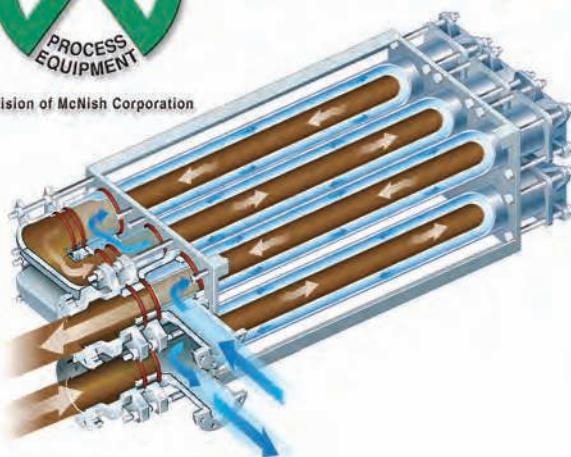
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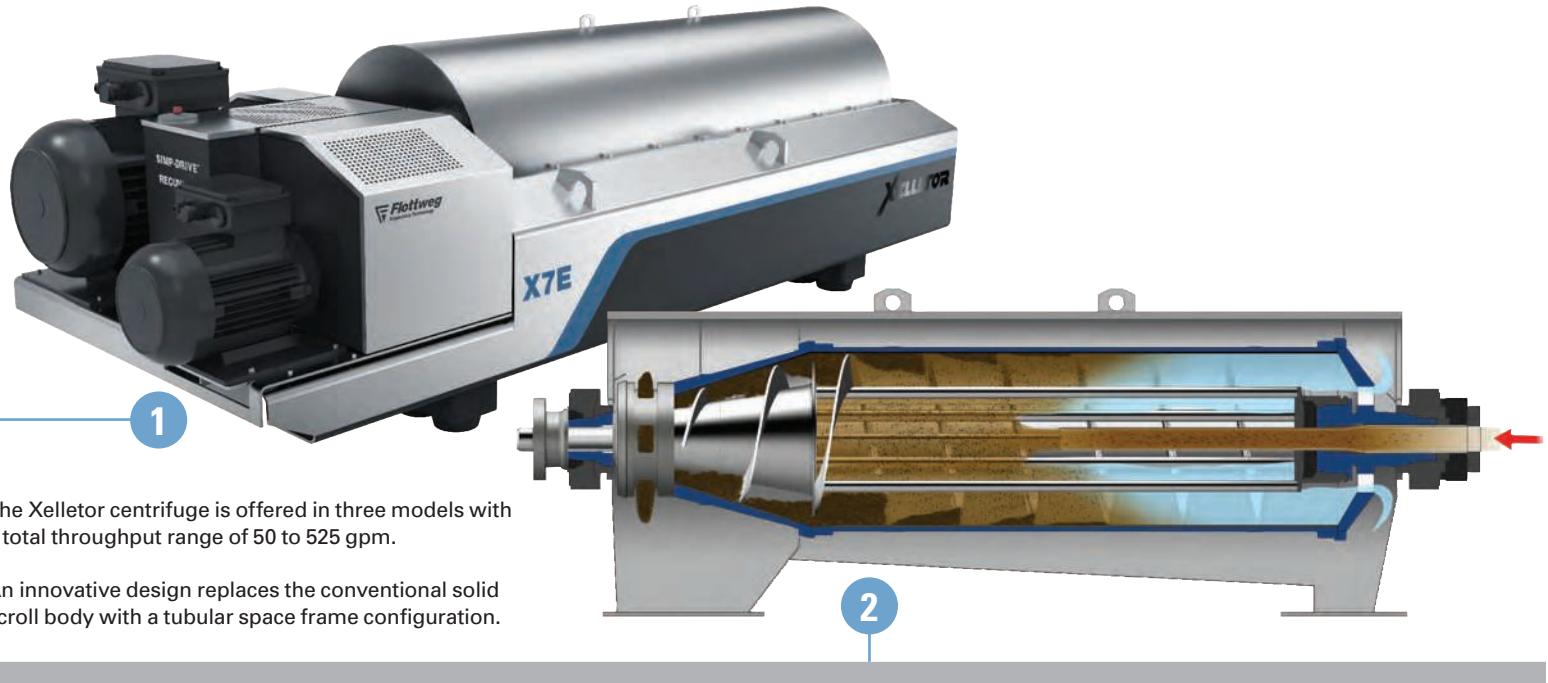
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Spinning Out More Water

A NEW APPROACH TO DECANTER CENTRIFUGE DEWATERING OF BIOSOLIDS OFFERS DRIER END PRODUCT, LOWER POLYMER USAGE AND ENERGY SAVINGS

By Ted J. Rulseh

The biggest expense in dealing with biosolids has to do with water — specifically, separating it from the solids. The less water content, the lower the cost to haul, landfill, or incinerate the material.

That's why makers of dewatering presses and centrifuges strive constantly to improve their technologies to yield a drier end product. A few percentage points improvement in solids content can make a big difference in a clean-water plant's operating expense.

Flottweg Separation Technology, a company specializing in separation technologies, introduced a new decanter centrifuge at the Water Environment Federation Annual Technical Exhibition and Conference in October. It uses innovative technology to improve dewatering performance, reduce polymer consumption, save energy and maximize capacity.

Decanter centrifuges aren't new, and the physical principles by which they operate are simple: Spin the material fast and the solids are pushed to the exterior of the machine, where they are collected and removed. In an interview with *Treatment Plant Operator*, Frank Scriver, environmental market manager, explains how Flottweg Separation Technology's Xelletor series centrifuges have improved on conventional technology.

tpo: What was the rationale for creating this new technology?

Scriver: Our municipal customers are always looking to get a drier cake. The owner of a wastewater treatment plant is interested in performance. How much will the technology cost me to operate? How much will it

“The major variable that significantly affects performance is the depth of the liquid pool inside the centrifuge.”

FRANK SCRIVER

save in terms of managing my biosolids? That's where the benefit of the Xelletor design comes into play.

tpo: At the most basic level, how does this technology improve dewatering performance?

Scriver: The key dewatering performance metrics are dry cake, clear centrate, polymer consumption and energy consumption. The major variable that significantly affects performance is the depth of the liquid pool inside the centrifuge. A deeper pool gives you more volume, which means higher throughput. In addition, by having a super-deep pool, we get solids that are drier on average by 2 percentage points. So, if we were getting 25 percent solids using conventional technology, we're now getting 27 percent.

tpo: What is the function of that deeper liquid pool?

Scriver: First of all, the super-deep pool gives the solids more time to settle, and that improves solids capture efficiency. Another benefit is lower consumption of polymer, which is also a significant operating cost.

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Force Flow continues to take the lead as an innovator in chemical monitoring with products like the Wizard 4000 and Chlor-Scale 150 for cylinders. The company also offers a five-year warranty and performance guarantee. For more information about the Tote Bin Scale:

800-893-6723 | info@forceflow.com | www.forceflowscales.com

tpo: How does the technology help plant operators save on polymer?

Scriver: By having the super-deep pool and a new design of the scroll, we significantly reduce the amount of shear force that's applied to the flocculated feed. A lower shear force means you're not breaking up the floc, so you actually need less polymer in the centrifuge to achieve the same result. With this technology, we're seeing an average 20 percent reduction in polymer. It's a significant cost saving.

tpo: How has the scroll been refined in this centrifuge series?

Scriver: The scroll that removes the settled solids from the centrifuge is a shafted screw. What has limited the depth of the liquid pool in the machine is the hub of the scroll. The liquid pool can't touch the scroll body because that creates turbulence, hinders settling, and increases power consumption because the liquid is dragging on the scroll. We've replaced the conventional solid scroll body with a tubular space frame design.

tpo: What is the benefit of this alternative design?

Scriver: We've kept the same structural integrity as the solid scroll body, but now we can run the liquid pool inside that tubular space. That means the only limit to the depth of the liquid pool in the machine is the diameter of the bearing housing. We're basically running the depth of the liquid almost right up to the diameter of the feed tube inside the centrifuge. With the tubular space frame, we've also eliminated the feed zone in the scroll body from the conventional design. With the tubular space frame, we're feeding directly onto the surface of the liquid pool. So we're eliminating a shear point and a point of wear.

tpo: What is the impact of the design improvements on energy savings?

Scriver: The closer the liquid is to the axis of rotation, the lower the energy consumption. By running a super-deep pool, we reduce the distance to the rotating axis. That has a major impact — it requires about 20 percent

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“ By running a super-deep pool, we reduce the distance to the rotating axis. That has a major impact — it requires about 20 percent less energy than our conventional design.”

FRANK SCRIVER

less energy than our conventional design. This is in addition to a feature of our conventional design that reduces energy consumption by directing the liquid discharge to help rotate the bowl — in the same way that a rotating lawn sprinkler uses the force of the water to spin the arm. That yields about 25 percent savings.

tpo: What have you done to prove out this technology?

Scriver: With all of our new technologies, we run the equipment for a minimum of one year, both to vet it mechanically and to collect performance data. In the case of Xelletor, we have been running it at three plants in Germany for more than three years, each at commercial scale. We've also done some comparative testing at facilities where we have our existing C series decanter centrifuges installed.

tpo: Is there a particular size of treatment facility for which this technology is especially well-suited?

Scriver: We offer three models with a total throughput range of 50 to 525 gpm. Any treatment plant 5 mgd and up would be a good application for this technology. Historically, centrifuge sizing in the engineering phase has been based on bowl diameter. With the new scroll design, this is no longer an accurate way to predict performance. **tpo**



The Team Makes the Magic



AN AWARD-WINNING NEW MEXICO PLANT MEETS TIGHTENING PERMIT LIMITS WITH CONTINUOUS UPGRADES, DEDICATED OPERATORS AND A RESPONSIVE BOARD OF DIRECTORS

STORY: Trude Witham | PHOTOGRAPHY: Roberto Rosales

Gerardo Gonzalez Ortiz, full-time operators and one part-time operator run and maintain the cooperative's wastewater and groundwater treatment systems.

RESIDENTS OF THE LAS CAMPANAS SUBDIVISION near Santa Fe, New Mexico, enjoy beautiful neighborhoods, amenities, and scenery. They also benefit from an award-winning water and sewer cooperative.

Operated by Jacobs (formerly CH2M), the Las Campanas Water and Sewer Cooperative and its staff make sure the community receives top-notch water and wastewater services. The water and wastewater facilities consistently meet regulatory requirements.

Three operators handle a 0.3 mgd wastewater treatment plant, a 1.5-mgd groundwater treatment facility, the distribution and collections systems, and pump stations and lift stations. The wastewater plant won the 2017 Plant Performance Award from the Rocky Mountain Water Environment Association.

Gerardo Gonzalez Ortiz, cooperative project manager, says, "We've worked closely with the Las Campanas community and also the board of directors and management team to invest in technologies and improvements that have made our great service even more efficient and attentive."

Challenges include meeting the new wastewater permit issued in 2017. "We met compliance last year, but we plan to do a wastewater treatment equipment condition assessment to make sure we can still meet our goal," Gonzalez Ortiz says. "Some of this equipment has been here for 18 years."

CONTINUOUS UPDATES

The cooperative's conventional wastewater treatment plant was built in 1994 and upgraded in 2007. It serves a population that peaks at 1,400 in summer. Jacobs has operated the facility since 2000.

Wastewater from the collections system enters the headworks and is sent to the equalization basin and

The team at the Las Campanas Water and Sewer Cooperative Wastewater Treatment Plant includes, from left, Ryan Lujan, operator; Gerardo Gonzalez Ortiz, project manager; and Jesus Gonzalez, operator.

“With a team of three, time is valuable, so having the ability to schedule, assign, and close work orders while we are in the field is a huge benefit.”

GERARDO GONZALEZ ORTIZ



Plant team members use smart tablets to remotely monitor operations throughout the facility.

then to one of two 200,000-gpd sequencing batch reactors (Aqua-Aerobic Systems). The effluent is then disinfected with sodium hypochlorite before tertiary treatment in two sand filters (Everfilt).

All effluent is reused to irrigate the subdivision's golf course. “The effluent automatically discharges to the golf course lake,” Gonzalez Ortiz says. “Per our discharge permit, if any effluent parameter is out of compliance, we have to discharge to the onsite effluent storage pond. That change must be done manually.”

Liquid biosolids (385,000 gallons per year) are hauled by an outside contractor to the Santa Fe County wastewater treatment plant. Improvements to the plant in the last few years include:

- SCADA system upgrade (GE Digital iFIX).
- Computerized maintenance management system (Maintenance Connection).
- Cameras at various plant locations and on the distribution and collections systems.

Improvements to the SCADA and CMMS systems include tablet-based interfaces that allow operators to work more efficiently and monitor opera-

Las Campanas Water and Sewer Cooperative Wastewater Treatment Plant, Santa Fe, New Mexico

BUILT: | 1994, upgraded 2007

POPULATION SERVED: | Up to 1,400

EMPLOYEES: | 4

FLOWS: | 0.3 mgd design, 0.077 mgd average, 0.125 mgd peak

TREATMENT LEVEL: | Tertiary

TREATMENT PROCESS: | Sequencing batch reactor

RECEIVING WATER: | Golf course lake for irrigation

BIOSOLIDS: | Hauled by contractor to outside wastewater treatment plant

WEBSITE: | www.lcwatersewer.coop/lcwatersewer/page.html

GPS COORDINATES: | Latitude: 35°42'27.97"N; longitude: 106° 4'48.06"W



tions when offsite. As a result, the plant has reduced operating costs while improving performance, reliability and safety. Gonzalez Ortiz says, “By updating the SCADA system, we now have the ability to protect the system from being hacked and from other cyberattacks.”

The CMMS has helped manage work orders, eliminate paperwork, increase productivity and reduce downtime and repair costs: “With a team of three, time is valuable, so having the ability to schedule, assign, and close work orders while we are in the field is a huge benefit.”

BUSY TEAM

Besides Gonzalez Ortiz, the cooperative’s team includes two full-time operators and one part-time operator. They are on call 24/7 and keep busy operating and maintaining the wastewater and groundwater treatment systems. One operator is assigned to each system, and team members rotate every three months. Operators perform preventive and light maintenance and housekeeping for both systems.

Responsibilities at the wastewater treatment plant and collections system include equipment operation, process control sampling, lab analysis, and lift station and manhole inspection. Operator responsibilities for the water distribution system include booster station inspection, meter reading, chlorine residual testing, meter testing and repair or changeout, opening and closing water valves.



Gonzalez Ortiz with the plant's effluent pumps (Nidec Motor Corp.).

Las Campanas Water and Sewer Cooperative Wastewater Treatment Plant PERMIT* AND PERFORMANCE

	PERMIT daily maximum	PERMIT monthly average	EFFLUENT annual average
BOD	45 mg/L	30 mg/L	9.55 mg/L
TSS	45 mg/L	30 mg/L	4.95 mg/L
Fecal coliform	200 cfu/100 ml	100 cfu/100 ml	6.01 cfu/100 ml

*New Mexico monthly environment permit

The water system serves 400 to 800 people (peaking in summer). Source water is the Buckman Direct Diversion project wellfield and water treatment plant. "We purchase our water from Santa Fe County, and it's received with a chlorine residual," Gonzalez Ortiz says. "We monitor the residual daily and if necessary add sodium hypochlorite to boost the residual through the distribution system. The water system is more demanding because it requires substantial customer service."

SAFETY MENTALITY

Gonzalez Ortiz has been with Jacobs for 11 years. He reports to Douglas Gaumer, Santa Fe area manager, and David Sohns, southwest operations director. "I handle the management and financial side and also oversee the safety program," he says. "I'm typically not out in the field unless a team member is absent and I need to help with a specific task." Reporting to him are:

- Ryan Lujan (Class II water and wastewater, 10 years with Jacobs) and Jesus Gonzalez (Class II water, 5 years), operators.
 - Kenneth Salazar (Class IV wastewater, 3 years), part-time operator.
- Gonzalez Ortiz has high praise for the team: "My crew is very depend-



The cooperative is making a transition to digital water meters (Badger Meter) to replace standard analog meters in certain subdivisions.

able. I can call them anytime, and they will do what needs to be done. They have the know-how and experience that you can't learn in a book but is just common operator knowledge." In 2015, Jesus Gonzalez won the Rocky Mountain WEA Operator of the Year award, after being nominated at his previous project.



Reclaimed water fills this pond at the Las Campanas golf course; it is eventually used for turf irrigation on the course.

FUTURE CHALLENGES

Operator challenges include meeting new wastewater permit parameters issued in July 2017. Gonzalez Ortiz says, "Because the effluent goes to the pond and is reused, some new parameters were included in our New Mexico environmental permit. There are 44 new annual parameters and two new quarterly parameters."

"So far, we've tested these samples only once, and all were well within compliance. We don't anticipate any problems meeting the limits, but collecting and testing samples each year keeps us on our toes."

The cooperative completed a wastewater treatment equipment condition assessment in June 2018 that will help identify which equipment needs replacing and how soon. A capital improvement plan will follow.

Improvements are already in the works.

"We are planning to install GIS to monitor water distribution and collection pipe networks," Gonzalez Ortiz says. "This will further enhance remote system monitoring and automation." The team also plans to upgrade from flowmeters to Beacon advanced metering analytics (Badger Meter). The new meters will allow homeowners to track their water usage with a smartphone application and set up leak alarms.

“We can have all the advanced technologies and tools in the world, but teamwork is what makes really great operations and customer service.”

GERARDO GONZALEZ ORTIZ

Another goal is to upgrade the wastewater effluent line: "We're discussing switching to an automatic valve, so that if we have to direct the effluent to the pond instead of the golf course lake, we won't have to do it manually."

As for the future, the team is well-prepared to continue delivering quality service. "Our success here is all about our people," Gonzalez Ortiz says. "We can have all the advanced technologies and tools in the world, but teamwork is what makes really great operations and customer service. We talk to each other and watch out for each other and the residents we serve. That's the real magic." **tpo**

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QUICK RESPONSE

In May 2017, when a thunderstorm knocked out power to the Las Campanas Water and Sewer Cooperative Wastewater Treatment Plant, the operations crew acted quickly.

Gerardo Gonzalez Ortiz, project manager of the Las Campanas Water and Sewer Cooperative, remembers it well: "As the power was restored, the PLC that controls the effluent discharge valve failed to open the valve. The operations team received a high-level alarm from the SCADA system. Operators logged onto the system remotely and identified the problem."

In about 20 minutes, operators Ryan Lujan and Jesus Gonzalez arrived at the plant. They rerouted the effluent to a pond to allow it to evaporate. The team then reprogrammed the PLC and returned the plant to normal operations. Gonzalez Ortiz says, "Thanks to the team's quick response and commitment, the problem was corrected, and we avoided discharging partially treated wastewater."

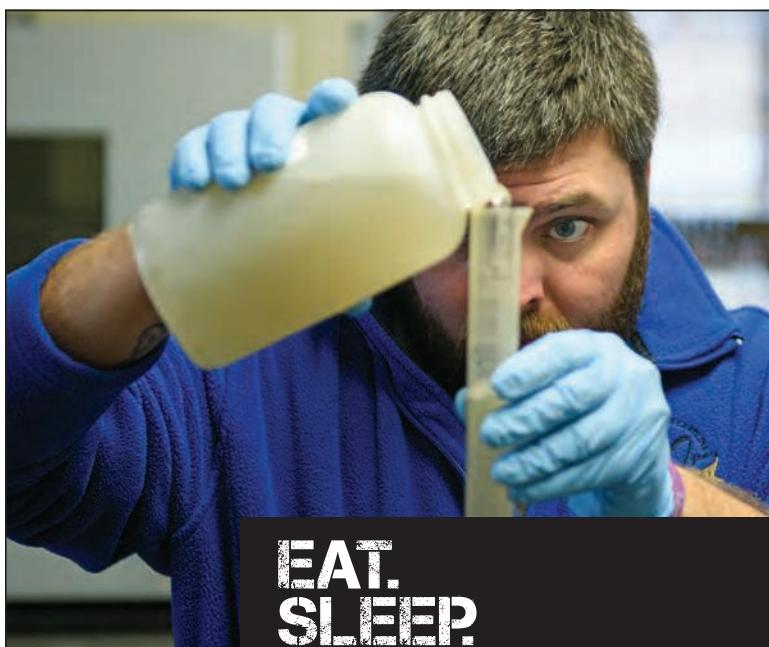
Communication is key. Gonzalez Ortiz holds daily safety planning meetings, weekly process meetings and monthly team meetings: "Contact and information exchange among our team members is vital to staying engaged and informed on our daily activities and maintaining safe and efficient operations," he says. "We have gone 10 years with no accidents. The operators have that safety mentality."

After winning the George W. Burke Jr. Safety Award in 2016, the cooperative has continued to improve. Team members suggested creating an information center where they could easily access all safety-related news and topics. They also created a safety bulletin board with posters and information on topics like weather and lessons learned.

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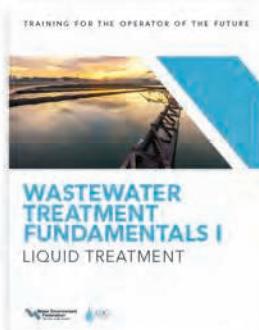


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Outside the headworks of the R.M. Clayton Water Reclamation Plant. The aluminum decking (right side of photo) covers the HeadCell grit removal equipment (Hydro International).

Optimizing Cogeneration

ATLANTA'S MAIN CLEAN-WATER PLANT GETS THE MOST FROM ON-SITE POWER GENERATION WHILE LOOKING TO CLASS A BIOSOLIDS AND NUTRIENT RECOVERY FOR FERTILIZER

By Steve Lund

Acogeneration project at Atlanta's R.M. Clayton Water Reclamation Plant didn't work as well as expected — until the operators found a better place to use the electricity.

In 2012, the plant added a 1,600 kW Caterpillar Inc., Electric Power Division, engine-generator to make better use of biogas from the four anaerobic digesters. Previously the methane had been compressed and stored and used to heat the digesters or to fuel the plant's two incinerators, but sometimes

surplus gas had to be flared. Heat captured from the generator was looped back to the digesters.

The project was a significant sustainability improvement, but it didn't operate as well as expected. The basic problem: The generator produced electricity faster than the plant could consume it, and the electricity was overwhelming the equipment in the headworks. "It was shutting down switchgears," says Daniel Sabou, plant manager. "We've got a lot of older switchgears that were not designed to receive load on the back side."

The cogeneration system was not designed to send power to the grid; the power has to be used immediately on site. With the frequent equipment failures, the generator could not run at capacity — until the team devised a solution.

"We rerouted the electrical output from the primary side, which was not that much of a load, to the secondary side, where there is higher demand," Sabou says. Changing the point of consumption enabled the plant to make full use of the generator's output.

SOLVING A GRIT PROBLEM

Meanwhile, there was another problem at the plant: a tertiary facility (100 mgd design, 80 mgd average) discharging to the Chattahoochee River. Grit was affecting all plant operations, including the cogeneration system. "The grit coming from the headworks was taxing on the digesters," Sabou says. "We were filling the digesters with grit. We couldn't mix them properly, the pumps were failing constantly, and we were not producing good-quality biogas."

"The grit was interfering with all the biological processes. It was plugging up pipes, so we couldn't transfer sludge from one tank to another. We couldn't maintain our process in a viable fashion."

Late in 2015, a major headworks upgrade started. A new screening mechanism (HUBER Technology) reduced the screen openings 1 inch to half an



A heavy-duty WEMCO pump (Weir Specialty Pumps) handles a slurry of grit removed from the wastewater stream.



Inside the headworks, team members inspect the area where mechanical grit screening equipment (Huber Technology) was installed.

The solution is a low-temperature dryer (SUEZ), expected to be operating by 2022. The cake will be placed on a long conveyor belt where 170-degree F air will be blown across it. The dried material will then be pushed through a grid to form pellets. The final product is expected to be a Class A biosolids at 65 to 90 percent solids.

NUTRIENT HARVESTING

Another improvement, in an early stage of development, is a nutrient harvesting system designed by Ostara Nutrient Recovery Technologies that will capture phosphorus and nitrogen in the centrifuge centrate to create a marketable fertilizer.

"We hope to find a pretty good market for that," Sabou says. "Currently, to meet our phosphorus discharge limits, we have to add chemicals to the wastewater, and that's a cost. By capturing the phosphorus, we get something out of it. It's not just a cost; there's also revenue."

tpo

inch, and a HeadCell grit removal system (Hydro International) was added. The equipment went online in 2017.

The grit removal system is like a cone-shaped stack of trays. The wastewater slows down in the trays and the grit and other solids settle out. The material that ends up in the bottom of the cone is pumped to a separator, dried and trucked to a landfill.

"It removed all the abrasive components in the wastewater that had been significantly damaging our equipment — pumps, valves, gauges, everything," Sabou says. "We noticed a decrease in the maintenance emergency requests and lower costs for equipment replacement once we started removing the grit continuously."

“Currently, to meet our phosphorus discharge limits, we have to add chemicals to the wastewater, and that's a cost. By capturing the phosphorus, we get something out of it. It's not just a cost; there's also revenue.”

DANIEL SABOU

TOWARD CLASS A BIOSOLIDS

Looking ahead, sustainability improvements are in store for the solids side of the process. Thickened sludges are sent to the digesters, and the digested material goes to a dewatering centrifuge that produces cake at 24 to 25 percent solids. The cake is then fed to two incinerators, built in the 1970s. For every 9 tons of cake, about 1 ton of ash remains.

In the past, the ash was used by a brick manufacturer. When that company went out of business, the ash had to be landfilled. With air pollution regulations becoming stricter and the incinerators nearing end of life, the plant team looked for alternatives.

A black and white portrait of Gerardo Gonzalez Ortiz, a man with glasses and a beard, wearing a white hard hat with the Jacobs logo and a high-visibility safety vest. He is smiling at the camera. To his right is a quote and his name.

“Our success here is all about our people ... teamwork is what makes really great operations and customer service. We talk to and watch out for each other and the residents we serve. That's the real magic.”

Gerardo Gonzalez Ortiz
Cooperative Project Manager
Las Campanas Water & Sewer Co-op
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A Dome Ideal for Art

MORE THAN 800 SPRAY CANS IN THE HANDS OF AN ARTIST HELPED CREATE A MURAL WITH A MESSAGE ON A WATER TANK IN GREENSBORO, NORTH CAROLINA

By Jeff Smith

“Water Is Life” is the message the Greensboro (North Carolina) Water Resources Department wanted to convey to citizens and visitors. So the city did it in a big way, with a bold mural on the domed roof of a 1-million-gallon ground-level water storage tank at the Mitchell Water Treatment Plant.

Featuring a bright pallet of shades of blue, the 124-foot-diameter abstract mural has sharp angles, hexagonal forms, and circular waves appearing as water droplets that suggest water in its natural state. The dome is highly visible to motorists and passersby on a heavily used greenway next to the 24 mgd water treatment plant.

“Art speaks in a language that can be more accessible and more inspirational than words alone,” says Steve Drew, water resources director. “We wanted to instill a sense of awe and curiosity. We want the community to ask questions and to realize that the way they use water affects the future for everyone who lives, works or visits Greensboro. Our department has taken a bold step in community outreach, and in this case, bold action is bold art.”

PLENTY OF PAINT

Artist David Louf of the Netherlands painted the fine-art portion of the mural using acrylic-based paint from nearly 864 spray cans. Larger sections of the graphic design were rolled with 75 gallons of Sherwin-Williams exterior paint. A protective coating of PPG Protective & Marine Coatings PERMACRETE finished the job. Phillip Marsh, Greensboro native and artist, assisted with the project; he describes the mural as an “anamorphic abstract.”

Louf’s artistic work was aided by drones. Aerial photographs of his progress were used to help keep the correct perspective of the images he was creating on the convex surface. Marsh also served on the nine-member selection committee that coordinated the call for artists, reviewed the credentials and ideas of 45 respondents, and chose “Mr. June,” as Louf is known in the art world.

An aerial view of the completed mural. Artist David Louf stands on top of the 1-million-gallon storage tank.

Louf’s nickname came from the random letters “J-U-N-E” that he wrote on street-art graffiti he created as a kid in Rotterdam, Netherlands: He didn’t know it was the English word for a month.

LOCAL INSPIRATION

Drew says the main inspiration for the mural was Faun Finley, chair of Greensboro’s Community Sustainability Council. Finley was touring the water plant to discuss options for public art at the site and said, “The dome-shaped storage tank is a perfect blank canvas for a mural. It’s calling out to be painted.”

The concrete storage tank was completed in 2017 and primed with a tan-colored durable paint. Before Finley’s observation, plans were to paint the city’s green logo on the surface. The cost avoided for that project helped offset the nearly \$20,000 cost of the mural.

Mike Borchers, assistant director, coordinated the mural project with the plant staff. “We are very pleased with the results,” he says. “We’re excited to continue to convey the message that ‘Water is Life.’”

ART WITH A MESSAGE

The mural unveiling ceremony included an interactive art event that attracted more than 120 children. Each used water-based spray cans to create graffiti on sheets of plywood set up like easels or on large sheets of clear plastic stretched between trees. As a memento, everyone received a spray can Louf used to create the mural. The cans were decorated with stickers imprinted with an image of the mural.

Drew says the mural helps the city and the Water Resources Department educate customers about the importance of water: “It’s my job to effectively manage water resources, but it’s my duty to educate the public about water safety and water stewardship. That’s a big reason we painted a mural on the tank.” **tpo**

industry news

Ovivo USA acquires FilterBoxx Water and Environmental

Ovivo USA announced it acquired FilterBoxx Water and Environmental and its subsidiaries. Based in Alberta, FilterBoxx designs and supplies modular water and wastewater solutions for a wide array of industrial customers across the United States. Ovivo USA will operate all FilterBoxx activities under the name of FilterBoxx Inc., an Ovivo company.

Klein Tools acquires Ergodyne in St. Paul, Minnesota

Klein Tools and Tenacious Holdings, the parent company of Ergodyne, announced that Klein Tools acquired Ergodyne. Ergodyne will be operated as a separate business unit at its current headquarters in St. Paul, Minnesota. Tom Votel will remain as Ergodyne's president. The combined companies plan to expand their brands and leverage combined expertise, experience, and industry knowledge to innovate in the safety products space.

Leadership change at JWC Environmental

JWC Environmental announced the appointment of Greg Guard as the president of JWC Environmental business. He will lead the company as it expands into new international markets through synergies with the Sulzer sales channels. Guard joined the company in 2012 to lead the newly created industrial business group and took on the responsibility for municipal sales in North and South America in 2013. In 2016, he was promoted to senior vice president of sales and assumed responsibility for the entirety of JWC's global sales.



Greg Guard

SUEZ opens new mobile water service center in Atlanta

SUEZ opened a new mobile water service center in Atlanta. The 62,800-square-foot facility consists of a plant, office, and storage areas, and it began commercial operation in the fall of 2018. The new location will house a range of water treatment technologies to provide deionization, demineralization, resin regeneration, filtration, reverse osmosis, softening and deoxygenation treatment for raw water, process/makeup water, and wastewater.

Centrisys/CNP announces exclusive distributorship

Centrisys/CNP announced its exclusive distributorship for the Passavant hydrograv adapt system in North America. Benefits of the system include improved process stability of secondary clarification, a reduction of effluent suspended solids to usually less than 3 mg/L, improved particulate phosphorus removal, improved clarification capacity from hydraulic optimization and overall low maintenance requirements. **tpo**

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Packaged plant provides turnkey solution for private utility company

Problem

Windy Hill Utility is an investor-owned water and wastewater utility provider in Hays County, Texas, that provides services to a residential housing development. The utility needed a turnkey package with a small footprint that could meet the strict permit requirements.

Solution

The chosen **Active Water Solutions** packaged system

had to meet effluent limits of 5 mg/L BOD and TSS, 2 mg/L NH₄-N, and 1 mg/L total phosphorus for the 30,000-gpd phase one of the project. To maintain ease of operation, the process train was made for reliability and simplicity by incorporating Active Water Solutions' submerged fixed-bed biofilm reactor method for BOD oxidation and nitrification. To further minimize moving parts and repair costs, clarification is handled by a tube settler rather than a mechanized system, while the chemical feed for phosphorus removal is introduced to a static mixer located between the aeration process and clarification. The facility includes an integrated chlorine contact basin. Waste is periodically moved from the clarifier via pump to a holding tank, to be hauled as needed.



RESULT:

The cost-effective, packaged treatment system meets strict permit requirements while maintaining the resiliency and ease of use needed by utility providers. **832-571-1111; www.activewatersolutions.com**

Mixing panels keep grit removal system running

Problem

Southport Advanced Wastewater Treatment Plant in Indianapolis sought a solution that would maintain solids to prevent buildup in its grit removal system for a dry weather flow of 70 mgd. "The pulsed air mixing system is provided in Junction Structure 101B to suspend solids, which settle out following grit removal so they can pass on downstream for further removal or treatment," says Gary Ruston, senior project engineer. "Keeping solids from accumulating in JS 101B will minimize or eliminate the need to periodically take JS 101B out of service for cleaning, which would be a major undertaking."

Solution

Wessler Engineering was tasked with developing the system. They worked with **Pulsed Hydraulics** to provide 24 bubble forming plates located in the channels and basin pursuant with the CFD model. The company supplied three four-valve mixing panels with an Allen-Bradley PLC and two rotary screw 20 hp compressors. "The **pulsed air system** was selected due to its higher mixing energy and better ability to keep or resuspend solids throughout the entire tank," Ruston says. "The system can be operated on a continuous basis or may be operated intermittently, based on operator preference."



RESULT:

Requirements met and verified by customer's engineer. **800-641-1726; www.phiwatertech.com**

Anaerobic Membrane Bioreactor (AnMBR) pilot demonstrates superior performance in brewery

Problem

The continued growth in popularity of craft beer and demand for its special brews, promoted Deschutes Brewery in Oregon to step up production. The company's focus on sustainability, combined with economics, regulations, and space limitations, influenced Deschutes Brewery's choice to find a system to treat the brewery's wastewater and produce biogas in the process.

Solution

Deschutes Brewery initiated a pilot study to verify if the anaerobic MBR technology using the **Pentair X-Flow Helix membranes** can handle the levels of COD and TSS created by spent hops and yeast residuals. In addition, the pilot helped identify the organic loading rate, the MLSS concentration, and ideal sludge retention time. This information was to minimize the footprint of a full-scale version, without sacrificing effluent quality and membrane performance.



RESULT:

The six-month pilot proved the system's performance. The external setup and Helix flux enhancement technology controlled any issues with fouling. As a result, the membranes provide a durable and reliable barrier for many years of demanding operation. The almost absolute separation between solids and fluids keeps the biomass in the reactor and delivers a superior effluent quality. **815-986-0391; www.xflow.pentair.com**

Mixer provides efficiency and energy

Problem

The Bellozanne Sewage Treatment Works on the island of Jersey in the Channel Islands — a crown dependency of Great Britain — sought a mixer system that would provide efficiency and energy.

Solution

Utilizing its chopper pump to break down particle size, **Landia's** externally mounted **GasMix digester mixing system** was successfully installed. "We certainly agreed straightaway that for the three new anaerobic digesters, all pipework and moving parts should be on the outside of the tank," says Michelle Macleod, principal mechanical engineer for Doosan Enpure, who delivers water, wastewater, and renewable energy solutions. "Externally mounted equipment would also improve health and safety by eliminating the need for working at height and confined-space entry." Bellozanne and Doosan Enpure also chose Landia pumps for three separate tanks containing digested biosolids, thickened biosolids (fed to the digesters via pasteurizers), and unthickened biosolids that comes off the final clarifiers, which are then thickened and added to the thickened tank to maximize overall residence time.



RESULT:

Dave Garnett, technical specialist (wastewater) at Doosan Enpure added that Bellozanne is achieving high volatile solids destruction at an average of around 60 percent. "The pasteurizers must help," he says. "Good mixing is critical with the high temperature feed to the digesters to make sure that everything is distributed properly. GasMix is working very well because we're seeing plenty of energy produced by the CHP, making a big reduction in operating expense." **919-466-0603; www.landiainc.com**

Phosphorus recovery alleviates struvite buildup

Problem

High levels of orthophosphates in the biosolids at Madison Metropolitan Sewerage District's Nine Springs Wastewater Treatment Plant in Wisconsin caused struvite issues in the methane digester, as well as increased the polymer consumption during dewatering and reduced the plant's biosolids dewaterability. The high orthophosphate levels also posed challenges for meeting the facility's National Pollutant Discharge Elimination System permit.

Solution

Centrisys/CNP conducted an extensive pilot of the scalable **phosphorus recovery system, CalPrex**. The system recovers phosphorus at a high rate in the form of brushite, diverting over 50 percent of the phosphorus from the digesters. The recovered brushite is a valuable phosphate fertilizer that can be utilized as an agricultural nutrient.



RESULT:

The pilot achieved orthophosphate reduction of over 90 percent and resulted in a fully scalable process. A Tailored Collaborative research pilot in collaboration with The Water Research Foundation, Milwaukee Metropolitan Sewerage District, Metro Wastewater Reclamation District of Denver, Madison Metropolitan Sewerage District, and Massachusetts Water Resources Authority is currently underway. **262-654-6006; www.cnp-tec.com**

Reclaimed water station combats extreme drought

Problem

During an extreme drought, the city of Brenham, Texas, struggled to conserve potable water. With nonessential needs like construction, toilet flushing, and dust control draining their supply, the city set off to find a solution but found most options to be cost-prohibitive.

Solution

With permission from the Texas Commission on Environmental Quality, the city procured a 210 Reuse Authorization, which allowed them to divert effluent water from their wastewater treatment plant to be used for nonessential needs. **EleMech** installed a **Portalogic FS-22 bulk water filling station** at the plant, which is monitored remotely by management software installed on personal computers in the administration office. After installation, EleMech also provided training for the city's employees on the use of the station and software.



RESULT:

The station not only enabled the city to drastically reduce potable water consumption, but also added a source of revenue. Haulers now purchase reclaimed water at the station, which is tracked via customer accounts in the management software. The station is open full time and has proven convenient and easy to use for numerous contractors. **630-499-7080; www.portalogic.info**

(continued)

Winery solves odor issues with aeration

Problem

Ste. Chapelle Winery in Caldwell, Idaho, was experiencing odors from its 300-by-200-foot evaporative lagoon. These odors were generating complaints from retail customers and threatening the feasibility of a planned outdoor concert venue. A high BOD load of 2,100 mg/L was consuming all the oxygen in the water. Undigested process solids including grape pulp and skins were becoming septic and releasing pungent odors. The lagoon had less than 1 foot of water depth, and solids were building up around the inlet.

Solution

Triplepoint Environmental assessed the pond with the engineers and site management and determined that nearly 5 feet of available freeboard would support a higher water level in the lagoon. They advised the winery that raising the water level to a minimum of 2.5 feet would allow an **AeroHub Fine-Bubble Lagoon Aeration System** to be installed to maintain dissolved oxygen levels, digest volatile solids and mitigate odors. Twelve fine-bubble units were installed onto the lagoon floor. Irrigation water was used to fill the lagoon to the recommended minimum depth of 2.5 feet. Because they are powered by an onshore blower, there are no moving parts in the water to malfunction, ensuring reliability and saving on operation and maintenance.



RESULT:

The AeroHubs nestled into the process solids; significant surface foam demonstrated that they had immediately started oxidizing the solids. After a couple of weeks of acclimation, the foam dissipated, and the odors are under control. **800-654-9307; www.tpenv.com**

Moving bed biofilm reactor system allows town to meet effluent limits

Problem

An existing wastewater treatment plant in Ladysmith, British Columbia, provided treatment before discharging to the Ladysmith Harbor. The plant removed primarily particulate matter and suspended solids to be driven to a composting site. The system met some needs, but would not be able to achieve the future BOD and TSS effluent limits proposed to the town. The town needed an upgraded system that would minimize its biological and separation footprint while also meeting proposed effluent limits of 15 mg/L for both BOD and TSS on an average monthly basis.

Solution

Ideal MBBR-DAF technology from **World Water Works** was selected. It combines moving bed biofilm reactor and dissolved air flotation technology to provide removal of BOD and TSS. The reactor degrades organic matter resulting in BOD removal, and the DAF component separates the biomass and solids from the water. This duo system allows the town to remove BOD and TSS with a small footprint. The system was designed with future flexibility for nitrification and denitrification. The 2.66 mgd secondary wastewater treatment plant treats mainly domestic sources, is designed to service a population of 17,000 and will treat the town's wastewater for at least the next 20 years.



RESULT:

The system was completed in the summer of 2016. The town was able to minimize its ecological footprint, and during the system's performance test, it met an average of 8 mg/L BOD and 11 mg/L TSS. **800-607-7973; www.worldwaterworks.com**

Plant utilizes efficient mixing technology

Problem

The DTE Tonawanda wastewater treatment plant in Buffalo, New York, cleaned membranes in its ultrafiltration system with a two-step cleaning process using caustic soda followed by a citric acid wash. Less-than-acceptable results were met after three to four wash cycles. In addition, the caustic cleaners were highly corrosive and were hazardous to the operators.

Solution

The plant manager switched to **Micro-90 concentrated cleaning solution** from **International Products**. It is a nonhazardous, water-based concentrate. A 1 percent solution removed the organics and metals that blind the membranes, and it has allowed them to eliminate the previous two-step cleaning process using caustic material.



RESULT:

The single cleaning cycle provides savings through reduced energy use, reduced chemical use and less downtime. The plant achieves 100 percent recovery after every wash, thus extending the life of their membranes to 11 years. **609-386-8770; www.ipcol.com_tpo**

people/awards

The **Lincoln County Sanitation District** received the 2018 H2O Award for outstanding wastewater project from the Kentucky Infrastructure Authority. The project involves construction of a collections and conveyance system to serve 535 residential customers and 50 commercial customers in western Lincoln County.

The American Public Works Association announced its 2018 Public Works Projects of the Year. Among the honorees were: more than \$75 million, **Chambers Creek Regional Wastewater Treatment Plant expansion (Pierce County, Washington)**; and \$5 million-\$25 million, **Dixie Drain Phosphorus Removal Facility (Boise, Idaho)**.

Jeffrey Rose was named director of the wastewater systems division for the Chattanooga (Tennessee) Department of Public Works.

The **Town of Plain Dealing** received North Zone Wastewater System of the Year honors from the Louisiana Rural Water Association.

The **Town of Nederland** received a \$950,000 grant from the Colorado Department of Local Affairs for improvements at its wastewater treatment facility. The project will add an aerobic digester and a screw press.

The Pennsylvania Water Environment Association presented its 2018 Utility Leadership Excellence Award to **Mike Kyle**, executive director of the Lancaster Area Sewer Authority.

The **Water Environment Federation** announced the 2018 WEF Awards recipients for education:

- Canham Graduate Studies Scholarship: **Christopher Evan Lawson**, University of Wisconsin-Madison.
- Fair Distinguished Engineering Educator Medal: **Dr. Paul Westerhoff**, Arizona State University.
- Public Communication and Outreach Program Awards, Individual: **Shea Dunifon**, education coordinator, South Cross Bayou Water Reclamation Facility, Pinellas County, Florida.
- Public Communication and Outreach Program Awards, Member Association: **Japan Sewage Works Association**, *The Secrets of Wastewater*.
- Public Communication and Outreach Program Awards, Other: **Baltimore City Department of Public Works**, YH20 Youth Water Mentoring Program.

Jared Cummons, superintendent of utilities in Bridgeport, received the 2018 Wastewater Operator of the Year award from the West Virginia Rural Water Association.

The **City of Long Beach** and the **Bainbridge Island Wastewater Treatment Plant** received 2017 Washington Department of Ecology Wastewater Treatment Plant Outstanding Performance Awards.

The Water Environment Federation announced the 2018 WEF Awards for individual contributions:

- Public Officials Award: Gov. **Brian Sandoval** of Nevada.
- Outstanding Young Water Environment Professional Award: **Ryan LeBlanc**, WEF and North Carolina American Water Works Association member.
- Outstanding Member Association Award: **Pacific Northwest Clean Water Association**.
- Water Heroes Awards: **North Port (Florida) Utilities Department; Jacobs operations teams in Key West, Pembroke Pines, The Villages and West Melbourne**.

The **North Platte Wastewater Treatment Facility** received the 2017 Scott Wilbur Outstanding Facility Award from the Nebraska Water Environment Association.

Glasgow Water won the Best Tasting Water Contest held by the Kentucky Rural Water Association.

Doug Smith, assistant general manager and chief engineer at the Morgantown Utility Board, was named to head the West Virginia Rural Water Association.

Scott Dunn, senior water treatment plant operator for the Olympic View Water & Sewer District, was recognized for reaching the Silver Level of the Washington Department of Health Treatment Optimization Program.

The Pennsylvania American Water's **Shady Lane Water Treatment Plant** in East Vincent received the Phase III Directors Award from the Partnership for Safe Water.

Jim Bromka, manager of the Waterloo (New York) water treatment facility received a Founders Award from the Seneca Lake Pure Waters Association and Rep. Tom Reed.

The **water treatment plant in Forest City** received an Area Wide Optimization Award from the North Carolina Public Water Supply. **tpo**



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Melissa Kahoun, Aqua Illinois, Area Manager, Kankakee and Will Counties
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2. SPIRAX SARCO SPIRA-TROL MODULAR CONTROL VALVES

Spirax Sarco introduced shipping within four business days for its Spira-trol modular control valves. The valves leave the factory pre-commissioned for applications, enabling quick plug-and-play installation. With a modular design and quick-change clamp-in-place seat, they can be altered to match changing plant conditions, rather than replacing the entire valve. No special tools are required and there is no need to take the valve out of the pipeline. Both electrically and pneumatically actuated Spira-trol valves from 1/2 to 4 inch up to flanged ANSI 150 versions are available within four business days. The complete range extends up to 8 inches and an ANSI 600 pressure envelope. **800-883-4411; www.spiraxsarco.com**

3. WILO USA SELECTOR SELECTION SOFTWARE

Wilo USA's Selector selection software, powered by Intelliquip, provides a consolidated platform that allows for the selection of a pump based on user-based requirements; it generates pricing and performance documents for the appropriate pump or booster system. In addition, the selector has the ability to save multiple pumps to a single project and create a combined project document that includes all of the individual pump documents. The responsive-design website allows access to the platform from any device, and a Quick Select tool requires only the head and flow in order to make a selection. **888-945-6872; www.wilo-usa.com**

4. SUEZ ZEEWEED 700B-RMS RACKLESS MEMBRANE SYSTEM

SUEZ ZeeWeed 700B-RMS is a ultrafiltration rackless membrane system that has a reduced footprint for installation, so there is no need for a steel rack or feed, permeate or reject pipes. The integrated header concept makes upgrading existing systems simple by replacing the module and rack to gain added treatment capacity. The inside-out ultrafiltration membranes can be used for drinking water, seawater reverse osmosis pretreatment, and tertiary treatment for water reuse. It is suitable for both new and retrofit water treatment projects. **800-446-1150; www.suez.com**

wastewater: product spotlight

Flood-proof submersible actuator helps plants operate in high-water events

By Craig Mandli

Valves in today's water treatment plants require dependable and precise positioning control. However, long life-span requirements and variables such as humidity and harsh weather can cause electric actuators to be unreliable or to fail prematurely. That's why rugged, dependable actuators are needed for modulating and fixed position control of those valves, especially during harsh weather and its aftermath.

Emerson recently introduced the **EIM Aquanaught** for those challenging conditions. The waterproof submersible electric actuator is designed to meet critical isolation demands on wastewater treatment plants during high water conditions.

"When floodwaters begin to overwhelm wastewater treatment facilities, it becomes critical for these plants to keep pace with the changing conditions and continue to operate for the sake of their communities," says Shimona Verma, senior product marketing manager for actuation technologies at Emerson Automation Solutions.

The EIM Aquanaught can be submerged and still operate under 150 feet of dirty water for seven days, which is substantially deeper and longer than the company's previous submersible technologies. It has a durable mechanical design with a waterproof enclosure and hermetically sealed connections that ensure uninterrupted plant operation during flooding conditions.

Ideal for gate or valve isolation applications found in wastewater, water,

EIM Aquanaught from Emerson

collections systems, hydropower, flood control, and desalination plants, the design allows these facilities to remain in control of their isolation needs from a safe remote location, even if the actuator becomes submerged for extended periods of time. Waterproof sensors provide additional protection by enabling early diagnostic and preventive maintenance during the flooding event.

According to the U.S. EPA, the country processes approximately 34 billion gallons of wastewater every day. During events like hurricanes Sandy, Irma and Harvey, billions of gallons of untreated sewer overflowed into impacted communities, posing significant health and environmental risks to the affected areas. With flooding an immediate threat to water systems in any heavy rain event, the need for more reliable actuation technologies becomes critical for these facilities.

"More facilities are looking to upgrade their infrastructure to ensure they aren't outmatched by future floodwaters, and we believe that the EIM Aquanaught is a reliable component that will help their operations stay afloat," Verma says. **www.emerson.com/EIMAquanaught**



water: product spotlight

High accuracy for low flow rates

By Craig Mandli

When adding chemicals to a potable water supply, sometimes the smallest amounts of a substance must be measured and added with a high degree of accuracy — whether in piping or in chemical reactors. The newly developed **Promass A** from **Endress+Hauser** measures such substances drop-for-drop with precision.

According to the maker, the Promass A offers durability and precisely measured values with high-end repeatability, even in cases where process and ambient conditions fluctuate significantly. All of this is thanks to an innovative sensor concept, which sets new standards in Coriolis measurement technology. The unit is light and compact, with no loss in performance or durability. The measuring device is therefore ideally suited for space-saving installation, for example in modular process facilities and skids.

The sensor system is mounted on a base plate that acts as a shock absorber, effectively shielding the Coriolis measurement from outside interference (e.g., from pipe vibrations). Other contributing factors are the oscillation frequency of the measuring tube, which is significantly higher than that of traditional Coriolis flowmeters, and its completely balanced oscillation behavior. At a specified maximum measured error of plus or minus 0.1 percent, high-precision measurements down to 8 g/min are possible, or if the maximum error is permitted to be plus or minus 1 percent, even a quantity of less than 1 g/min can be measured.

Thanks to the variety of device options, such as nominal diameter, material, process connection, certification, transmitter type, or degree of protection, it can be used in numerous applications. Thanks to its light and space-saving design, it can also be easily installed in extremely tight



Promass A from Endress+Hauser

spaces, such as in skids. There are a multitude of process connections available, such as flanges, lap joint flanges, couplings, internal threads or tri-clamps. It can be used at process temperatures between 58 degrees below zero to 401 degrees F.

Proline 300/500 transmitters include a web server as a standard. Using a standard Ethernet cable and a laptop — or wireless over WLAN — users have direct access to all diagnostic, configuration, and device data without additional software or hardware. This enables targeted and time-saving maintenance and service. For reliable measurements and maximum operational safety, Heartbeat Technology enables permanent self-diagnostics with the highest diagnostic coverage (more than 95 percent), as well as a TÜV-tested, metrologically traceable device verification without process interruption. All of this reduces complexity and hazards in a plant and increases its reliability and availability. **888-363-7377;** www.us.endress.com

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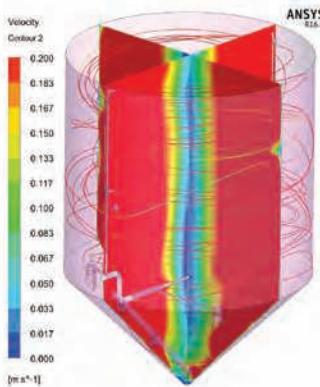
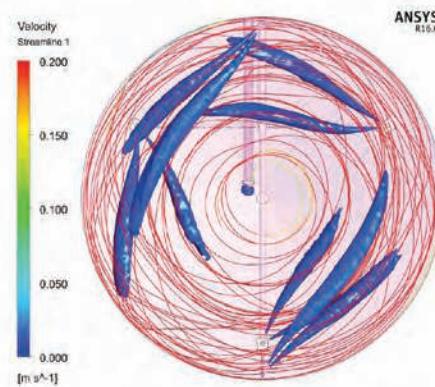
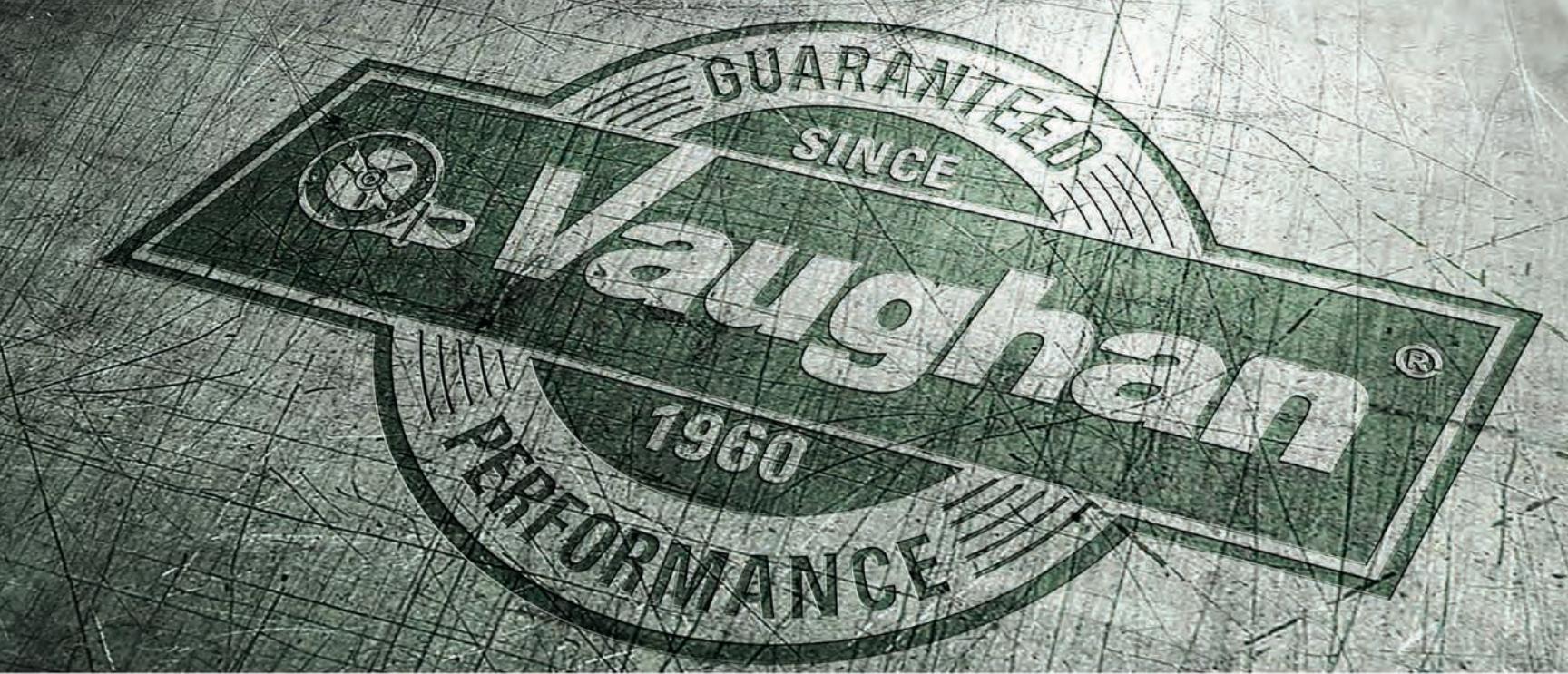
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