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Elisabeth Werth
Laboratory Support Supervisor
Denver, Colo.

Always the Technician

ELISABETH WERTH TURNED A LIFELONG
APTITUDE FOR SCIENCE INTO AN
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By Steve Frank

ON THE COVER: In middle school, Elisabeth Werth did science experiments and built rockets. Today she puts her passion for science to work as laboratory support supervisor at Metro Wastewater Reclamation District in Denver, Colorado. She observes, "I like to gather my own evidence and dig into the details, to learn things all the time." (Photos courtesy of Colleen Miller, Denver Metro Water Reclamation District)

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let's be clear

Better With Age? Not Likely.

OUR WATER INFRASTRUCTURE BADLY NEEDS WORK. IN A TIME OF TAX CUTS, COVID-19 RELIEF AND HUGE DEFICITS, WHERE WILL THE MONEY COME FROM?

By Ted J Rulseh, Editor



There's a scene in the old Tom Hanks/Shelley Long movie, *The Money Pit* that relates to the status of America's infrastructure.

The Hanks character calls a plumber to fix the piping of the stately but decrepit home he and his wife (Long) have bought. The plumber gives an estimate (outrageous) without even going into the basement. Hanks asks if he even plans to look at the pipes. The crusty old tradesman replies, "I looked at them five years ago. Do you figure they've improved with age?"

It turns that out as a nation we are treating our plumbing — our water and sewer infrastructure — as if it's going to get better (or at least not worse) over time without adequate investment. This was a big problem a decade or more ago. It's an even tougher problem now that we've cut taxes by trillions of dollars and added more trillions in (albeit necessary) COVID-19-related stimulus and relief.

But the infrastructure issues remain. And now we are approaching \$30 trillion in national debt. With annual structural deficits of at least a trillion dollars a year as far as the eye can see. With millions of people out of work and so not paying taxes, many may be falling behind on their utility bills. Yet the money for upgrades has to come from somewhere.

UGLY NUMBERS

How big is the problem? The American Society of Civil Engineers' latest Infrastructure Report Card gives our drinking water systems a grade of D and our wastewater systems a D+. Those grades have stayed pretty much the same over the years.

The ASCE published its last Infrastructure Report Card in 2017. They used to come out every two years; one has to wonder if the society has just grown tired of sounding an alarm to which those in power do not respond. Consider a few facts from the latest report card:

- The nation's nearly 14,800 wastewater treatment plants will see more than 56 million new users connect over the next two decades, a 23% increase. An estimated \$271 billion is needed to meet current and future demands.
- Many of our nation's drinking water pipes were laid in the early to mid-20th century with a life span of 75 to 100 years. There are about 240,000 water main breaks per year, wasting more than 2 trillion gallons. The AWWA estimates it will take \$1 trillion to maintain and expand service to meet demands over the next 25 years.

And the water sectors have to compete for funds with airports, dams, railways, schools, bridges, roads, transit and much more. Can the entire burden of upgrading water systems be placed on local? Not likely. And yet,



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The American Society of Civil Engineers' latest Infrastructure Report Card gives our drinking water systems a grade of D and our wastewater systems a D+. Those grades have stayed pretty much the same over the years.

some of the cost is certain to be borne locally, since federal and state funds will be hard to come by.

WINNING SUPPORT

So, where does that leave plant operations teams who don't control the purse strings, who make things tick day to day while the elected or appointed decision-makers deal with the finances?

It turns out that everyone in the industry has a role to play. In large measure it's about making sure communities' elected officials and citizens at large understand the importance of drinking water and wastewater facilities, and the cost (financial and otherwise) of letting them continue to deteriorate.

That means saying goodbye to the low profile. It means getting out and talking to school groups. Being visible at community events. Bringing decision-makers and community residents of all ages in for plant tours. Giving talks to Rotary and Lions clubs. Anything to drive home the message that these services are important, that they need money, and that the investment will be well worth it in the end.

Infrastructure renewal is an issue everyone in the drinking water and clean-water professions will have to help promote in some manner. Because our pipes (and other facilities) are certainly not improving with age. **tpo**



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WINNERS ANNOUNCED

Water/Wastewater Impact Award

A labor-intensive restoration of eight deteriorated membrane bioreactor basins for the South Valley Sewer District in Bluffdale, Utah, has earned the 2020 Sherwin-Williams Impact Award. The award recognizes exceptional projects that feature high-performance coating and lining materials from Sherwin-Williams Protective & Marine.

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RECYCLED WATER PROJECT

Southern California Steps Forward

Southern California has advanced on its path to developing a new sustainable water source from purified wastewater as Metropolitan Water District's Board of Directors in Los Angeles voted to begin environmental planning work on what would be one of the largest advanced water treatment plants in the world.

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“OVERHEARD ONLINE

“Research has been done on potential ways to remove other contaminants, but this is the first study to use cotton gin waste specifically to remove pharmaceuticals from water.”

Biochar From Agricultural Waste Products Can Adsorb Wastewater Contaminants
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REMOVING NUTRIENTS

What's the Price?

Stricter effluent nutrient limits pose a dilemma for clean-water plant teams: How can they comply with the new permit, and at what cost? The U.S. EPA is compiling a study on efficient and cost-effective approaches for nutrient removal, looking to help communities find ways to meet stricter limits without undue financial burden.

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Elisabeth Werth's duties include overseeing sampling and analysis for nonroutine and one-of-a-kind projects.

Always the Technician

ELISABETH WERTH TURNED A LIFELONG APTITUDE FOR MATH AND SCIENCE INTO AN AWARD-WINNING CAREER AS A LAB ANALYST WITH DENVER METRO

STORY: **Steve Frank** | PHOTOGRAPHY: **Colleen Miller**



In middle school, Elisabeth Werth did science experiments and built rockets.

Science was a natural fit: “I’ve always been curious and scientific,” says Werth, laboratory support supervisor at Metro Wastewater Reclamation District in Denver, Colorado. “I like to gather my own evidence and dig into the details, to learn things all the time.

“I was always on a technical career path. It was always where I was headed. I excelled in math and science more than in other areas.” With a bit of tongue-in-cheek and a twinkle in her eye, she says she was “really cool in middle school.” Now she takes pride in having earned the 2019 Water Environment Federation Laboratory Analyst Award for the Rocky Mountain Water Environment Association.

GETTING TO GOALS

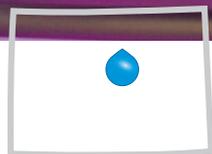
Werth heads the laboratory support group for the Metro District, which treats the wastewater for most of metropolitan Denver. She oversees sampling and analysis for nonroutine and one-of-a-kind projects. These often require her to develop or validate new treatment technologies the district is considering or has installed.

“You can’t just use any old analysis on any sample and expect good results,” she says. “What we do really well is work with the person requesting an analysis. We dig into their data quality objectives. We ask: What are you going to use this data for? What are your goals?” That helps her group know what to sample, when, and where, and what type of analyses to perform.

“Any bias in the sample from collection will be amplified throughout the analysis,” she observes. “Small changes



Elisabeth Werth says she “can’t wait to get to work every day” because there’s always a challenge in store.



Elisabeth Werth, Metro Wastewater Reclamation District, Denver

POSITION:
Laboratory Support Supervisor

EXPERIENCE:
8 years with district laboratory

EDUCATION:
**Bachelor’s degree, chemistry,
Colorado School of Mines**

AWARDS:
WEF 2019 Laboratory Analyst

**Award, Rocky Mountain Water
Environment Association**

GOAL:
**Continue to grow analytical
and management skills while
broadening and deepening
understanding of wastewater
treatment technology**

in the mixed liquor or suspended solids number can have huge effects on wasting calculations and treatment efficiencies.”

One example she cites is the relatively new MagPrex phosphorus-recovery technology (Centrisys/CNP) the district has adopted: “It’s an aerobic tank that comes after anaerobic digestion in the process train. We want to get struvite to form there, in the tank, and not in our piping. Then we can recover it.”

It took exacting analysis to determine how to get the struvite to form its crystals in the tank, and not elsewhere in the treatment process. All the analytes had to be precisely measured and accounted for. Then the struvite crystallizes, precipitates and drops to the cone at the bottom of the tank for removal.

WEIGHING OPTIONS

Werth earned her bachelor’s degree in chemistry at Colorado School of Mines, one of the premier technical universities in the West. She did a recruiting trip to the school during October when the leaves were changing to gold, the weather was perfect and the mountains were beautiful. She was also interested in playing soccer. “They said come on and practice with us. It all really appealed to me.”

She began college thinking about a degree in chemical engineering, but “after taking thermodynamics four different times, I realized I didn’t want to do that my whole life. So I followed the why and the how.” She also took a couple of biology classes, and her microbiology course has paid big dividends in her current career.

She came to work at the Denver district after a friend brought her to the wastewater treatment plant in fall of 2012 and showed her around. Tanya Bayha, now her boss, took her through the lab, and she learned that a laboratory analyst job was open: “I thought it sounded interesting, and I applied and got it. I worked my way up, and now I’m in Tanya’s group.”

MAKING CONNECTIONS

The largest group in the lab is analytical services, which does all the compliance and process control sampling and analysis. That includes including analyzing loadings that determine, along with flows, how much the connectors to the Denver Metro system pay for treatment.

The group also analyzes samples in support of the district’s retreatment program. Biological oxygen demand, TSS and TKN are the loading constituents of interest. When flow is factored in, the concentration and amount of each measured constituent helps the district determine how much it costs to treat the wastewater for the city or sanitation district where it originated.

The analytical services group also has an organic chemistry team, a quality assurance/quality control group, and several supervisors who oversee the production work. In addition, an inline instrumentation group installs and maintains analytical tools. “This group has grown a lot recently, and operations can see the trends in the process in real time,” Werth says.

The lab support group where Werth works “fills in the gaps. We’re the liaison among all the different groups at the plant like strategy and innovation, regulatory affairs, pretreatment and operations. We do capacity planning for the lab and balance the workload.”

PROTECTING THE WATERSHED

One of the biggest jobs is supporting developmental work. “We evaluate new technologies and work on process optimizations,” Werth says. “We adapt already-developed methods for different, weird matrix types that we’re trying to evaluate. We also work on potential new regulations, looking at things like whether we can reduce the detection limits of our analyses to meet them.”

The team also works with the water quality group. These scientists collect watershed monitoring data that help the district assess the overall health of the South Platte River, the stream to which the treatment plant discharges 130 mgd of effluent.

The data collected goes to stream modelers. “We use the output from the model to talk with Colorado Department of Public Health and the Environment,” Werth says. “We look both upstream and downstream from our outfall, so we know what’s coming into the plant, what our treatment capacities are, what kind of efficiencies we can get, and how that will impact the watershed.”

LOVING THE CHALLENGE

The first two lines from a Willie Nelson song seem to capture Liz Werth’s professional life so far: “On the road again, just can’t wait to get on the road again ...”

Werth loves her job as a laboratory support supervisor at Denver’s Metro Wastewater Reclamation District. She just can’t wait to get to work every day because there’s always something different to challenge her.

She loves tackling hard things like adapting standard analytical methods to analyze “different weird matrix types we’re trying to evaluate.”

The daughter of an engineer, she felt she was always on a technical career path. “It was always where I was headed,” she says, recalling doing science experiments and building model rockets with her dad. “I think what we do here is so important. We really make a difference.”

Werth is passionate about passing her excitement on to students in middle and high school. She wants them to learn about analytical work opportunities in the water and wastewater field. And she’s channeling her excitement by working on plans for student outreach and succession planning with the WEF Utility Management Committee.

“I think Metro does a good job of discussing proposed regulation changes with the state and engaging in a balancing act. We can show the ideal treatment and what’s practical without being a financial burden on our customers. We might show that we get 90% of the benefit for this much money using this treatment, and it costs that amount again to get the remaining 10% of the benefit.”

OPTIMUM DOSING

Werth has been deeply involved in full-scale studies evaluating peracetic acid as an alternative disinfectant. “Peracetic acid is a really powerful oxidant, and it’s a very effective disinfectant,” she says. “We’re evaluating and optimizing it here.”

The project started with a small-scale pilot demonstration in 2016 and moved to full-scale evaluation in January 2018. The group is looking at optimum dosing and effects due to seasonal changes, and there’s a hidden benefit, too: “What’s really beneficial about peracetic acid is you’re not adding additional salt to the river.”

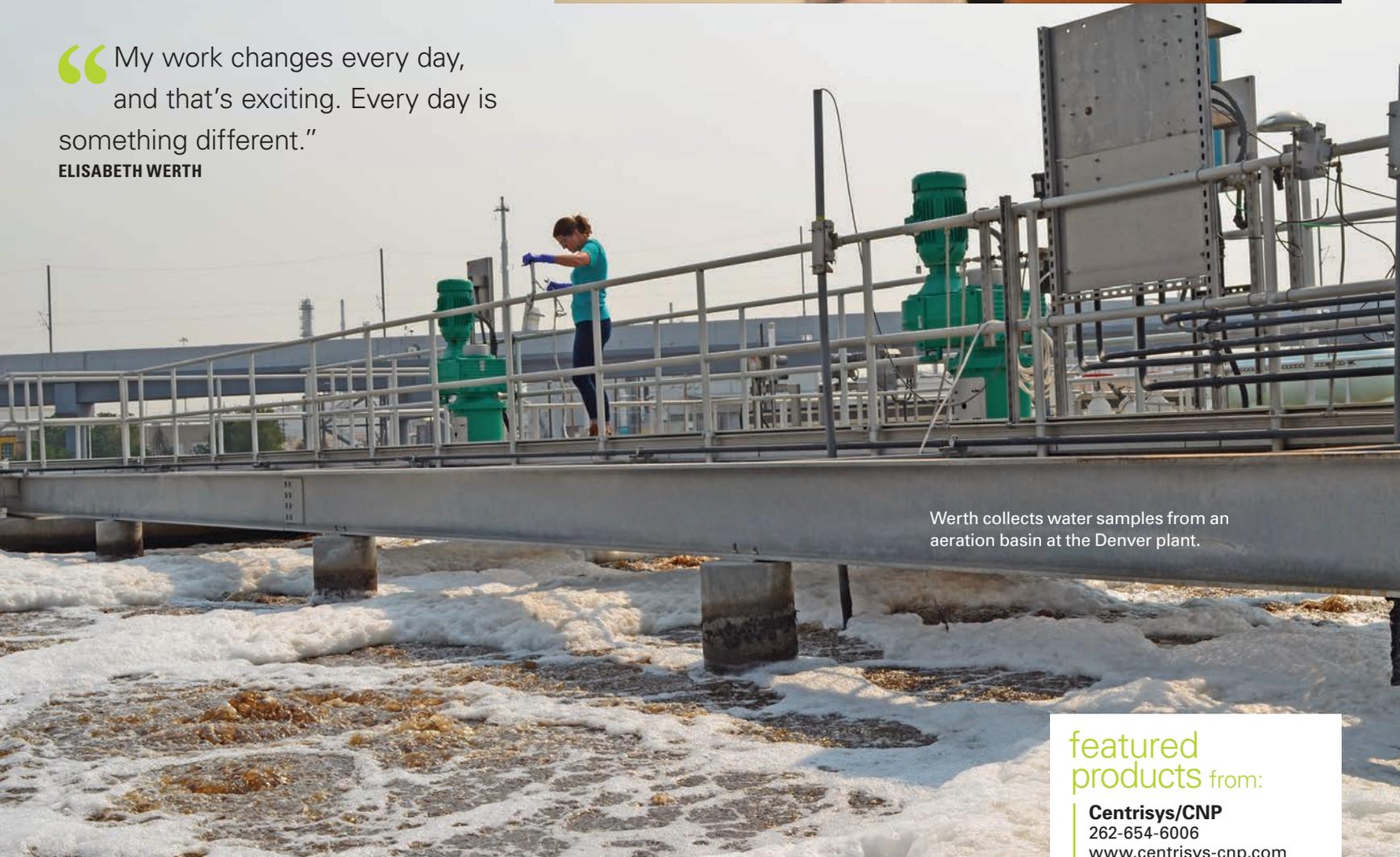
Werth clearly enjoys her work. She calls the Lab Analyst Award a nice surprise, but, “It’s not why I come in every day. My work changes every day, and that’s exciting. Every day is something different.” **tpo**

Werth earned the 2019 Water Environment Federation Laboratory Analyst Award for the Rocky Mountain WEA.



“My work changes every day, and that’s exciting. Every day is something different.”

ELISABETH WERTH



Werth collects water samples from an aeration basin at the Denver plant.

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“ Filament identification is hard to learn. You’re looking at the image and asking, is that squiggle *Nocardia*? Or is that squiggle *S. natans*? Or is that squiggle *Thiothrix*? ”

BRYAN ARNDT

Opseyes enables operators to get quick identification of filaments using a microscope and a smartphone camera.

Quick-Turn Microscopy

A NEW TECHNOLOGY HELPS OPERATORS GET A BIOLOGICAL ANALYSIS OF THE TREATMENT PROCESS USING AN ONLINE TOOL, A MICROSCOPE AND A SMARTPHONE

By Ted J. Rulseh

Microbiological analysis can be a powerful tool for managing biological treatment and diagnosing and resolving process issues. Now there’s an online technology that lets operators get a nearly instant microscopy assessment of filamentous bacteria by way of a smartphone. Opseyes has launched an artificial-intelligence-powered tool that can provide a rapid check on plant conditions and deliver expert recommendations to address potential concerns.

Developed by Ramboll, a Denmark-based consultancy that includes a specialty in water and wastewater treatment, the tool sends an analysis to the user’s inbox after online submission of a microscopy sample. The company says the ability to respond to changes in bacteria in real time helps operators consistently meet permit requirements.

The analysis requires only a simple three-step process, according to Bryan Arndt, CEO of Opseyes. Arndt talked about the technology in an interview with *Treatment Plant Operator*.

tpo: Why did you develop this tool?

Arndt: I’ve been running wastewater plants for about 20 years as an engineer and troubleshooter. Fifteen years ago, I was working at a landfill, and we had a huge filament problem. We sent a sample to a lab to get the filament identified. The plant was overflowing every day, and I was in my waders sweeping up leachate and bacteria every day for five days waiting on the lab test result. I really wanted that fixed.

tpo: How did that experience lead to the development of the technology you now offer?

Arndt: My brother told me how doctors are using artificial intelligence to read X-rays. As good as a doctor is, if you combine that expertise with AI, it’s even better. And I said, maybe if AI can read X-rays, I can teach it to read bacteria. We took the same basic technology and fed it a ton of images, and it learned to identify the bacteria.

tpo: What steps does an operator use to get the online analysis?

Arndt: Most plants have a microscope because somebody bought one at some point, but it sits in a corner and nobody knows how to use it. We provide an attachment so they can take a cellphone, attach it to the microscope, and take four different pictures from a wastewater sample. They go to our website and upload the pictures, and the AI does the work. It identifies the filaments in the sample and sends a report back.

tpo: How many filaments can your tool identify?

Arndt: Right now, we can identify six of the most common filaments.

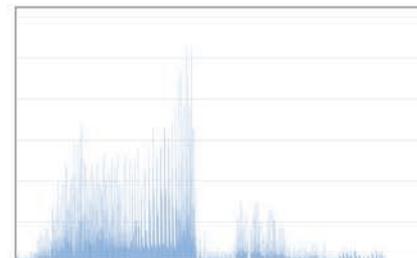
tpo: Why can’t operators just look through a microscope to make the identification?

Arndt: Filament identification is hard to learn. You’re looking at the image and asking, is that squiggle *Nocardia*? Or is that squiggle *S. natans*? Or is that squiggle *Thiothrix*? I’ve taken a class personally, and I had trouble doing it. That’s part of the reason I wanted to develop this process. It’s hard to identify in the field what filaments you have, but AI can do it accurately.

tpo: What is involved in training the AI tool?

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Arndt: We take, say, 10,000 images of the target filament. We set 20% of the images aside and teach the AI by feeding the remaining 80% to it. Then we feed it the rest of the images and make it identify them.

tpo: What level of accuracy are you seeing in the filament identification?

Arndt: We are seeing at least 90% accuracy. We are having the reports reviewed by professional microbiologists as well, until we are 100% sure this tool is perfect.

tpo: How long does it take from the time the operator uploads the picture until the report is sent back?

Arndt: We send out a draft from the AI in 10 minutes or less. Then our biologist reviews it, and a final report is sent within 24 hours — generally much sooner than that.

tpo: Do the slides used to view the sample need staining or other preparation?

Arndt: No. That's part of why AI is very useful. It can detect things that are a lot harder for humans to see. It's pattern recognition, so we don't need any staining at all.

tpo: Are there any special techniques for taking the sample?

Arndt: No. They just follow the standard protocol. We need a representative sample. So don't take a sample from a corner that never gets mixed, and don't take one that has no bacteria in it because you took it off the top of the clarifier. Just take a standard bulk sample you should be taking anyway every day.

tpo: How easy is it to connect the cellphone to the microscope?

Arndt: You simply put the phone in a U-bracket that has soft padding. Then you aim it at the microscope. It looks right down where your eye would

go. Or if you have a camera connector on your microscope, you can attach the phone to that, too.

tpo: What magnification is used to view the sample and take the picture?

Arndt: We prefer 100X to 400X.

tpo: What is included in the report that operators receive?

Arndt: It tells whether we detected a filament and whether it's a significant problem. It gives a description of the filament, what causes it, and a little background on it. If it's a significant problem, it gives you steps to correct it. For example, it might say this filament is vulnerable to chlorination, so chlorinate your return activated sludge. If the filament is not abundant enough to cause a problem but we're seeing a predominant type, the report will recommend things to watch so it doesn't become a problem in the future.

tpo: How do you envision expanding this tool's capability in microbiology analysis?

Arndt: We want to keep adding filaments. We also want to add higher life forms like rotifers, tardigrades, protozoa and stalked ciliates. That way we would be able to tell operators their sludge age and make recommendations accordingly.

tpo: What has been the response from operators who see this technology in action?

Arndt: A lot of them really like it. They know this is a good thing to do for checking out their plant. It can identify high loading, underloading, oil and grease problems, and septic conditions in the sewer network. Our client base is very receptive to the concept. I am excited to finally get to do this and help fix a problem I had years ago. **tpo**

Unique Vision

FAIRFAX COUNTY PROJECT WINS A SUSTAINABILITY AWARD IN THE DESIGN STAGE FOR INNOVATIVE METHODS USED IN SWITCH FROM HYPOCHLORITE TO UV DISINFECTION

By Steve Lund

Suppose that during a new construction project your operators could actually see the spaces where they would be working.

The design process for a new disinfection facility at a clean-water plant in Virginia's Fairfax County provided that capability. Innovations like that were a key reason the county earned a 2019 Envision Gold Award for Sustainability from the Institute for Sustainable Infrastructure for a UV disinfection facility at the Noman M. Cole Jr. Pollution Control Plant.

The disinfection upgrade is one of many improvements in store for the 50-year-old plant. It can't all happen at once; engineers, operators and administrators have to pick their battles.

"You can't upgrade the entire plant all at the same time," says Laurel Xiao, a capital projects engineer for the Wastewater Design and Construction Division in the county's Department of Public Works and Environmental Services. "You have to do it stage by stage." Xiao was the county's project engineer for the switch from sodium hypochlorite to UV (TrojanUV) for disinfection.

COLLABORATIVE PROCESS

The new disinfection system is expected to go online in March. The Envision award was presented when the project was less than half complete because the award was partly based on sustainability in the design process.

One factor was the way the county staff worked with the designers (Hazen and Sawyer PC) and the construction contractor (Ulliman Schutte Construction). Those firms joined with the county staff in a construction-management-at-risk project delivery method that encourages collaboration and teamwork. The method allows early input from the construction manager, and in this case that led to some design improvements and an increase in salvageable material.

Another innovation in design for the UV system was the use of mixed-reality technology. Holographic images of new elements were superimposed on existing spaces to help the design team better understand the work environment being created.

Plant operators and engineers wearing 3D Oculus goggles experienced three-dimensional views of the work spaces before construction. This enabled modifications that could save money or reduce future maintenance. It was the first public works project in the county to use the technology.

"It is a great tool for plant operators to view and provide feedback on the design," Xiao says. "The 3D images are developed by the design engineer during the design phase so people can view what a building, a piece of equipment, or a piping network looks like before they are constructed."

MULTIPLE BOOSTS

The change to UV disinfection is expected to improve operations in several ways, including greater safety for workers and the community, reduced



The room hosting UV disinfection equipment is shown within a building under construction. The finished project is to include five UV channels.

labor and maintenance costs, and less use of chemicals. Although the process will require more electricity, the plant's carbon footprint will be reduced if carbon reductions from chemical manufacture, transportation and storage are counted.

"The old system was more labor intensive. We had to monitor dosages," Xiao says. "Compared to the new system, it was also expensive to maintain. The old system was outdated. The new one is simpler, safer and more cost-effective."

Along with the change in disinfection, the upgrade project included filter backwash pumping, a new outfall pipe, pumping for reuse water and advanced plant water with separate disinfection, and various electrical improvements.

Another sustainability boost came from a modification in the hydraulic grade, which eliminated a pump station and offset some of the increased electrical demand from the UV process. New Floway turbine pumps (Trilium Flow Technologies) were also installed to move reuse water to a storage tank, replacing the existing 10-year-old pumps.

OLD PLANT, NEW PROCESSES

The Noman M. Cole facility serves a highly populated area just south of Washington, D.C. It opened in 1970, two years before the Clean Water Act was passed. It was designed for 18 mgd but it has been upgraded numerous times to 67 mgd capacity. Average flow is 40-50 mgd. The plant employs about 100 people.

The tertiary treatment plant uses moving bed biofilm reactor technology for nitrogen removal, with tertiary clarification and filtration for phosphorus removal. Biosolids are dried and incinerated, and the inert ash is taken to a landfill. The plant discharges to Pohick Creek, a tributary to the Potomac River.

The plant produces reuse water for cooling at a power plant and for irrigation at golf course and a ballfield. Advanced plant water is used for in-plant cleaning and other processes.

Fairfax County, with its commitment to continual upgrades at the plant, was honored in August by the National Association of Clean Water Agencies as a Utility of the Future, a program that recognizes facilities that implement technological advancements that improve resource recovery, efficiency and sustainability. **tpo**

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PHOTOS BY T.J. GERLACH, COURTESY OF THE CITY OF BROKEN ARROW

The floating wetland was launched with the help of the city staff in May 2018.

Making a Big Splash

BROKEN ARROW CITY AND SCHOOL DISTRICT PARTNER TO CREATE WHAT IS BELIEVED TO BE OKLAHOMA'S LARGEST FLOATING WETLAND

By **Sandra Buettner**

The City of Broken Arrow partnered with high school students to build a floating wetland in the shape of the school district's logo, while helping to build school spirit.

The city owned a detention pond across the street from the high school and wanted to design a second phase to the pond for teaching students and the public about water quality, floodplain protection and environmental stewardship. The pond drains into the Adams Creek which flows into the Verdigris River, the source of residents' drinking water.

Broken Arrow, near Tulsa and the fourth-largest city in Oklahoma, has a population of 113,000 spread over 61 square miles. Its Verdigris River Water Treatment Plant produces 30 mgd.

SCHOOL CONNECTION

Kenny Schwab, assistant city manager of operations, knew that approaching the high school and getting buy-in for the project would help make it a success and at the same time educate students on water quality.

He told the high school staff, "Let's work together and build an outdoor classroom." The school invited him to a meeting with its educators. Schwab walked in with an empty sheet of paper and said, "Let's get some ideas on what you would like to do. And dream big!"

From that meeting, 15 great ideas came up, one of which was the floating wetland in the 400-foot-by-500-foot pond. Everyone felt the students and the city would benefit, and that students could be engaged as part of their environmental science studies.

This "Together Project" includes the wetland built in 2018 and a rain garden on the slope of the detention pond, created in 2019. "We decided to also get the art students involved," says Schwab. "We created a litter prevention contest and challenged them to create a logo and signage. The winner got a cash prize, and we used the logo on our signage around the pond."

CREATING THE WETLAND

Donna Gradel, environmental sciences teacher for the Broken Arrow high school, was instrumental in getting the students on board. She invited city representatives to talk to her students about the partnership and generate excitement about the wetland project.

The city team presented to the students on World Wetlands Day and showed them the engineering drawings. The students especially loved the idea of using the district's logo for the shape. They enjoyed learning about the purpose of a wetland and how they could help put it together.

Schwab did research to see if other schools had partnered with cities to create such projects and could find no examples. He presented the project to the city council, which gave its support. The funds to build the wetland unit came from a city bond. Schwab also solicited contributions from businesses, who donated materials for the structure. The students provided substantial input on the design and materials.

The floating wetland took about four days to build. The students and engineers from the city constructed the unit on a weekend, during their lunch hours and after school. All told, about 25 students and city workers helped put the floating structure together. The completed wetland measures 40 by 80 feet.

AWARDS AND ACCOLADES

The Together Project floating wetland received a Water Environment Federation Public Communication and Outreach Program Award. It also received the Ronald D. Flanagan Gold Project Award from the Oklahoma Floodplain Managers Association.

The partnership and project were well received by the residents. Schwab observes, "The backing of the community surprised me the most. We presented at the homeowners association and at other public meetings.

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A member of the City of Broken Arrow Stormwater Planning Division assembles a part of the floating wetland while high school students inspect another.

“Not only did they like the partnering with the school district, they thought the whole project was great and wanted us going forward to include a boardwalk, trails and overlooks. They asked us to tie everything together with a wetland preserve the city also owns near the pond.”

Schwab said that the students were committed to the project from day one. They spent many hours putting it together and checking on it. No maintenance on the wetland has been needed. The wetland plants die back in winter; the large rooted structure below stays intact, and in spring the plants grow back. The students enjoy observing the unit in all seasons.

As a result of this project, several students have gone on to pursue engineering and environmental engineering studies in college. A couple of kids also won scholarships and presented at a conference on the project.

According to T.J. Gerlach, communications coordinator for the city, “Last spring we had a tornado in the area. Two concerned students grabbed a kayak to check on the floating wetland and, lo and behold, it survived and was just fine.” **tpo**



The floating wetland in the shape of the Broken Arrow Public Schools logo as it looked in July 2020, more than two years after it was anchored in the detention pond.



Perry Smith is manager of water works for Wheatland Electric Cooperative in Garden City, Kansas, and superintendent of the Finney County Rural Water District.

Diverse and Dedicated

PERRY SMITH'S VARIED BACKGROUND MADE HIM IDEALLY SUITED TO OPERATING A NEW REVERSE OSMOSIS FACILITY IN SOUTHWEST KANSAS

STORY: **David Steinkraus** | PHOTOGRAPHY: **Denny Medley**

Perry Smith still doesn't know who nominated him for his awards. He certainly wasn't pleased about standing up in front of a crowd of people.

"I'm kind of a private person," he says. In 2019 he received the Water Plant Operator of the Year award from the Kansas Rural Water Association, and the Operator Meritorious Award from the Kansas Section, AWWA. The state AWWA newsletter said Smith has consistently met the criteria for the award and through creative management serves large customers with only two employees.

Smith is manager of water works for Wheatland Electric Cooperative in Garden City, a community of about 26,000 along the Arkansas River in southwest Kansas. It's the place where he grew up, and that he came back to when it was time to settle.

ON THE ROAD

He grew up near Garden City but after high school he didn't stay. He went into commercial construction, and from his start as a laborer in August 1980 he swiftly rose to carpenter, foreman, assistant superintendent and then acting superintendent.

He worked on schools, hospitals and other structures in Kansas, Colorado, New Mexico, Arizona and Alabama. After eight years, he went to work for the City of Holcomb, about 8 miles west of Garden City, because he could stay in one place instead of living in the mobile home his company paid to move from one job site to the next.

"It's difficult to raise two boys and be married when you're moving from state to state, job to job," Smith says. "It was time to park and plant some roots." In Holcomb he began as a water plant operator but within a year became city superintendent. In a town of about 2,200, that meant doing everything. "Water, sewer, solid waste, streets, new utilities, asphalt, paving, curb and gutter, sidewalks, lift stations, sewer, water, and I ran the trash truck." He liked the variety.

NEW PLANT RISING

After 14 years with Holcomb, he learned that Wheatland Electric was building a water treatment plant and was in the market for an operator. In September 2002, he started work when the reverse osmosis plant was just a slab of concrete and the shell of a building.



Smith monitors pH using the Endress+Hauser gauges at the treatment plant.

“It’s difficult to raise two boys and be married when you’re moving from state to state, job to job. It was time to park and plant some roots.”

PERRY SMITH



Perry Smith
Garden City, Kansas

POSITION:
Manager of Water Works,
Wheatland Electric;
superintendent, Finney County
Rural Water District

EXPERIENCE:
31 years

DUTIES:
Operate Wheatland Electric water
treatment plant, oversee Finney
County Rural Water District
distribution system

EDUCATION:
Junior college and University
of Southern California online
classes

CERTIFICATIONS:
Class IV licenses, water and
wastewater

Design-build work was complete and all the equipment selected from GE Osmonics was installed, but Wheatland wanted its own representative on the ground working with the contractor and learning about the plant.

Wheatland's water business is wholesale, but it also contracts to run the distribution system for the Finney County Rural Water District just outside Garden City. Smith handles both the water plant and the lift stations and pipes in the district's system. Reverse osmosis was new to him.

"It was probably better, at that time, that I didn't know anything and had no preconceived notions about what needed to be done," he says. Learning RO wasn't hard, and the staff members from GE were good teachers. "Learning how to make the equipment we have work, with water quality that was always changing, that was probably the largest learning curve. And, full disclosure, I'm still learning today."

TWO TRAINS

The 6 mgd (design) Wheatland RO plant brings raw water in through a 20-inch pipe, and 85% of that is fed to the plant. The rest bypasses the RO system and is later blended with RO permeate to replace minerals and other chemical compounds removed by the RO process.

Water going through the plant is first pretreated in 155 1-micron filters in Pall Water housings. The filtered water empties into a sump where it is picked up by a Johnson pump with a 300 hp GE motor, boosting pressure to at least 180 psi, the minimum required for the RO membranes.

The RO system consists of two three-stage trains. Each train has 62 housings with seven membranes in each housing. All water is pumped through

the first stage of 32 housings. Permeate is sent to the end of the train while the concentrate (water that hasn't passed through a membrane and contains high levels of contaminants filtered out through the process) is sent to the 22-housing second stage. Concentrate from the second stage is sent to a third stage with eight filter housings.

Each RO train can treat up to 3 mgd and uses an input of 2,200 gpm to produce an output of 1,800 gpm of filtered water. Concentrate from the third stage is returned to the ground through a deep well. Permeate is blended with the bypassed raw water, chlorinated, adjusted for pH, and sent to a 3-million-gallon storage tank.

“That would seem to be an awful boring career to come in and do the exact same thing at the exact same time every day.”

PERRY SMITH

TROUBLED WATERS

The Wheatland plant was designed for expansion. When the plant was built, rough piping, electrical service and SCADA blanks were installed for another three RO trains. That would give the plant a capacity of 15 mgd.

Water in local wells has two problems: sulfates and uranium. Garden City is in the alluvial soils of the Arkansas River, and wells around it draw from the Ogallala Aquifer, which stretches beneath the western Great Plains from southern South Dakota to western Texas.

Ordinarily, it is desirable to have a well next to a river so that there is recharge as groundwater moves past the well and toward the river, Smith says. But the Arkansas River isn't like that. "The water has effectively been pumped out by the agricultural interests on both sides of the river, and so where water used to run toward the river, now the river levels have dropped, and the water flows out."



From left, Luke West, Wheatland water treatment manager, Perry Smith, and Francis Lobmeyer, master electrician, examine the operations schematic on the Allen-Bradley VersaView 5200 display (Rockwell Automation).

BUILDING THE NEXT TEAM

Perry Smith is closing in on age 60, which means one of his goals is to transfer his knowledge to the next generation of operators.

"They tell me every day the proverbial bus is going to run me over, and then where will they be?" Smith says with a laugh. "And, quite frankly, I've spent the last 30 years building things that I don't want to see fall into neglect because of apathy or atrophy."

He wants a team player, and to him a team really is a group of people working together, whatever happens. "My philosophy has been share the blame or share the fame," he says.

That doesn't mean it will be easy to find that next person: "It seems difficult to find personalities who want to put in 100%, let alone 101%, and I think that's what it takes to do this."

Water flowing out of the river and into the aquifer carries uranium and sulfates picked up in eastern Colorado. RO and nanofiltration can remove that, which is why RO is gaining popularity in his part of the country.

GROWING RESPONSIBILITIES

Hours for Smith and Francis Lobmeyer, a Class IV water operator, are 8 a.m. to 5 p.m. Monday through Friday. They alternate weeks being on call. Lobmeyer, who trained as an electrician, met Smith while the plant was being built.

"He has brought a wealth of knowledge and skill to the water division," Smith says. "We just finished a very comprehensive SCADA upgrade, PLCs and software, working with Allen-Bradley (Rockwell Automation). Lobmeyer worked in the thick of that because he wired this building.

"Our SCADA system is pretty heavily automated. Wheatland Electric has let us make some changes, and we have an alarm system that covers pretty much anything that could happen. Most things that could happen can be taken care of by computer." Using company-issued secure laptops, he and Lobmeyer can link to the SCADA system from home.

During Smith's time with Wheatland, the water operation has expanded. In addition to sending about 2.7 mgd to Garden City, the plant supplies about 300,000 gpd to the Finney County Rural Water District, and more water to a Tyson Foods facility just west of Holcomb.

The job he has now is extensive, moving from plant to pipes and pumps and back. It's not as varied as his job in Holcomb, but he doesn't miss that. "A lot of days it was more juggling than getting anything done," he recalls. "In a town of 2,200 people, you have 2,200 people who think they're your boss."

At the same time, he says, accomplishing anything takes a team. In Garden City, that means the people at the cooperative, in particular Lobmeyer and Luke West, director of corporate services and water for Wheatland Electric and Smith's supervisor.

A WORKHORSE

West's observations about Smith are simple: "You're going to be hard-pressed to find somebody who's more dedicated to what he does. He's very diverse because of his history, has a very strong work ethic, and has a high expectation of that from others as well. He doesn't like to sit still, and he's very passionate about what he does. He works all the time, and he gets enjoyment out of it."

Smith lives in the country about halfway between Holcomb and Garden City. When not on the job, he works in his yard or drives to the plant just to check in. He also enjoys riding his motorcycles: "My latest one is a 2016 Harley-Davidson Ultra Glide." He also has a 1999 Kawasaki Vulcan Classic and a 2004 Suzuki DR-Z400 for trails, plus two ATVs and three pickup trucks.



Perry Smith near Injection Well No. 1 at the treatment plant.

"I don't really hunt anymore, but I do like to shoot," he says. There's plenty of open land in the sand hills south of the Arkansas River where he can keep up his skills with a rifle, pistol and shotgun.

With about 30 years in the water industry, his top piece of advice for a new person is this: "There is nothing static. Everything changes."

That is not the same as saying he wanted a job where nothing changes. "That would seem to be an awful boring career to come in and do the exact same thing at the exact same time every day. That's what I call going stable-sour.

"If you leave a horse in a stable too long, it doesn't like to be ridden when you get it out. It just wants to stand in the stable. So I think it's best to have diversity, keep yourself dusted off. By incident or accident, Wheatland Electric has let me do that." **tpo**

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Mike Kelley, former superintendent of the Mendocino City Community Services District, with the Aqualitec Screentec bar screen.

Out With Debris

A VERTICAL BAR SCREEN SYSTEM HELPS A NORTHERN CALIFORNIA CLEAN-WATER FACILITY PROTECT PUMPS AND OTHER CRITICAL EQUIPMENT

By Erwan Ouattara

The Mendocino Wastewater Treatment Plant sits on a jugged-out piece of land on California's north coast, overlooking Mendocino Bay to the south and Headlands State Park to the north.

This 35 mgd (average) activated sludge facility's coastal location presents a unique challenge because the damp salt air tends to be corrosive, creating a higher propensity for damage to equipment. In addition, Mendocino County has to account for planned water shortages during dry summer months.

While these challenges are endemic to the location, the plant also must deal with clogs to pumps and other equipment caused by debris in the influent. "We always had a problem disposing of the debris that would come down through the collection system, plugging things up and causing problems in the clarifier," notes Mike Kelley, former superintendent of the Mendocino City Community Services District.

The facility staff solved the debris problem by installing an Aqualitec Screentec vertical bar screen with an automated rake.

SCENIC LOCATION

Mendocino County (population 87,000) stretches along the California coast between the Oregon border to the north and San Francisco three hours south. The area is attractive to residents and tourists seeking rest and recreation. This area is classified as the world's largest temperate rainforest ecoregion, attracting visitors from all over the world to enjoy the dense redwood forest and breathtaking Lost Coast.

Team members at the wastewater treatment facility enjoy a stunning view of beaches, islets and cliffs. The Town of Mendocino was established in 1851, but the first water treatment facility was not built for another 120 years. Finally, in 1971, the Mendocino City Community Services District was created as a solution to the area's wastewater and water issues.

DEALING WITH DEBRIS

Without a bar screen, team members had to remove debris manually by entering the wet well, a dangerous and time-consuming process. Unless removed, the debris would clog and eventually damage pumps, costing up to \$100,000 for replacement, an unacceptable expense for a relatively small community.

“It just fits right into our existing headworks without making any changes to the channel or to the concrete structure. It's a perfect solution.”

MIKE KELLEY

The Aqualitec Screentec bar screen proved to be a cost-effective solution, Kelley observes. The vertical bar screen filter system is designed to remove any solid objects from wastewater, while also protecting pumps and other downstream equipment from clogging.

The unit's vertical design enables it to fit headworks, pump stations, lift stations, wet wells and manholes. A stainless steel rake collects debris at

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the bottom of the frame. The material is then ejected upward and prepared for disposal.

This screen was well suited for the Mendocino facility because it can be retrofitted for any well size. “It just fits right into our existing headworks without making any changes to the channel or to the concrete structure,” says Kelley. “It’s a perfect solution.”

The screen became the first level of filtration in the wastewater treatment process and extended pump life cycles while also improving the quality of treatment. With no moving parts at the bottom of the frame, it can safely be operated from the top. Looking back at the time he ordered the device, Kelley says, “It was like a eureka moment. It actually worked perfectly.”

AFFORDABLE AND VERSATILE

The bar screen’s design for versatility made Mendocino’s installation easy. The unit eliminated the risks of manual debris removal while protecting high-value equipment.

“After a short period of time using the bar screen, it was obvious that it was removing everything,” Kelley says. “We no longer saw any debris in the clarifier. It was a big deal because it reduced the manpower it took to clean up the clarifier. It has definitely cut down our costs and freed up manpower for other types of maintenance.”

The system has been a good investment, saving money and improving operating efficiency. Since installation in 2011, the facility has spent only \$800 on maintenance fees. “The cost was low for the unit compared to many of the other ones I looked at,” Kelley says. “The Screentec unit doesn’t require much maintenance, and I expect it will continue to operate well for the district well into the future.” **tpo**

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.

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Centrisys secures order for Denver treatment facility

Centrisys Corp. will be sending eight CS26-4 decanter centrifuges to the Metro Wastewater Reclamation District in Denver. The new centrifuges will replace aging equipment and will support increased performance and capacity at the Robert W. Hite Treatment Facility, as the district moves into a new biological phosphorus-removal process.

SEEPEx promotes Karasch to national sales manager

SEEPEx announced the promotion of Chris Karasch to national sales manager. He joined SEEPEx over 12 years ago as a territory manager and has gained valuable insight into the progressive cavity market. He then moved into a district manager role, and then on to regional sales manager. He most recently was the director of sales.



Chris Karasch

120Water and PUR Community join forces on lead remediation

120Water, a digital water platform in use at more than 180,000 sample sites across the nation, has joined forces with PUR Community, a new municipality initiative created by PUR, a Helen of Troy brand, to simplify point-of-use drinking water programs for utilities, municipalities and facilities, including lead remediation programs. With this partnership, 120Water can offer PUR pitcher and filter kits as part of its digital water platform used across the country to manage and modernize complex water programs and to help stay compliant with EPA regulations, including the upcoming revised Lead and Copper Rule.

Grundfos appoints Poul Due Jensen as new CEO

Grundfos Holding's board of directors has appointed Group Executive Vice President Poul Due Jensen as its new CEO. He started with Grundfos in 1997 and since 2015 he has been a central part of the group management team.

Brown and Caldwell welcomes new head of diversity and inclusion

Brown and Caldwell announced Andrea Hall joined the company as senior director of diversity and inclusion. Hall brings a 17-year track record of creating and leading company-wide diversity and inclusion strategy and strengthening equitable processes for global organizations. As senior director of diversity and inclusion, she will be responsible for identifying and implementing programs to maintain and promote Brown and Caldwell's culture of belonging, diversity and inclusion. Additionally, she will enhance current diversity and inclusion initiatives as the foundation of its recruitment, retention and professional advancement practices.



Andrea Hall

Schneider Electric announces \$40M investment

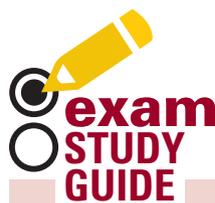
Schneider Electric announced a \$40 million investment to modernize its facilities across the U.S., and to bring new production lines to the states. In addition to new software and facility upgrades, the investment will further strengthen its workforce by introducing new digital training and upskilling opportunities and adds 130 new jobs.

MFG Chemical hires new VP operation

MFG Chemical has hired George Graham, Ph.D., into the key position of vice president, operations. He will be responsible for MFG's three plants in the Dalton, Georgia, area and the 27-acre plant in Pasadena, Texas. Graham joins MFG Chemical after a 25-year career and, most recently, served as director of operations at Wacker Polysilicon. **tpo**



George Graham



Licensing exams can be challenging. Our **Exam Study Guide** helps you prepare by presenting questions similar to those on an actual exam. You can find many more sample questions on the *TPO* website at www.tpomag.com/study.

WASTEWATER

By Rick Lallish

Typically, for an activated sludge process to maintain its operating parameters, what two variables impact the performance process and must be monitored?

- A. Temperature and humidity
- B. Upstream and downstream processes
- C. Federal guidelines and state regulations
- D. Time and operating capability

ANSWER: B. If the upstream and downstream processes run as desired, the activated sludge process can be controlled to meet objectives that include producing floc-forming bacteria, managing the activated sludge (foot/microorganism ratio) and maintaining healthy settleability in the secondary clarifier. Any disruption in the upstream or downstream process can affect the activated sludge process in many ways. An understanding of these processes is key for operators to maintain their facilities and meet NPDES requirements. More information can be found in the Office of Water Programs California State University, Sacramento textbook: *Operation of Wastewater Treatment Plants*, volume one, eighth edition, Chapter 5.

DRINKING WATER

By Drew Hoelscher

What is most likely to occur if a chlorine cylinder is stored in a room containing temperatures near 160 degrees F?

- A. The fusible plugs will melt to prevent any release of chlorine.
- B. The fusible plugs will melt, allowing chlorine gas to escape.
- C. The chlorine feed rate will drastically decrease due to lack of internal pressure.
- D. The chlorine inside the cylinder will only be in liquid form.

ANSWER: B. Chlorine stored inside steel cylinders expands as temperatures rise, creating excessive internal pressures. The melting of the fusible plug (or plugs) on a chlorine cylinder allows for a more controlled release of excessive pressure from chlorine gas. Fusible plugs melt at around 160 degrees F and are installed on 150-pound cylinders and 1-ton cylinders. The fusible plug on a 150-pound cylinder is located on the valve underneath the valve seat, and a 1-ton cylinder has three fusible plugs on each end.

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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The team at the Ashland Wastewater Treatment Plant includes, front row, from left, Kim Nethercutt, Operator 1; Jeff McFarlin, chief operator; and James Morgan, superintendent. Middle row, Larry McKee, lab director; Mark Anderson, lab technician; and Jeff Adkins, Operator 4. Back row, Dave Krueger, maintenance director; and Rick Morrison, Operator 2.

Making Do, Making Good

A KENTUCKY CLEAN-WATER PLANT TEAM MAINTAINS AWARD-WINNING PERFORMANCE WITH AGING EQUIPMENT WHILE AWAITING A BRAND-NEW FACILITY

STORY: **Jim Force** | PHOTOGRAPHY: **Ashley Quinn**

“We were down to half a plant. We were stressed but didn’t violate our permit.”

JEFF McFARLIN

For proof that there’s no keeping a good plant down, look to Ashland, Kentucky.

In February, a truck loaded with landfill leachate broke through the concrete slab over the main electrical conduit, shutting off power to the plant and the biosolids building for three days.

And that was followed by a staffing shortage, issues with sludge tubes in the rectangular clarifiers, aging equipment including a rotor aerator blade and the dewatering belt press, and a control system that dates to the 1980s and reminds the staff of something from the TV series, *Lost in Space*.

But through it all, the Ashland Wastewater Treatment Plant maintained compliance and received the 2019 Plant Operations Award from the Kentucky-Tennessee Clean Water Professionals organization — an honor the plant also won in 2009 and 2018.

“We had to do more than the job description called for,” says James Morgan, plant superintendent. Adds Jeff “Mac” McFarlin, chief operator, “Our guys really stepped up.”

OLD BUT FUNCTIONAL

Ashland’s is an extended aeration plant designed for an average daily flow of 11 mgd, with a hydraulic capacity of 18-20 mgd. Average flow is in the range of 5 to 6 mgd. The system serves the City of Ashland and several portions of Boyd County, near the West Virginia border.

After a headworks that includes grit screens and manually raked bar screens, the flow passes to a carousel

ditch system (Ovivo), equipped with rotor aerators. Treated water settles in rectangular clarifiers; it is disinfected with chlorine and dechlorinated with sulfur dioxide before discharge to the Ohio River, which flows alongside the property.

Moyno pumps (NOV) move biosolids to aerobic digestion and thickening before dewatering on Andritz Separation belt presses. Cake at about 16.5% solids is hauled to composting or to landfill. The plant is due for a complete upgrade, now being planned and due for completion in stages between 2022 and 2025.



Mark Anderson performs tests that are essential to keeping process quality and compliance on track.

Ashland (Kentucky) Wastewater Treatment Plant

www.ashlandky.gov



BUILT:	1981
POPULATION SERVED:	44,500
AREA SERVED:	City of Ashland, portions of Boyd County
FLOWS:	11 mgd design, 5-6 mgd average
TREATMENT LEVEL:	Secondary
TREATMENT PROCESS:	Oxidation ditch
RECEIVING STREAM:	Ohio River
BIOSOLIDS:	Aerobic digestion, composting and landfill
ANNUAL BUDGET:	\$1,935,000 (operations)



Jeff McFarlin at the aerator control panel.

frequency drives to the aeration basins to enable better control over flow and power usage.

Solids handling has been another issue, specifically the sludge suction tubes in the rectangular clarifiers and the hard-working but aging dewatering equipment. Pinhole leaks in the tubes prevented them from holding their prime for more than a few hours. That led to frequent repriming, plus abnormally high mixed liquor suspended solids. “Normally, we like to keep it around 3,000 ppm, and it was getting up to 4,000 to 5,000,” says Morgan.

Since these issues surfaced, the Ashland team has purchased new suction tubes (Pro-Fit) and McFarlin says they have “helped tremendously.” More replacement tubes are in the budget.

PRESSING MATTER

The belt presses are another issue.

“They’ve served us well for over 18 years, but they’re really too old to keep fixing,” says Morgan. “The rollers are getting so old that the screen won’t stay on.”

McFarlin adds, “Seems like all we’re doing is patch and patch and patch.” But there is a bright light here, and it’s Dave Krueger, maintenance director. “He’s an absolute beast,” says McFarlin.

Krueger is a whiz in the shop, able to fabricate just about everything and saving the plant a ton of money in the process. His welding abilities have helped keep the old belt presses operating. “In one case, the bearings were not machined correctly,” says Morgan. “They weren’t big enough for the housing.” Krueger machined a new housing to keep the bearings in place.

In another case, the plastic part that holds a fuse was broken. “This is

MEETING CHALLENGES

While serious, the collapsed pavement, damaged wiring, and power outage were just part of a series of challenges faced by the Ashland operations team in the last couple of years. Morgan says equipment issues have been the major headache; much of the treatment gear at least 30 years old.

Specifically, the staff had to deal with a broken aerator rotor on one of its two oxidation ditches. At the same time, another aerator malfunctioned, leaving the plant operating at half capacity, on just one basin. Luckily, the damage occurred during the summer when flows were low.

“We were down to half a plant,” says McFarlin. “We were stressed but didn’t violate our permit.” Ultimately, a new rotor was purchased and a crane brought in to install it. In addition, the team has started adding variable-

NEW PLANT IN DESIGN

Working with its engineering firm, Strand Associates, Ashland should finish the design for its updated wastewater treatment plant in 2021 and begin construction in 2022.

The project will modernize the wet end and the solids handling section of the plant, while working within the existing small footprint beside the Ohio River. Improvements to the collections system are also in the package.

The clarification process will undergo a major upgrade, with new circular basins. That will allow some of the old tanks to be used for storage of high flows. Jeff McFarlin, chief operator, says high flows have been a problem in the past: “We can spike to 40 mgd after a hard rainstorm. This will enable us to accept the storm flow and feed it back at the rate we want, rather than just having to try to slow things down.”

The old controls will be replaced by a new SCADA system, and alternative disinfection methods will be evaluated to relieve what Morgan refers to as a bottleneck at the chlorine contact stage.

To deal with nutrient removal requirements, Ashland will fully employ a modification to its oxidation ditches that the team has been experimenting with.

“A retired professor who’s still active in the field gave us a tip on turning off our aerators from one to four hours a day, just trial and error, until we found the right amount of time,” says James Morgan, plant superintendent. “We found that turning them off for two hours a day allows denitrification to happen in our ditches, rather than the clarifiers where it ends up degrading our effluent.” The new process will include an anoxic zone to accomplish phosphorus removal and help with denitrification.

The solids handling process will get a facelift, too, and the old workhorse presses will be retired. Pilot testing of new equipment was already going on late last summer. Morgan says fewer industrial dischargers on the Ashland system may mean the treatment plant will be able to produce a high-quality biosolids product that can be used as a fertilizer.



The Ashland Wastewater Treatment Plant has an 11 mgd design flow.

Ashland Wastewater Treatment Plant PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
BOD	208 mg/L	6.67 mg/L	45 mg/L
TSS	182 mg/L	6.42 mg/L	45 mg/L
Ammonia	N/A	2.66 mg/L	20 mg/L

“We’ll create good water as we build. Our people should learn as they see the new equipment being installed. Our maintenance issues should be better.”

JAMES MORGAN

not something you can just go down to the electrical shop and buy,” says Morgan. Instead, Krueger took pieces off spare electrical equipment and made a new fuse holder. Krueger is a Navy veteran and could retire soon. “We’ll hate to lose him,” says McFarlin. “He MacGyvers everything for us.”

STAFFING CHALLENGES

That brings up staffing, which may have been the most pressing issue at Ashland. “We’re fully staffed at 13 full-time positions, and we operate on site 24/7,” Morgan says.

But cutbacks caused by the COVID-19 virus have reduced the staff to 12. Plus, budget cuts cost the facility two seasonal employees who were responsible for groundskeeping and other maintenance. On top of that, the plant superintendent moved up to utilities director, the laboratory director retired, another lead operator left to take a position in private industry, and the staff experienced a number of sick leaves.

It was necessary to dip into the operations staff to fill the superintendent, chief operator and laboratory positions. “That left us short three operators,” says Morgan. “We were short-handed much of the year.” Then last August, Mark Anderson, laboratory director, died.

“This was yet another tough transition within our family here as we looked to somehow fill his shoes, absent of his years of service, all his years of curmudgeonry, his years of old Air Force stories, and his years of friendship,” says McFarlin.

How did they cope? Everyone pitched in. Morgan says the smaller staff had to do more frequent plant checks, and do its best to stay on top of everything. “Obviously, we had overtime,” says Morgan. “But some of us just had to do things that were more than the original job description called for. Supervisors had to do some manual labor. We just did what we had to do.”



James Morgan, left, superintendent; and Jeff McFarlin, chief operator

LOOKING UP

Better days should be ahead. Ashland has replaced the three operator positions; the new hires are in training for their Class 1 licenses. Besides Morgan, McFarlin and Krueger, the staff includes Kevin Cassidy, pretreatment administrator; Jeff Adkins, Operator 4; Larry McKee, new lab director; Rick Morrison and Claude Wright, Operator 2; and Kim Nethercutt, Patrick Ewing and Forrest Moore, Operator 1.

The new plant is on the horizon. “We’ll create good water as we build,” says Morgan. “Our people should learn as they see the new equipment being installed. Our maintenance issues should be better.”

Considering their experience and the coming improvements, it’s a good bet that more operational excellence awards are in the future for Ashland.

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The augmented reality-based Remote Insights tool from ABB is part of a suite of products aimed at helping users to quickly access equipment performance data and call for expert help when required.

Mastering Measurement

ONLINE DIGITAL MEASUREMENT TECHNOLOGIES BACKED BY PREDICTIVE MAINTENANCE ARE HELPING WATER INDUSTRY OPERATORS MEET GROWING QUALITY, SUPPLY AND COMPLIANCE CHALLENGES

By Jonathan Penn

With global water shortages looming, industries and municipalities increasingly seek solutions to avoid a water crisis. The combination of continuous water analysis technology and advanced digital predictive maintenance can make a significant difference in drinking water and wastewater treatment.

The impacts of a growing population, climate change and a trend toward urbanization are already having an impact on the way that water is managed and distributed. With predictions that demand for water will outstrip supplies by 40% by 2030, structures must be put in place to ensure access to water for as many people as possible.

Preparation for the future means understanding what is happening now and taking measures to prevent issues and optimize networks to meet current and future demand. In water plants, instruments and analyzers provide the front line in gathering information on water quality throughout the treatment processes.

Traditionally, testing entailed extracting samples for laboratory analysis and applying the results to the overall condition of the source from which the samples were taken. This approach only yielded information for a particular set of conditions at a moment in time.

ADVANTAGES OF TECHNOLOGY

In recent years, this method is being overtaken by online devices that measure and analyze conditions in real time or near-real time. Advanced digital technologies include the ability to use a single analyzer to measure inputs from multiple sensors tracking different parameters. These devices are deployed in a growing range of municipal and industrial applications that demand accurate, reliable, timely water quality measurement.

Given the need for continuous water treatment and supply, along with the growing need to conserve water and satisfy environmental regulations, operators need to fully understand what is happening in their processes.

Online measurement using the latest digital equipment provides ready access to data on current conditions. Operators then can make informed decisions to maximize treatment efficiency. This delivers significant benefits.

Optimized chemical dosing

During coagulation and flocculation stages in potable water treatment, it is important to ensure that the correct amounts of chemicals are added. Aside from the cost of the chemicals, overdosing can impair long-term filter efficiency and lead to excessive residual coagulant entering the distribution system. On the other hand, underdosing can inhibit removal of color, turbidity and microorganisms.

Continuous water analyzers that monitor key parameters like aluminum or iron content, turbidity, pH/ORP, color and dissolved organics help ensure that the water is dosed appropriately, keeping the process in balance chemicals costs in line.

In water plants, instruments and analyzers provide the front line in gathering information on water quality throughout the treatment processes.

Improved energy efficiency

Energy accounts for a significant share of treatment and distribution costs. For example, aeration in wastewater treatment typically accounts for more than half of plant energy consumption. For optimum efficiency, dissolved oxygen needs to be continually controlled and maintained. Too little will impair treatment efficiency; too much can hinder sludge settling and denitrification and increase treatment cost.

These problems can be overcome through continuous DO measurement. When used with digital sensing technology, online measurement helps closely

match DO to the actual oxygen demand. When coupled with automatic blower control, significant energy cost savings can be realized.

Reduced risk of compliance breaches

Drinking water quality and wastewater effluent regulations are tightening; noncompliance can bring penalties potentially running into millions of dollars. Continuous measurement again provides the answer. The latest optical measurement sensing technologies provide precise and extremely stable measurements, enabling operators to keep a close eye on the process and remain in compliance.

SHARPER MANAGEMENT

As operators rely on these devices to deliver the information they need, the devices must be kept in optimum working condition, with the ability to pinpoint, diagnose and rectify problems before they escalate. Developments in remote predictive maintenance technology make that easier to achieve. Technology opens new opportunities to interrogate, operate and maintain devices without an engineer being physically present.

Manufacturers offer an expanding range of technology-based services providing added value functions that give operators up-to-the-minute information on device status in a variety of ways through devices such as laptops,

PCs, tablets and smartphones. Often, these services include the option to have the devices monitored by the manufacturer, who can assess their performance and inform customers when remedial actions are needed.

The use of familiar technology interfaces also helps to equip service engineers with new tools to easily assess equipment performance and diagnose, report and resolve faults with minimal training. One tool enables an engineer to use a QR code to report a fault and get a fast response from a dedicated technical expert able to talk through and resolve a problem.

Another example is the use of augmented reality to enable users to collaborate remotely with a manufacturer's expert. Using live guidance overlaid on live video, the expert and the user share the same view of the equipment and can discuss what steps need to be taken.

BEING SUSTAINABLE

More information, better control, less cost, more focused maintenance, fewer breakdowns



Online water-quality measurement using the latest digital sensing and analysis equipment provides ready access to data on current conditions.

and a substantially reduced risk of water quality incidents — all these benefits come from the latest online digital measurement equipment. Predictive maintenance technologies make these devices a powerful solution to help water companies face the growing challenge of water sustainability.

ABOUT THE AUTHOR

Jonathan Penn is the product line manager for ABB's portfolio of continuous water analyzers. He can be reached at jon.penn@gb.abb.com. tpo

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Part of the Plan

ADVISOR MIKE MCGILL SAYS WATER AND WASTEWATER UTILITIES SHOULD MAKE COMMUNICATIONS WITH THE PUBLIC A COMPONENT OF THE OPERATIONS PROTOCOL

By Ted J. Rulseh

Water agencies today can't afford not to communicate with their publics. The issues are diverse: COVID-19. PFAS. Odors. Lead. Sewer overflows. Water main breaks. Boil orders. Facility improvements funded by rate hikes. To win public support in both good and difficult times, utilities need to make sure customers understand the work they do and how well they do it.

So says Mike McGill, founder of WaterPIO (for public information officer), a communications firm based in Hampstead, North Carolina. McGill launched the business in 2016 with a background in local and national news reporting, public relations and communications with the Washington Suburban Sanitary Commission, Loudoun Water in Ashburn, Virginia, and the Cape Fear Public Utility Authority in North Carolina.

McGill and his WaterPIO colleagues combine more than 70 years of experience working in water and three decades of expertise in news production and public relations. They help utilities meet a variety of communication challenges, including management of crises. McGill offered advice to utility leaders and plant operators and managers in an interview with *Treatment Plant Operator*.

tpo: Why is communication to the public so essential for water agencies?

McGill: There is so much that has to be communicated in water and wastewater, and the way the world has changed, with social media and everything, it doesn't make sense for a utility not to communicate. The simple fact is that we live in the instant information age. They need to be out front talking about how they provide safe, clean and reliable services. Then when a crisis happens, they have built up some trust to draw upon.

tpo: What are the consequences of failing to communicate effectively in a crisis?

McGill: In this day and age, if you fail to respond appropriately in a crisis, your reputation can be wiped out in days, and can be tarnished for years. If you want to make a case to the public for strengthening your systems, and it involves a rate increase, and the public doesn't trust you because you failed in an earlier crisis, that hampers your ability to do your job.

tpo: How is communication relevant to the professionals who manage and operate treatment facilities?

McGill: To people who operate the systems and make sure everything works properly, we say: Treat communication like any other part of your operation. It works in conjunction. It's not off to the side. It's not in a binder

sitting on a shelf collecting dust. It's wholly integrated with operations. So if you have a problem, you have an action plan, and the communication about that action plan is perfectly in sync. You could have the best operational plan possible, but if you fail when communicating it, people will think it's the worst plan possible.

tpo: What is the single biggest thing to remember when communicating in a crisis?

McGill: I always say that accuracy is Job 1, but speed is Job 1A. The way you achieve that is first to have a proper plan in place before a crisis hits. You test that right along with your operational plan. If you have done the work in advance, if you have the information 80% to 90% complete, then you can just plug in the specifics of the situation and push it out quickly. And you are going to be ahead of the game. You have approval processes and staffing delineations in place — who does



Mike McGill

“ I always say that accuracy is Job 1, but speed is Job 1A. The way you achieve that is first to have a proper plan in place before a crisis hits.”

MIKE MCGILL

what, when and how, and who approves it. If you're not prepared in a crisis, if you're throwing things against the wall, you're going to make mistakes, you're going to look bad, and it's going to harm your reputation.

tpo: What happens with communication after the first stages of a crisis?

McGill: You rely on your plan to get your initial response out fast and accurately. Then you get your audiences on a regular system of updates. You inform them first, so before their questions come to mind you have already answered them. That is vital. Consider especially the critical customers in your service area. If they don't understand what's going on because you're not communicating, then all bets are off. They will go elsewhere for information, which usually will not be correct, and that's going to cause new problems. They may call the press or elected officials for the answers you're not giving. Then the press and the elected officials turn on you and say: *Why aren't you communicating?* That can derail your operational response.

“The adage we had in newsrooms was: If I hear from you first, I trust you first. If I hear from you last, I trust you last.

That’s as basic and essential as it gets.”

MIKE MCGILL

tpo: How can a utility organization deal effectively with social media?

McGill: As part of your plan, you have to be active rolling out information on social media. That information will mirror what you put out for the press and public. Then you have to engage on social media to prevent misinformation from wrecking your communications work.

tpo: In the context of a complete communication program, what is the relative importance of social media?

McGill: I do not insist that social media is the end-all be-all. Most people don’t engage on social media saying, “Now I get to interact with my water and sewer utility.” But you do have to be there as part of the conversation. If you’re not, someone else takes that conversation over. You’ve got to take part, you need to have a plan, but don’t miss the forest for the trees by avoiding working with mass media.

tpo: Why do the traditional media retain so much importance?

McGill: If you produce a video for social media, 250 people might see it. But if you work with the press on a story to get out proactive information about what you do and how you do it, 10 to 100 times as many people will see it. And you’ll have a third party — the reporter — saying how well you’re doing your job.

tpo: What is the most common mistake utilities make in communication?

McGill: They go into a bunker. They feel people don’t understand and appreciate them. No one gets into water and wastewater for the glory — it’s a public service. But you have to be out there assuring your customers that you’re doing the job and doing it well. If they search on Google about water and wastewater, they’re going to get a lot of negative information. You’ve got to be part of the communication process. Out of sight, out of mind might have worked in the past, but not anymore.

tpo: In what other ways can utilities’ communications fall short?

McGill: One is lack of appreciation for how essential communications are. We see people who have their operational plans nailed down to a tee, but they treat communications as kind of a necessary evil. In reality, if you are not communicating your actions well, then your actions will be viewed as poor. Another is failing to make a commitment. Some utilities say, “We’ve done some communication. We dipped our toe in the water, it worked out all right, but we won’t commit to it.” They are missing a lot of opportunities. You will lose the success you’ve had if you don’t consistently build on it.”

tpo: Can you give an example of the importance of sticking with communication?

McGill: We had a water utility client whose lead exceedance was on the order of 50 parts per billion. We explained to the press and the public what we were going to do about it and how it would take time, in order to set expectations. We took a little bit of a hit in the press, but we actually we got some pretty decent coverage. Six months later when we got our results, we were still in the 30s, twice the action level. At that point a lot of people would say, “We’re not going to talk about that.” That’s where you go wrong. Instead, we said, “Yes, we’re in the 30s, but look at the progress we’ve made already.”

tpo: How receptive do you find agencies to be in laying the groundwork for crisis and communication generally?

McGill: It’s getting better and better. We see organizations that want to plan more, that see the dangers of being caught off guard and the benefits of

having a plan. There are many water issues coming up because testing technology is improving and we’re finding everything in our water. If they’re not ready for that, they’re going to be in big trouble when something is found. We have significant threats to public confidence in our services. More and more utilities understand that. Some old adages have had to age out.

tpo: What is an example of an adage or an attitude that needs to change?

McGill: When I started my business, there were always people in the back row of my presentations saying, “Sure, kid. If we tried to explain ourselves to the public, they’re not going to understand it. They’re only going to get confused. So we’ll tell them what we want to tell them, when we want to tell them.” But in this instant information age, if you take that attitude, you’re dead. The adage we had in my newsroom was: If I hear from you first, I trust you first. If I hear from you last, I trust you last. That’s as basic and essential as it gets. Pushing out information whenever you have something to say, that will help you win.

tpo: What do you advise for a utility that doesn’t yet feel comfortable about communicating on a regular basis?

McGill: I don’t propose they go beyond their comfort level, unless I can make the case that doing so is a great benefit. We work with utilities that don’t want to go proactive yet. We understand that, but at least let’s get ready.

tpo: What does that “get ready” phase involve?

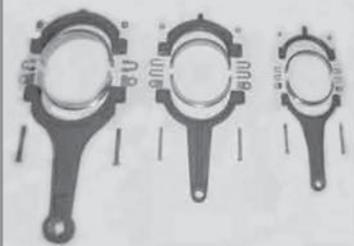
McGill: If a utility doesn’t yet want the spotlight on them, OK. But let’s get halfway there and have a plan in place, so that whenever you hit a problem, you’re ready. And when you decide to do proactive work with the press and the public, it’s easier. You’ve already of climbed a few steps up that ladder.

tpo: What would you say as a final word to treatment plant operators and managers?

McGill: They are typically not the people who control communications in their utilities, but what I say to operators is that they can help by understanding how important communication is and by bringing that up the line, incorporating it into their operations plans. A solid communications plan is going to help you make the case for more funding when you need it. And if you have a crisis communications plan, then when the worst happens, you’re ready to go. You have the confidence to say, “We’re going to get through this, and here’s how.” tpo

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A portion of the Water Wise Demonstration Garden and an informational kiosk along the pathway.

Less Water. Same Beauty.

A XERISCAPING DEMONSTRATION GARDEN IN COLORADO SPRINGS SHOWS RESIDENTS HOW TO CREATE APPEALING LANDSCAPES WITH LESS NEED FOR IRRIGATION

By Jeff Smith

Two acres of land next to the 42 mgd Tollefson Water Treatment Plant in Colorado Springs are the showpiece of water conservation.

The Water Wise Demonstration Garden, created by Colorado Springs Utilities, presents a water-saving landscape that is an attraction for thousands of residents and tourists. Divided into 10 segmented areas arranged according to their watering needs, the garden boasts more than 45 species of trees, shrubs, plants, flowers and native grasses. Each unique area is designed to demonstrate the seven principles of xeriscape gardening.

“It provides real-life examples of how you can get all the beauty and benefits of xeriscape gardening, but still use water more wisely,” says Catherine Moravec, senior water conservation specialist for the utility.

VISITOR FRIENDLY

Concrete walkways and a few gravel paths meander throughout the site. Benches and seating areas allow visitors to stop and read informational kiosks or view interpretive signs. Many trees, shrubs, plants and grasses are identified with 2- by 4-inch metal labels mounted on stands. A display explains the xeriscaping principles: planning and design, soil amendment, plant selection, suitable turf, mulching, efficient irrigation and proper maintenance.

The garden was planned and originally planted in 1991. Since then, it has expanded to include experimental concepts. “As we get new ideas and a

“ [The garden] provides real-life examples of how you can get all the beauty and benefits of xeriscape gardening, but still use water more wisely.”

CATHERINE MORAVEC

better understanding of how to make all this work, we develop a new area around the garden,” Moravec says. “The garden area is surrounded on two sides by the water treatment plant, so about every 10 years we ask the water plant to consider moving the fence back a little so we can expand the garden.”

The most recent expansion was in 2015, when the utility’s Water Conservation Group developed the Water Wise Neighborhood. Consisting of five small-scale front yards, the area is specific to the needs and concerns of city residents. Homeowners can pick up a handout that provides a design guide and plant list for each area. Visitors get a good idea of the different styles they can use and which plants will thrive with different amounts of water.

TAKING CARE

Garden maintenance is the job of the Water Conservation Group and a large corps of volunteers. “We have limited interaction with the treatment



The entrance to one area of the Water Wise Demonstration Garden.



Catherine Moravec, senior water conservation specialist for Colorado Springs Utilities, in front of a portion of the Water Wise Neighborhood of the xeriscape demonstration garden.

plant because they're responsible for cleaning and providing the water, and we're responsible for helping customers use it wisely," Moravec says.

The area's semiarid climate accentuates the need to build a conservation ethic, says Moravec. Between 35% to 45% of the water the utility delivers is for landscape irrigation. "How do we meet the water needs of our growing community and prepare for their future needs?" Moravec asks.

"We are always looking for efficiencies, whether in low-flow toilets, better heating and cooling systems. In the case of landscapes, we want to set an example of how people can use xeriscape gardening techniques and still have a beautiful landscape with healthy vegetation, while watering once a week rather than three times."

The utility's conservation efforts are supported by a state sponsored Water Wise initiative that addresses water challenges by improving water-use efficiency through diverse community connections and innovative solutions. Many web-based resources detail specific practices that form a foundation for efficiency.

EDUCATION FIRST

Education is the primary goal. "We have rebate programs and incentives, but education is what's really the most important to us," says Moravec. "We feel that education has been the reason we have seen a reduction in overwatering, down to about 15%.

"When we talk to the energy demand management staff, their primary approach is that if they can get people to change out the hardware to increase efficiency, then they've done their job. On the water side, it's significantly different because water use is governed a lot by behavior. We invest in education, because that's the foundation of helping people use water wisely."

In normal (non-COVID-19) times, the utility offers joint tours of the Tollefson Water Treatment plant and Water Wise garden; it makes a great field trip for school groups because they learn about where their water comes from and what they can do to use it wisely.

During the pandemic, other educational efforts continue. Instead of the 14 in-person Water Wise landscape classes held last year, 11 webinars were substituted this year. "We had more than 800 registrants to the webinars, and so far have tracked nearly 1,600 additional views of the webinar recordings," says Moravec. "We have reached more people this year and hope to continue improving our approach in 2021 as we learn more about using technology.

"The thing that I talk about with our water operations department is that we go through a whole lot of effort to get water rights, transport water to our community, clean it to drinking water standards, and distribute it to people's houses. If we can support our community to understand water's value and to use it wisely, then the whole system is working together." tpo



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Kaeser EBS 410 rotary screw blowers

Kaeser Compressor's energy efficient EBS 410 series rotary screw blowers come in 30 to 100 hp models and provide up to 1,448 cfm with pressures from 4 to 15 psig. EBS blowers feature the renowned Sigma Profile airend and high-efficiency gear drive technology. They are available in both STC (wye-delta start) and SFC (variable-frequency drive) for superior energy performance and reliability. The blowers are shipped completely assembled with high-efficiency motors, inlet filters, silencers, integral starters/drive and a full complement of sensors. The fully soundproofed enclosure is designed with all maintenance access points in front and process connections in the back for space-saving side-by-side installation. The advanced Sigma Control 2 is standard on all models and features expanded communication capabilities including remote monitoring and email notifications for service and alarms.

877-596-7138; www.kaeser.com



Infinite Informatics AERINOS ProfiSens wireless IoT system

CAS DataLoggers' new AERINOS ProfiSens wireless IoT system from Infinite Informatics includes

product spotlight

wastewater

Ultrasonic technology helps control algae

By Craig Mandli

Algae and biofilm often cause headaches for water and wastewater facility operators. They can cause issues such as increased pH, as well as high BOD and TSS, causing discharge issues, and pushing permit limits to the brink of compliance. Ultrasound technology, though, is proven to reduce algae, which can lower potential fines and compliance concerns. The **Mezzo-DB** from **Sonic Solutions** is an ultrasonic device designed specifically for algae and biofilm control in water and wastewater applications.

The Mezzo (bidirectional) DB (dual bandwidth) offers a bidirectional sound output achieved with a piezo sound emitter that operates in two different bandwidths for better control of green algae and diatoms in the lower bandwidth and blue-green algae in the higher bandwidth, making it ideal for use in water and wastewater.

"There are two unit sizes in the Hydro BioScience product line — the Quattro-DB and Mezzo-DB," says Devon Taylor Assael, vice president of sales and marketing for Sonic Solutions. "They can be used widely across multiple applications in the municipal water industry, from drinking water reservoirs, holding lagoons, clarifiers and basins at the treatment plant, to wastewater lagoons, discharge ponds, aeration basins and cooling towers."

The Mezzo-DB, part of Sonic Solutions' Hydro BioScience product line, offers a 360-degree range with a single unit. The technology emits over 2,000 frequencies in dual bandwidth, with the range of a single unit covering up to 120 acres of a blue-green algae issue with a single unit. It can be run off a simple 180-watt solar panel floating system that offers

a family of wireless sensor nodes and a cellular data gateway which forwards data and sends SMS alarm messages. Features include low-power operation from a lithium battery or external power; wireless range of greater than 3 miles (line of sight) between sensors and data concentrator; up to 32 sensor nodes and 64 measurement channels; support for FTP upload and SMS alarm messaging; and a rugged IP66 enclosure suitable for outdoor use.

800-956-4437;
www.dataloggerinc.com



Mezzo-DB from Sonic Solutions

a continuous charge. According to Assael, Sonic Solutions has more than 17 years of research and development invested in the Hydro BioScience line.

"Ultrasound is a great fit for the municipal water treatment industry because it helps to reduce chemical use, and assists with customers to keep in compliance," she says. "There are few instances where ultrasound would not be a good solution, and the sales and customer service team at Sonic Solutions Algae Control will help with making sure that ultrasound would be a viable solution for each customer's application."

Maintenance on the unit is relatively simple as well. "Our customers love the ease of install, the reduction of chemical required throughout their system, and the more permanent solution," says Assael. "The return on investment for a typical installation, when compared to ongoing chemical costs, is approximately 1 1/2 years."

866-562-5423; www.sonicsolutionsllc.com



Endress+Hauser Liquiline Mobile CML18 monitor

Endress+Hauser's Liquiline Mobile CML18 multiparameter handheld device enables easy and reliable monitoring of a variety of critical measured values. The CML18 can be paired with the CPL51E pH electrode for applications in the lab or for grab sample analysis in the field.

The CML18 device can be operated easily using the intuitive SmartBlue app. All measured values and sensor data are transferred via a secure Bluetooth connection to the app on a smartphone or tablet. The device has an integrated, wireless charging function, which enables inductive charging using a Qi-certified charger. The monitor can also be used with Endress+Hauser Memosens pH, ORP, conductivity and dissolved oxygen sensors.

888-363-7377;
www.us.endress.com

product spotlight

water

Popular check valve now available in larger size

By Craig Mandli

Water wells require heavy-duty infrastructure components designed to operate in high-stress situations for long periods of time. Because much of that infrastructure is located below ground, water treatment operators need to have the confidence to install components that they know will continue working properly over long periods. And with larger wells with increased flow rates now a necessity in growing communities, the infrastructure to deliver that water needs to grow as well.

The **Model 80DIVFD submersible pump check valve** is an industry-proven heavy-duty in-line poppet-style valve designed to prevent flow reversal. When pumping from a well, water is allowed to flow through the valve, which then closes automatically when the pump is shut off to prevent backflow. **Flomatic** recently expanded their AIS-compliant Model 80DIVFD submersible pump check valve offerings to include a 10-inch size. With the addition, the submersible pump check valve is now available in an extended size range from 1 through 10 inches for use with variable-frequency drive control submersible pumps or conventional systems.

Standard check valves will “chatter” and be noisy when a VFD goes to low flow, causing premature wear and eventual failure. The Model 80DIVFD valve is designed to minimize flow losses and hydraulic shocks in the submersible pumping system. It includes a standard epoxy coated (ANSI/NSF 61 approved powder) ductile iron body to support deep-set pumps. A stainless steel guided poppet system ensures that the valve automatically adjusts noiselessly from high to very low flow rates. The radiuses of the valve seat allow a self-cleaning “one point swiping action” by the radius-edged custom molded rubber seal disc.

“The whole internal assembly can be actuated up and down very easily with minimal pressure required,” says Brian Allen, engineering manager/design engineer with Flomatic Valves. “It is a very smooth, stable mechanism, with no vibration during normal flow conditions.”



NOARK Electric Ex9CA safety contactor

The new Ex9CA safety contactor from NOARK Electric is designed for use in safety function applications. It offers unique features that allow the design of safety control circuits with current ratings up to 38A. Applications for the Ex9CA include E-stops, light curtains, safety gates and safety interlocks. The NOARK

Electric Ex9CA is equipped with a permanent transparent cover that prevents manual operation and provides easy identification of the device status. They are available with either AC or DC operating coils. DC coil models are equipped with integrated surge suppression. They install easily on 35 mm DIN rail or on panels.

626-330-7007;
na.noark-electric.com tpo

Check out more manufacturers and dealers at:

tpomag.com



Model 80DIVFD from Flomatic

All internal parts are made from corrosion-resistant materials and have a high-strength durable design. An optional 1/2- or 3/4-inch break-off plug, the Model “PLG”, is available for easy, safe, and quick pulling of the pump for servicing. The Model 80DIVFD is designed to be more flow efficient than standard check valve models, and is rated to 600 psi and 180 degrees F max. It is also available in an all-stainless steel version, Model 80S6 VFD.

“There is no noise, and no turbulence, with very low friction losses,” says Allen. “That’s all with that high psi rating and at very high flow rates.”
800-833-2040; www.flomatic.com

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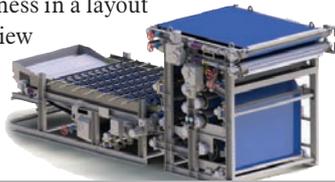
Biosolids Management and Headworks

By Craig Mandli

Belt Filter/Rotary Presses

ALFA LAVAL AS-H KPZ BELT PRESS

The Alfa Laval AS-H KPZ belt press is designed to allow high solids loading while maintaining a high hydraulic throughput. Performance results in ideal sludge cake dryness in a layout that allows for an operator floor-level view of the gravity deck. It is suitable for all municipal biosolids and residual sludge types and a wide variety of industrial solid/liquid separation applications, such as paper, petrochemical, mineral, food processing, pharmaceutical and chemical. It incorporates variable energy mixing, flocculation, gravity drainage and pressure filtration. The design allows for decreased civil construction costs, elevated cake discharge height and low maintenance requirements. **866-253-2528; www.alfalaval.us**



AS-H KPZ belt press from Alfa Laval

BRIGHT TECHNOLOGIES, DIVISION OF SEBRIGHT PRODUCTS, SKID-MOUNTED BELT FILTER PRESS



Belt filter press from Bright Technologies, Division of Sebright Products

The compact 0.6-meter skid-mounted belt filter press from Bright Technologies, Division of Sebright Products, has stainless steel frame and roller construction, as well as radius wedge zone and wing roller for sludge dewatering. Components include a sludge pump, polymer system and wash-water booster pump. Options

include a sludge flowmeter, air compressor and discharge conveyors. The compact walk-around skid design can be utilized in as little as a 10-by-20-foot floor area. The Boerger rotary lobe sludge pump has a maintain-in-place design offering ease of maintenance. Cake solids of up to 35% can be achieved. Rates of 25 to 50 gpm make it ideal for small applications or when a processor has outgrown dewatering containers. **800-253-0532; www.brightbeltpress.com**

Biosolids Handling/Hauling/Disposal/Application

HYDRA-TECH PUMPS S3CSL

The S3CSL submersible 3-inch hydraulic-driven sand slurry pump from Hydra-Tech Pumps includes a built-in agitator used for stirring up solids. It has hardened alloy wear parts and is designed to be used in applications where settled solids must be put into suspension and pumped away with the discharge water. Primary applications include



S3CSL pump from Hydra-Tech Pumps

desilting ponds, lakes and streams; other uses include filling sandbags to prevent beach erosion, cleaning tanks and digesters, or pumping sediment from caissons. It requires hydraulic inputs of up to 10 gpm at 3,000 psi, and when combined with HT11 to HT20 open and sound-attenuated power units, it is capable of output flows to 450 gpm. **570-645-3779; www.hydra-tech.com**



Level Lodor cover system from JDV Equipment

JDV EQUIPMENT LEVEL LODOR

The Level Lodor cover system from JDV Equipment helps contain odors by covering standard dump containers used for hauling processed material. The design allows for even distribution, increasing the fill percentage without having to manually even out material. Enclosing containers allow outdoor installation without exposing material to the environ-

ment or pests. **973-366-6556; www.jdvequipment.com**

PAXXO LONGOPAC FILL

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



Longopac Fill continuous bag system from Paxxo



Smart Air Injection system from SEEPEX

SEEPEX SMART AIR INJECTION

Smart Air Injection, or SAI, is a SEEPEX customized system solution for pumping over long distances. The system uses compressed air and polymer injections to convey biosolids, or other media with a dry matter content of 20% to 40%, over distances of up to 1,000 meters. This combination ensures a low-pressure level

in the delivery line, as well as low friction, which translates into a long life cycle and low operating costs. The system is easy to integrate into existing automation and control systems; reduces the pressure rating of the pipework and valves; and is an enclosed pipework system, eliminating unpleasant odors or rainfall dilution. Open-hopper SAI systems with Smart Conveying Technology reduce maintenance time by up to 85% with the maintain-in-place design, requiring no disassembly of discharge pipework. **937-864-7150; www.seepex.com**

Biosolids Heaters/Dryers/Thickeners

BDP INDUSTRIES ROTARY DRUM THICKENER

The rotary drum thickener from BDP Industries is a suitable solution to thicken at water and wastewater treatment facilities. Internally baffled thickening zones lead to higher solids capture and higher throughput capability, all with reduced polymer usage. A full stainless steel construction with all bearings located outside of the enclosure makes operations and maintenance activities simple and easy. **518-796-1440; www.bdpindustries.com**



Rotary drum thickener from BDP Industries



Euro Series from Hurst Boiler

HURST BOILER EURO SERIES

The Euro Series from Hurst Boiler has a full wet-back radiant heat transfer area that promotes internal water circulation and rapid heat absorption. Separate rear tube sheets allow each pass of tubes to expand and contract at their own rate without tube-to-sheet stress.

Tubes are mechanically rolled, flared and beaded, making any tube service a simple matter. The only refractory in this design is a rear plug, which allows easy access to the furnace for inspection. It is available in eight models from 100 to 2,000 bhp. It is designed for optimum fuel efficiency and has proven in certified tests to meet, and often exceed, the efficiencies of four-pass boilers. There are no refractory baffles to replace or maintain. **229-346-3545; www.hurstboiler.com**

PIERALISI NORTH AMERICA SLUDGE THERMAL DRYER

The sludge thermal dryer from Pieralisi North America is totally automated and easy to operate. It reduces sludge volume by 75%, producing Class A biosolids. It is self-sustainable with biogas as fuel from biodigesters or energy from waste gas turbines. It uses AISI 316L stainless steel for all contact parts, needs only a small area for installation and has low maintenance cost. Its operation uses negative pressure throughout the system, avoiding gas emissions, dust and odor. The dried sludge has a spherical shape of 0.5-inch average diameter. **513-760-9077; www.pieralisinorthamerica.com**



Sludge thermal dryer from Pieralisi North America

Chemical/Polymer Feeding Equipment



Proseries-M M-4 from Blue-White Industries

BLUE-WHITE INDUSTRIES PROSERIES-M M-4

The Proseries-M M-4 from Blue-White Industries is suitable for metering the harsh chemicals associated with the water and wastewater treatment applications. It delivers accurate, smooth and quiet dosing of treatment chemicals. With output rates ranging from 0.002 to 158.5 gph, the peristaltic chemical metering pump is well suited to dosing chemical into large municipal water and wastewater treatment applications. The peristaltic pumping action ensures the unit will not vapor lock or lose prime, even when using off-gassing chemicals such as sodium hypochlorite and hydrogen peroxide. Units have CNC-machined squeeze rollers and two alignment rollers for optimum squeeze and tube life. The single-piece, heavy-duty rotor means no flexing as well as increased accuracy, and there are no metal springs or hinges to corrode. **714-893-8529; www.blwhite.com**

The peristaltic chemical metering pump is well suited to dosing chemical into large municipal water and wastewater treatment applications. The peristaltic pumping action ensures the unit will not vapor lock or lose prime, even when using off-gassing chemicals such as sodium hypochlorite and hydrogen peroxide. Units have CNC-machined squeeze rollers and two alignment rollers for optimum squeeze and tube life. The single-piece, heavy-duty rotor means no flexing as well as increased accuracy, and there are no metal springs or hinges to corrode. **714-893-8529; www.blwhite.com**

FORCE FLOW TOTE BIN SCALE

The Tote Bin Scale from Force Flow allows plant operators to accurately monitor the amount of polymer being fed from IBC-type totes for dewatering. Simply place the tote on the platform and monitoring begins, as there is nothing to install inside the tote. Monitoring systems prevent costly overfeed conditions



Tote Bin Scale from Force Flow

and enable the documentation of the actual amount fed, which keeps the plant in compliance with federal and state reporting requirements. Users can remotely monitor from SCADA or PLC. The unit is available with the SOLO G2 digital display or with the advanced Wizard 4000 chemical inventory management system. **800-893-6723; www.forceflow.com**

LUTZ-JESCO AMERICA LJ-POLYBLEND POLYMER SYSTEM

The LJ-PolyBlend Polymer System from Lutz-JESCO America is a dependable, motorized mixing machine with a corrosion-resistant housing, large turbine and multizone mixing chamber that provides uniform dispersion energy at the moment of initial polymer wetting. The prime mixing zone fully activates the polymer, while the second mixing zone promotes gentle polymer activation via a small turbine, lessening molecule fracturing. Its stainless steel injection valve prevents agglomerations and reduces the need for extended mixing time. The system includes a clear mixing chamber that provides visual monitoring of mixing polymer feed. Its compact design — only 1 to 1.5 square feet — means it's light and allows for easy installation and transportation. It has automatic pump speed adjustment via 4-20mA input, water flow sensor and priming port. **800-554-2762; www.lutzjescoamerica.com**



LJ-PolyBlend Polymer System from Lutz-JESCO America

PULSAFEEDER PULSATRON SERIES HV



Pulsatron Series HV from Pulsafeeder

The Pulsatron Series HV from Pulsafeeder is designed for high-viscosity applications for precise and accurate metering control. It offers manual control over stroke length and stroke rate, with the option to choose between 4-20mA and external pace inputs for automatic control. Models are available with pressure capabilities to 150 psi at 12 gpd, and flow capacities to 240 gpd at 80 psi, with a turn-down ratio of 100-1. It comes with a reliable timing circuit, circuit protection against voltage and current upsets, panel-mounted fuse, solenoid protection by thermal overload with auto-reset, water resistance for outdoor and indoor applications, and guided ball check valve systems to reduce back flow and enhance priming characteristics. **800-333-6677; www.pulsatron.com**

Composting Equipment

BROWN BEAR R31 SERIES

The Brown Bear R31 10-foot aerator attachment provides a solution for building windrows, blending bulking agents or additives, pulverizing, aerating and water addition for aerobic composting. It quickly attaches in place of the bucket on skid-steers and compact track loaders. The attachment is powered from the high-flow hydraulics of the skid-steer or compact track loader. The high-production aerator's reverse rotation works the windrow from the bottom up and to the side. The unit operates on soft or hard surfaces. Its intermittent flights are reversible, bolt-on and made from abrasion-resistant high carbon steel. **641-322-4220; www.brownbearcorp.com**



R31 aerator attachment from Brown Bear

(continued)

Dewatering Equipment

AQUA-ZYME DISPOSAL SYSTEMS ADS

The ADS 30-yard open-top roll-off dewatering unit from Aqua-Zyme Disposal Systems can be filled with 22,000 to 25,000 gallons of biosolids at 1% to 2% solids in about two hours.

After draining for 24 hours, the unit can be picked up using a standard-capacity roll-off truck and transported for solids disposal. Sludge volume can be reduced by 80% with reductions to 98% in BOD, COD, FOG and TSS. Effluent is clear, the unit has few moving parts, and the size of filter media can be selected according to job requirements. Standard equipment includes a roll-over tarp system; side, floor and center screens; 1/4-inch floor plate; 7-gauge side plates; four door-binder ratchets; eight drain ports; two inlet ports; and a long-handle scraper. Units are also available in a 15-yard size. **979-245-5656; www.aqua-zyme.com**



ADS dewatering unit from Aqua-Zyme Disposal Systems



Dewatering system from In The Round Dewatering

IN THE ROUND DEWATERING HORIZONTAL DRUM

The horizontal biosolids dewatering system from In The Round Dewatering has a stainless steel drum with perforated plastic tile lining. The drum is mounted on a roll-off frame for easy transport and unloading. Water trays allow containment of discharge water. An 18,000- to 25,000-gallon batch is mixed with polymer before being filtered in the rotating drum, driven by a 1/2 hp variable-speed electric motor with a heavy-duty chain and sprocket. The turning eliminates crusting and wet pockets to produce uniform, consistent results. The dewatered material dumps easily, and the drum is self-cleaning. **317-563-2072; www.itrdewatering.com**

The turning eliminates crusting and wet pockets to produce uniform, consistent results. The dewatered material dumps easily, and the drum is self-cleaning. **317-563-2072; www.itrdewatering.com**

PARK PROCESS SLUDGE KING II

The Sludge King II roll-off dewatering container from Park Process uses filters that turn 90 degrees at the bottom of the container, leaving standing water in the cake. This also increases the usable area of the filters by 33% over older containers with only one center filter wall. The increased filter surface area and the narrowed sludge compartments formed by the additional filter panel translate into drier cake formed in less time. **855-511-7275; www.parkprocess.com**



Sludge King II dewatering container from Park Process



Chopper pumps from Vaughan

Grinders/Shredders

VAUGHAN SELF-PRIMING CHOPPER PUMP

Self-priming chopper pumps from Vaughan are designed to be easily accessed outside of the wet well while pumping waste solids at heavy consistencies, without plugging or dewatering of the solids. They eliminate the loss in production and mess, along with making it easy to service the pump to get it back in operation. **888-249-2467; www.chopperpumps.com**

VOGELSANG ROTACUT

The RotaCut inline macerator from Vogelsang is designed to remove heavy solids from the waste stream while using a spinning blade assembly to reduce debris such as rags, wipes, hair, string, plastics, wood and bone into an acceptable size for the downstream equipment to pass. Instead of shredding hard objects such as metal or stone, the units catch heavy debris in a collection pot for removal from the line. Not only will these units protect pumps and dewatering equipment, they are ideal for biosolids conditioning based on the blades' ability to create a homogenized slurry. It comes in numerous models designed for a range of flow rates and pressures. They offer an ACC (Auto Cut Control) design, autoreverse, self-sharpening blades and easy inline maintenance. **330-296-3820; www.vogelsangusa.com**



RotaCut inline macerator from Vogelsang

Grit Handling/Removal/Hauling



OctoCell grit removal system from Envirodyne Systems

ENVIRODYNE SYSTEMS OCTOCELL

The OctoCell grit removal system from Envirodyne Systems uses stacked trays to achieve a small footprint. Unique to their design is the inlet trough and tentacle arrangement above the trays, which means the flow path to each tray is the same size/length to better equalize pressure drops, meaning reduced headloss and greater grit removal efficiency. It allows for visual detection of any plugging and serves as a means of controlling flow to each individual tray. It has the ability to engage/disengage trays automatically based on flow variations. A "lollipop" configuration is also available for enhanced control of velocities and reduced organics accumulation. **717-763-0500; www.envirodynesystems.com**

FLUIDYNE HYDRO-GRIT

The Fluidyne Hydro-Grit high-efficiency vortex grit-removal system is capable of removing 95% of all grit 75 micron and larger at all flow up to peak design flow. The grit separator can be supplied freestanding in stainless steel or fiberglass tankage, eliminating the need for concrete influent and effluent channels. Alternately, in cold weather climates or areas with limitations with existing hydraulic profiles, the unit can be submerged inside a concrete structure provided by others. It requires a minimal footprint and is designed to limit headloss. No internal moving parts eliminates maintenance inside the tank or structure. Large baffling and weirs abolish the need for a continuous source of flushing water for proper performance and to prevent plugging. It can be used at industrial and municipal wastewater treatment plants to remove fine grit and sand with pre-engineered models ranging from 0.5 up to 50 mgd. **319-266-9967; www.fluidynecorp.com**



Hydro-Grit grit-removal system from Fluidyne

Screening Systems

FEDERAL SCREEN MBBR SYSTEMS SCREENS

MBBR System Screens from Federal Screen are used as a secondary treatment for a variety of municipal and industrial applications. They are designed to maximize flow rates as well as to prevent biofilm carri-

ers from escaping in wastewater treatment applications. Manufactured with high-quality stainless wedge wire, using wastewater screens reduces environmental pollution levels and lowers operational costs over the years. They are fabricated with strong and durable resistance welding, and are available in a wide range of profile wire to suit most systems. They are robust for vertical wall applications and are self-cleaning when designed to the flow rate. Screens are available in a flat, curved or cylindrical form, and are manufactured to meet specifications. **905-677-4171; www.federalscreen.com**



MBBR System Screens from Federal Screen

JWC ENVIRONMENTAL CHAIN & RAKE MONSTER



Chain & Rake Monster from JWC Environmental

The Chain & Rake Monster from JWC Environmental is a continuously raked bar screen for headworks, pump stations and storm overflows. It quickly removes heavy slugs of material to protect downstream processes, making it suitable for when large concentrations of debris are expected. Replaceable teeth are bolted to the rake support, which is bolted to the chain on each side of the bar screen. The rakes pass through a bottom guide track, which avoids the necessity of sprockets and bearings in the sewage flow, increasing unit longevity. Debris is removed by a pivoted wiper with a UHMW blade. Bar spacing is available starting at 1/4-inch. It is designed to fit channel widths from 2 to 10

feet and depths up to 25 feet, with a 5-foot maximum discharge height. **888-418-8316; www.jwce.com**

LAKESIDE RAPTOR FALCONRAKE BAR SCREEN

Protecting downstream equipment in municipal and industrial applications, the Raptor FalconRake bar screen from Lakeside achieves high removal efficiency and low headloss, without the need for lower bearings, sprockets, bushings or guides that could foul or jam conditions in the channel. The all-stainless steel, corrosion-resistant construction is designed with multiple rakes that continuously remove captured material. It is available in a range of bar shapes and depths so that it can create an efficient, durable and dependable rapid debris removal system for a range of applications. In addition, its design and construction mean a low horsepower, energy-efficient drive system. **630-837-5640; www.lakeside-equipment.com**



Raptor FalconRake bar screen from Lakeside

PARKSON AQUA GUARD ULTRACLEAN

Parkson's Aqua Guard UltraClean offers a balance of capture rates and maintenance. Building off the original Aqua Guard element screen design, additional features reduce maintenance and improve cleaning efficiency to result in consistently high capture rates. Its three-dimensional filtration grid has been proven to double the capture rates of single-dimension vertical bar screens. Operator friendly features include

a redesigned brush with side removal to reduce maintenance, an extended belt path to improve self-cleaning and solids release, a removable spray header with quarter-turn nozzles to reduce maintenance, and a dedicated brush motor to optimize speed. It is available in Model MN (standard) or Model S (heavy-duty) and offers either a pivoting or stationary frame style. It is available on new screens and as a new "head" retrofit on existing Aqua Guard element screens. **888-727-5766; www.parkson.com**



Parkson's Aqua Guard UltraClean screen

Septage Receiving Stations

BIOMICROBICS MYFAST AND MACROFITT



MyFAST and MacroFITT treatment systems from BioMicrobics

Available from 10,000 to more than 2 million gpd residential and commercial applications, MyFAST and MacroFITT wastewater treatment systems from BioMicrobics are advanced, integrated, HS-STP (high-strength sewage treatment plants) that are easy to install and operate with autonomous aeration and ideal surface growth on the submerged

fixed-film. Retrofit for treatment plant sewer mining, the systems include aeration management systems and biosolids management systems to help the system run at optimal operation. The stability of the treatment process with fully submerged, fixed-film media and the effectiveness of activated sludge treatment helps in certain applications due to the unique characteristics of the wastewater and where there may or may not be infrastructure available. **913-422-0707; www.biomicrobics.com**

SCRENCO SYSTEMS TRASH MASTER 400 AUTO SCREEN

The Trash Master 400 Auto Screen from Screenco Systems uses gravity to separate the trash from the flow stream through a 4-inch inlet with a fan spreader to power-offload vacuum trucks. It has an aluminum hopper with a 6-inch outlet cam and 3/8-inch gapped 1/4-inch bar screen that meets U.S. Environmental Protection Agency 503 regulations. A stainless steel U-channel with plastic-lined titanium UHMW provides for years of wear, with a high-strength alloy steel 8 1/2-inch shaftless screw that moves trash to a waste container. The stainless steel U-channel has slotted drain holes and a center channel bar screen for cleaner and drier trash. A custom-built stainless steel bar rake is included for easy maintenance. A front spray bar with a 1 gpm nozzle keeps the unit clean and free of buildup. A 2 hp NORD gear reduction drive with Lenze variable-frequency drive control accomplishes a variable-speed screw from 6 to 30 rpms. **208-790-8770; www.screncosystems.com tpo**



Trash Master 400 Auto Screen from Screenco Systems

It's your magazine. Tell your story.

TPO welcomes news about your wastewater or water treatment operation. Send your ideas to editor@tpomag.com or call 877-953-3301

By Craig Mandli

Septage receiving unit contributes to green energy plan

Problem

The Silicon Valley Clean Water facility in Redwood City, California, serves more than 220,000 people and businesses. Its grease receiving facility faced challenges in receiving and processing grease off-loaded by haulers. Lack of proper screening and removal of contaminants resulted in frequent cleaning of receiving pits, digesters and transfer pipes.

Solution

The facility pilot tested and then chose a **FOG BEAST 1200 receiving and screening unit** from **Enviro-Care**. It removes the debris and allows the remaining fats, oils and grease to be directly injected into the digester. Trucks can unload in 15 minutes or less by gravity feed. The system also speeds up washdown of the truck tank and discharge pit before switching from grease to septage, as required by California law.



RESULT:

The system optimized performance of the receiving station, significantly reduced maintenance, and reduced the frequency of digester cleaning. **224-302-0303; www.enviro-care.com**

Oxygen injection system answers odor concerns

Problem

A 9,000-foot-long force main at the Granby RV Park in Granby, Colorado, was going septic, causing a huge odor problem in a pristine area 30 miles south of Rocky Mountain National Park. In the mountain location, frigid weather sometimes made it difficult for field technicians to work on issues. There were plans for a 300-unit residential development nearby, making odor reduction all the more important.

Solution

The **FORSe oxygen injection system** with remote digital telemetry (**Anue Water Technologies**) was tested for six months and ultimately chosen. It replaces chemical treatment and related operating requirements. The system has capability to inject ozone or a combination of oxygen and ozone. The remote digital telemetry makes it safe and easy for operators to monitor and control dissolved oxygen levels. Technicians at Anue Water can also log in and monitor.



RESULT:

The system eliminated the odors, bringing hydrogen sulfide levels nearly to zero. The system is paying for itself in chemical and operating cost savings. Operators can monitor and control remotely, important during winter and under the COVID-19 pandemic. **760-727-2683 www.anuewater.com**

Venturi aeration keeps odors at bay

Problem

The Delano and Reedley wastewater treatment plants in central California needed to store and process biosolids from the secondary clarifiers as part of their expansions. The biosolids were to be sent to three uncovered holding tanks (110,000 gallons each) to thicken before dewatering by centrifuges. The tanks had to be kept from going septic to prevent odors and avoid operational issues downstream.

Solution

Each holding tank was equipped with a venturi aeration system consisting of an **injector (Mazzei Injector Co.)** and a chopper pump, both installed outside the tank. The systems can operate in a single-pass configuration drawing directly from the clarifiers or as a recirculation configuration drawing from the sludge holding tanks. Each can run continuously or can be shut off for extended periods.



RESULT:

The systems provide flexibility to optimize the process. The Delano plant aerates the sludge as it enters the tank; the aeration system is turned for decanting. The Reedley plant constantly aerates and mixes the tank to prevent settling of solids. Due to the injectors' lack of small orifices and sharp edges, there has been no plugging and no maintenance on the injectors since startup. The biosolids are sent to farmland or to a composting facility. **661-363-6500; www.mazzei.net**

Headworks upgrade retrofits existing grit chambers and second-stage equipment

Problem

The Dallas Water Utilities' Southside Wastewater Treatment Plant headworks included four 30 mgd forced vortex grit chambers that had been in operation more than 17 years. The utility sought to improve grit removal efficiency through augmentation of the existing scheme or replacement of the grit removal system.

Solution

The utility worked with **Smith & Loveless** to optimize the primary grit chamber devices and the second-stage grit dewatering and classifying equipment, instead of building a new headworks facility. Cutting-edge analysis, retrofits and factory and field testing of equipment were applied as part of the evaluation and trial. The utility and engineers worked with the manufacturer to achieve the desired results without the full capital expense of a large grit system overhaul.



RESULT:

Project goals were realized without building a new facility. The upgrade improved performance, yielding more than 95% removal of grit particles down to 100 microns, while reducing capital and maintenance costs. **800-898-9122; www.smithandloveless.com**

Finnish sewage plant reduces operating costs

Problem

The Seinäjoki sewage treatment plant in Finland is designed for 100,000 inhabitants and operates at 90% capacity. However, the plant also receives wastewater from industries including a large dairy, which produces wastewater higher in fats.

Solution

The company replaced its existing decanter centrifuge with a new **decanter centrifuge** from **Flottweg Separation Technology**. Juha Korpi, plant manager, observes, “Good results were obtained in nationwide tests, so the decision was not difficult.”



RESULT:

The plant reduced its sludge treatment costs by 25%. “We are very happy with the Flottweg machine,” says Korpi. “The commissioning went very smoothly, and the delivery took place on schedule. The machine’s high performance enables us to amortize the investment within approximately two years.” **859-448-2331; www.flottweg.net**

Water reclamation plant conveying pebble lime pneumatically ends elbow failure

Problem

The Upper Occoquan Water Reclamation Plant in Centreville, Virginia, reclaims over 30 mgd. Its chemical treatment system relies on pebble lime that raises pH to levels at which phosphorus can be removed. The lime is conveyed pneumatically to six indoor silos during off-loading, but it wore through pipe elbow walls due to its 3%-4% grit content and high conveying velocities. “It’s very difficult for us to replace an elbow,” says Robert Forgione, director of operations and maintenance. “The elbows at ground level are not easily accessed and the ones on top of the silos are four stories up. It’s a safety and a cost concern.”

Solution

Forgione chose **Smart Elbow deflection elbows** from **HammerTek**. The elbow has a spherical chamber that protrudes slightly beyond the 90- or 45-degree flow path, causing a loose ball of material to rotate slowly in the same direction as the air stream that powers it, gently deflecting incoming material around the bend. The ball gradually releases material in a first-in, first-out progression. Five 45-degree, 4-inch-diameter elbows were installed where the trucks off-load lime, and twelve 90-degree, 4-inch-diameter elbows were installed at the tops of the silos. A custom alloy was specified based on characteristics of the pebble lime and the length and velocity of the pneumatic conveying system.



RESULT:

The elbows have been in place for more than 16 years without a blowout. “With the Smart Elbow deflection elbow, we’ve eliminated the primary source of lime dust along with the hazardous conditions it creates,” Forgione says. Maintenance and labor costs have been reduced, safety and air quality have been upgraded, and the buildings are visibly cleaner. **800-505-9665; www.hammertek.com**

Drying system helps city lower costs

Problem

The City of Buffalo, Minnesota, faced rising biosolids handling costs, odor issues and an increase in plant capacity with an increase in population from 15,000 to 30,000 by 2025. The city had to meet U.S. EPA 503 Class A standards in a limited site footprint.

Solution

Veolia’s BioCon ERS dewateres biosolids with thermal drying. Dewatered cake is pumped from a bin into the dryer cabinet through oscillating depositors that extrude thin ribbons through nozzles onto a slowly moving belt. The ribbons provide a large surface area for efficient drying at temperatures lower than a conventional oven (less than 350 degrees F). Heat is transferred to the biosolids by circulating air between heat exchangers and the ribbons. Moist air is continuously extracted air from the dryer, transferred through a condenser, and fed back to the dryer. The temperature decreases as the solids dry. Screw conveyers transport the material from the dryer to a solids hopper for use as fuel in the energy recovery system.



RESULT:

The plant increased its capacity to 1,850 tons of dry biosolids per year. The energy recovery system provides over 80% of heat for the dryer from renewable fuels. The dryer reduces biosolids volume by 95%. The solution, executed in a small footprint, contains odor and meets Class A requirements while reducing thermal energy required by 70%-80%. **919-677-8310; www.veoliawatertech.com**

Dredge system helps crew clear lagoons

Problem

The wastewater lagoons in Philipsburg, Montana, had not been dredged for 40 years and were half full of biosolids. The two 6-acre, 5-foot-deep lagoons were built in 1961. Public works director Sam Dennis and operators decided to dredge the primary lagoon.

Solution

The town rented a **Crisafulli FLUMP** with pivoting traverse system and 500 feet of floating pipe. The crew dredged the lagoon for six weeks. “The dredge with the pivoting traverse system worked really well and did what was promised,” says Dennis. The system accelerates dredging by enabling the operator to dredge, pivot, and dredge again. Pioneer Technical Services surveyed elevations, provided advice on chemical inputs and pipe sizing, and assisted in compliance with Department of Environmental Quality regulations.



RESULT:

The crew added polymers to the biosolids arriving at the lagoon bank and used a manifold system to direct the flows into 20 lined geobags 45 feet wide and 100 feet long. The bags are held in a 3-acre containment. Water is recycled as it drains from the bags back into the lagoon. **800-442-7867; www.crisafullipumps.com**

(continued)

BIOSOLIDS MANAGEMENT AND HEADWORKS

Centrifuges upgraded to increase life span

Problem

Two old 44-inch screen bowl centrifuges were possibly in need of refurbishing. They operated 24/7 in a fine-coal-recovery process requiring moistures between 15% and 23%.

Solution

The centrifuges were sent to **Centrisys/CNP** for a condition evaluation. Using **SOLIDWORKS** to engineer and retrofit the older planetary gearbox to a smaller, a more efficient **Viscotherm Rotodiff backdrive** will prolong the centrifuges' working life and achieve the necessary results. The backdrive is proven to produce the dry cake needed for the coal recovery process.



RESULT:

The system optimizes solids retention time (the time the solids stay in the centrifuge under G-force). This reduces the coal fines' moisture. 262-654-6006; www.centrisys-cnp.com

Water reclamation facility utilizes screw press trailers for temporary dewatering

Problem

The Tres Rios Water Reclamation Facility in Tucson, Arizona, needed to take down its entire centrifuge dewatering facility for contractors to install a second cake pump. Operators had to find a reliable way to divert flow from the entire 30 mgd facility.

Solution

Schwing Bioset provided **FSP1103** and **FSP703 screw press dewatering trailers**. Thickened biosolids were fed from the anaerobic digester to both presses.



Once the feed was connected via camlock hoses, power connected to the trailer, and the drainlines hooked up, the screw presses were ready to run. Technicians dialed in the polymer dose, screw press floc tank pressure, screw rotation speed and discharge cone pressure to optimize performance.

RESULT:

The screw presses provided reliable dewatering during the few weeks while the cake pump was installed. The presses produced cake and filtrate quality near that of the plant's existing centrifuges, an average of 17% cake solids, while running near design capacity. 715-247-3433; www.schwingbioset.com tpo

people/awards

The Maine City of Rockland has renamed its wastewater treatment plant the **Terrance G. Pinto Wastewater Treatment Facility and Campus** in honor of its longtime facility director.

The **Sequim Water Reclamation Facility** received a Wastewater Treatment Plant Outstanding Performance award for 2019 by the Washington Department of Ecology.

The **King County (Washington) Wastewater Treatment Division** received national recognition as a Utility of the Future Today for its beneficial use of Loop biosolids.

Four Tulsa, Oklahoma, wastewater treatment plants received National Association of Clean Water Agencies Peak Performance awards: **Lower Bird Creek**, Platinum; **Southside**, Gold; **Northside** and **Haikey Creek**, Silver.

The **Greeley (Colorado) Wastewater Treatment and Reclamation Facility** received a National Association of Clean Water Agencies Peak Performance Silver Award.

The U.S. Environmental Protection Agency named **Orange County (Florida) Utilities** as a 2020 WaterSense Partner of the Year.

The **City of Gonzales** won the Louisiana Municipal Association Community Achievement Award in the category of Outstanding Community Improvement in Technology and Creativity for the \$15 million expansion of its wastewater treatment facility and improvements to the infrastructure throughout the city.

The **Idaho Rural Water Association** earned the 2020 State Association of the Year award from the National Rural Water Association.

Jared Glick, water superintendent for Brunswick Regional Water and Sewer H2GO, was named Water Distribution Operator of the Year by the North Carolina AWWA and the North Carolina Water Environment Association.

The **Rochester (New York) Water Reclamation Plant** received a Gold Peak Performance Award from the National Association of Clean Water Agencies for the 22nd consecutive year.

University of Colorado Boulder professor **Karl Linden** received the 2020 Clarke Prize, the nation's most prestigious award for water research from the National Water Research Institute and the Joan Irvine Smith and Athalie R. Clarke Foundation. The annual \$50,000 award is given to leaders in water research whose work serves to solve real-world problems.

The **Elsinore Valley Municipal Water District** received the Operator's Meritorious Service Award from the AWWA California-Nevada Section.

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events

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