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JULY 2021

LET'S BE CLEAR:
Another bad infrastructure
report card | 6

IN MY WORDS:
Advances in
UV treatment | 28

HOW WE DO IT:
Odor control in
Laguna Beach | 26

Tyler Bragg
Primary Lab Analyst/
Laboratory Supervisor
Glasgow, Ky.

Always Learning

LAB SUPERVISOR TYLER BRAGG
IS A KEY PLAYER ON CROSS-TRAINED
PLANT TEAM | 30



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contents July 2021

- 6 LET'S BE CLEAR: **WHAT WOULD MOM AND DAD SAY?**
America's water and wastewater infrastructure continue to earn barely passing grades on the civil engineers' report cards.
By Ted J. Rulseh, Editor
- 8 @TPOMAG.COM
Visit daily for exclusive news, features and blogs.
- 9 LETTERS
- 16 SUSTAINABLE OPERATIONS: **HEAT AND PRESSURE**
A biosolids storage issue led the Hampton Roads Sanitation District to a new thermal hydrolysis process that yields a Class A material.
By Steve Lund
- 18 TECHNOLOGY DEEP DIVE: **SIMPLE. ADAPTABLE. DURABLE.**
A new-generation automated bar screen helps clean-water plants maximize screening efficiency and reliability and accommodate peak flow events.
By Ted J. Rulseh
- 26 HOW WE DO IT: **THAT SWEET SEA AIR**
Biological treatment systems help the City of Laguna Beach eliminate nuisance odors cost-effectively at three major lift stations.
By Ankur Shah
- 28 IN MY WORDS: **THE POWER OF UV**
Award-winning researcher Karl Linden sees big potential for ultraviolet light, not just for disinfection but to treat pharmaceuticals and even attack COVID.
By Ted J. Rulseh
- 34 HEARTS AND MINDS: **A TRADITIONAL CELEBRATION GOES VIRTUAL**
A pandemic could not stop this Colorado utility from continuing a children's water festival with a legacy that spans three decades.
By Sandra Buettner
- 36 PRODUCT FOCUS: **CONVEYANCE AND DISTRIBUTION SYSTEMS**
- 40 CASE STUDIES: **CONVEYANCE AND DISTRIBUTION SYSTEMS**
- 42 PRODUCT NEWS
Product Spotlights:
Wastewater: Detector helps municipalities stay on top of suspended solids
Water: Multiparameter controller easily configured to exact needs
By Craig Mandli

top performers



- 10 WATER/WASTEWATER LABORATORY: **BORN FOR LAB LIFE**
Anna leRoux's role with Brunswick County Public Utilities fulfilled a childhood ambition and gave her a rewarding career.
By Scottie Dayton

- 20 WASTEWATER PLANT: **UPGRADE ON THE FLY**
A North Carolina team finished a major plant upgrade with no shutdowns and no permit violations. The new equipment and technologies now serve them well.
By Jim Force

- 30 WASTEWATER LABORATORY: **ALWAYS LEARNING**
Award-winning lab supervisor Tyler Bragg functions as an integral part of a fully cross-trained clean-water plant team.
By David Steinkraus

ON THE COVER: Lab work is critical to the performance of the wastewater treatment plant in Glasgow, Kentucky. It's run by Tyler Bragg, who came to the industry right after high school looking for a job. Instead, he found a career. (Photography by Martin Cherry)

cover story

- 44 INDUSTRY NEWS
- 45 EXAM STUDY GUIDE
By Rick Lallish and Drew Hoelscher
- 46 WORTH NOTING
People/Awards; Events

coming next month: August 2021 FOCUS: **Headworks/Biosolids Management**

» Let's Be Clear: Paying for infrastructure improvement » TOP PERFORMERS: Water/Wastewater Operator: John Perry, Jefferson Township, New Jersey | Wastewater Plant: Hardin County (Kentucky) Water District 1 | Wastewater Plant: Coeur d'Alene (Idaho) WWTP » How We Do It: Biological lagoon cleaning in Kindersley, Saskatchewan » Building the Team: Award-winning training program in north Texas » Sustainable Operations: Progressive power savings in Gurnee, Illinois » Hearts and Minds: Clever characters highlight a youth outreach program » Technology Deep Dive: A new concept in advanced metering infrastructure



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Aerzen	17	Keller America Inc.	5
 AIMAX		 Komline-Sanderson	
AIMax Software, Inc.	43	Komline-Sanderson	45
Analytical Technology, Inc.	13	 LAKESIDE	
 AQUA-AEROBIC SYSTEMS, INC.		Lakeside Equipment Corporation	3
Aqua-Aerobic Systems, Inc.	23	 MYRON L COMPANY	
 Blue-White Industries	back cover	Myron L Company	15
 ClearSpan		Sulzer Pumps Solutions Inc.	25
ClearSpan Structures	27	 Vaughan	
ELODE USA	19	Vaughan Company, Inc.	47
Hach - Flow Monitoring	9	Veolia Water Technologies (dba Kruger)	7
Inovair	39	Xylem	2
 JDV		CLASSIFIEDS	45
JDV Equipment Corporation	29		

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let's be clear

What Would Mom and Dad Say?

AMERICA'S WATER AND WASTEWATER INFRASTRUCTURE CONTINUE TO EARN BARELY PASSING GRADES ON THE CIVIL ENGINEERS' REPORT CARDS

By Ted J. Rulseh, Editor



In all my years of schooling I never had to bring home a report card with a D or F on it. It's a good thing, because my parents didn't take kindly even to the occasional C.

Anyway, by that standard, my mom and dad would not appreciate the 2021 Report Card for America's Infrastructure from the American Society of Civil Engineers (ASCE). It's the society's first report card in four years, and it shows only modest improvement — an overall grade of C- versus a D+ for 2017.

As for drinking water and wastewater, they haven't yet climbed into the realm of average (C). Drinking water earned a C-, up from a D four years ago. Wastewater rated a D+, the same as for 2017. So essentially, the more time goes by, the more things stay about the same.

WATER MAIN BREAKS ABOUND

The ASCE reports that the nation has more than 148,000 active drinking water systems; the water distribution infrastructure includes some 2.2 million miles of underground pipes. "Unfortunately, the system is aging and underfunded," says the report card's summary. "The oldest pipes in the country were laid in the late 1800s, and many pipes installed after World War II are reaching the end of their 75- to 100-year life expectancy.

"There is a water main break every two minutes and an estimated 6 billion gallons of treated water lost each day . . . enough to fill over 9,000 swimming pools. This equates to 2.1 trillion gallons of nonrevenue water loss per year. The U.S. lost an estimated \$7.6 billion of treated water in 2019 due to leaks."

The report notes that smaller utilities can see up to twice as many pipe breaks as larger utilities because they have more miles of pipe per customer. They also have smaller customer bases and so less revenue and less money available for repairs.

On the plus side, the report stated that by 2019 utilities were replacing 1% to 4.8% of their pipes per year on average, a rate that matches the pipes' life cycle. The summary also notes signs of progress in that federal financing programs are expanding and utilities are raising rates so that they can reinvest in their networks.

By 2019 about one-third of utilities had solid asset management programs in place to help set investment priorities. Utilities also were improving resiliency with updated risk assessments and emergency response plans.

WASTEWATER PLANTS AGING

"The nation's more than 16,000 wastewater treatment plants are functioning, on average, at 81% of their design capacity, while 15% have reached

or exceeded it,” says the report. “Though large-scale capital improvements have been made to systems experiencing sanitary sewer overflows, efforts have slowed in recent years.”

Most treatment plants are designed to last 40 to 50 years, which means those built in the 1970s around passage of the original Clean Water Act in 1972 are reaching the end of their expected service lives. The report observes that as the facilities age, they will cost more to operate and maintain.

The wastewater collection network included more than 800,000 miles of public sewers and some 500,000 miles of private sewer laterals. As these pipes age, I&I becomes a growing problem, overtaxing the systems and leading to sanitary sewer overflows. “Conveyance systems are also susceptible

“There is a water main break every two minutes, and an estimated 6 billion gallons of treated water lost each day . . . enough to fill over 9,000 swimming pools.”

to other failures like blockages caused by consumer products such as wipes and paper towels,” says the report. In 2019, utilities spent more than \$3 billion to replace some 4,700 miles of sewer pipelines.

As with the water side, there are positive signs. Asset management plans are enabling 62% of utilities surveyed to manage proactively instead of just responding to failures. While the annual water infrastructure investment gap was \$81 billion in 2019, utilities have made gains by planning for resiliency and with innovations that yield cost savings or revenue-generating treatment byproducts.

THINGS LOOKING UP?

So it appears that while much news about the water and wastewater infrastructure is bad, there are clear trends in the right direction. In my home, that would have made Mom and Dad a bit more forgiving of any below-average grades. **tpo**



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SPEAKERS:



Bart Sperry
District Manager/ Engineer
North Table Mountain Water & Sanitation District
Graduated from California State Polytechnical University - Pomona. District Manager/Engineer – North Table Mountain Water and Sanitation District (2005-present). Instructor Red Rocks Community College, Water Quality Management Program.



Mark Pavlich
Operator
North Table Mountain Water & Sanitation District
Mark is a Class A Operator who has been a project manager (representing the operators) for the Treatment Plant Rehabilitation project that the ACTIFLO® turbo was recently installed. Graduated from Red Rocks Community College, Water Quality Management Program. Class A operator and Treatment Plant Project Manager - operator representative – North Table Mountain Water and Sanitation District (2016-present)

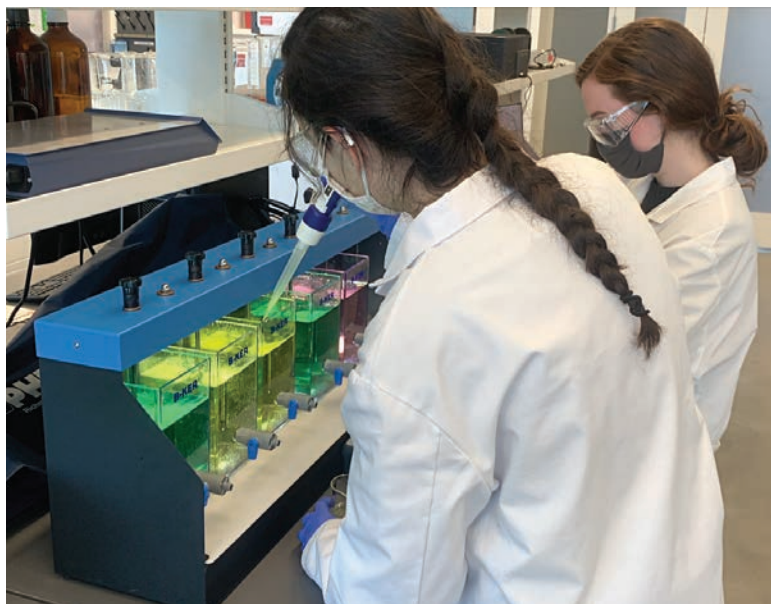


Reid Staton
Product Manager
Veolia Water Technologies
Reid Staton is the US Product Manager for Veolia's ACTIFLO® Ballasted Clarification System. Located in Raleigh, NC, he has a degree in Mechanical Engineering from North Carolina State University and has been with Veolia for over 20 years. Prior positions within Veolia include Mechanical and Process Engineer and Process Manager. He has extensive experience in process engineering and operation of physical/chemical separation and filtration processes for water and wastewater treatment.

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CLOSING THE WATER GAP

Treatment for Rural Communities

When it comes to ensuring that a community has clean drinking water, urban and rural communities have different needs, different resources and face different challenges. Through a National Science Foundation CAREER Award, engineering professor Joseph Goodwill is researching a water treatment method that could be especially useful for rural areas.

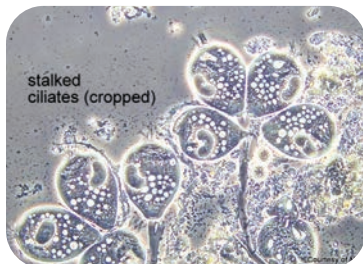
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BUG OF THE MONTH

Monitoring Stalked Ciliates

In this wastewater microbiology spotlight, learn about stalked ciliates and how they function within wastewater treatment plant processes. Stalked ciliates are generally one of the more sensitive higher life-form organisms found in activated sludge systems, and there are many different types with distinct features.

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OVERHEARD ONLINE

"Investing in water is the smart thing to do for public health and for the economy. Voters are sending a clear message to state and federal leaders that investing in water must be a top priority."

Voters Overwhelmingly Favor Investment in Water Infrastructure, Says New Poll
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MICROPLASTICS MOVEMENT

Filtration and Cleanup

Washington State University researchers recently published findings that show the fundamental mechanisms allowing microplastics to move through our environment. The work could help researchers develop better ways to filter out and clean up pervasive plastics from the environment.

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Double-Edged Swords

In reference to Ted Rulseh's April column, "When Rationality Is Cast Aside," two phrases I learned many years ago stick with me: that a thing represents a "double-edged sword," and that one may be "hoisted by one's own petard."

So it is with arguments that we need to follow, trust, and rely on science. Of course we do. Only we seldom get the balanced outcomes desired by sensible people. Science is political even where it is not politicized.

Science and research are funded by certain parties, not all of them disinterested. It may be used and is used to justify political and ideological decision-making. (Sometimes I think I'm the only person who got anything out of the *Yes, Minister* episodes that aired on public television.)

Indeed, the very provision of water and wastewater services can be political where capacity and line extensions are to be decided. Who is or is not served, who is to benefit, how, when and why — those are all political decisions. And those are simple matters compared to the huge issues we face.

So in the same issue where you write about the need to advocate for science, where you specifically cite the challenging cases of our response to climate change and coronavirus, there's concern expressed alongside it, in the article "A Heavy Burden," that science is driving unsound, unwise and unreasonable actions regarding PFAS in wastewater biosolids.

That piece looks at the "substantial impacts" PFAS and its state-by-state regulation are having on management programs. Here again, I would submit that what we see is science in the service of political ends, to say nothing of the fact that it is decades late regardless.

If in fact PFAS are toxic to one bodily system or another at ultra-low parts-per-trillion concentrations, and if we discount all the voluntary and ongoing human exposure to it by other routes, and if we ignore all the other environmental pollutants and insults such as radionuclides, PCBs and pharmaceutical residues that are (still) out there, then it follows, logically, in a risk-averse world, and especially among persons who prefer absolutes, that biosolids containing even traces of PFAS should not be spread on residential lawns or agricultural land. There can be no beneficial use. Not at all.

I had to suppress the impulse to finish that last paragraph with, "Nonsense!" I agree that science is helpful in decision-making. What is really needed in the world, however, and sorely lacking, is first, intellectual honesty and integrity among decision makers, and second their thorough deliberation and judgment, together with a sense of proportion surrounding the magnitude, significance and management of risks of whatever kind.

Dennis Wanless
Burlington, North Carolina

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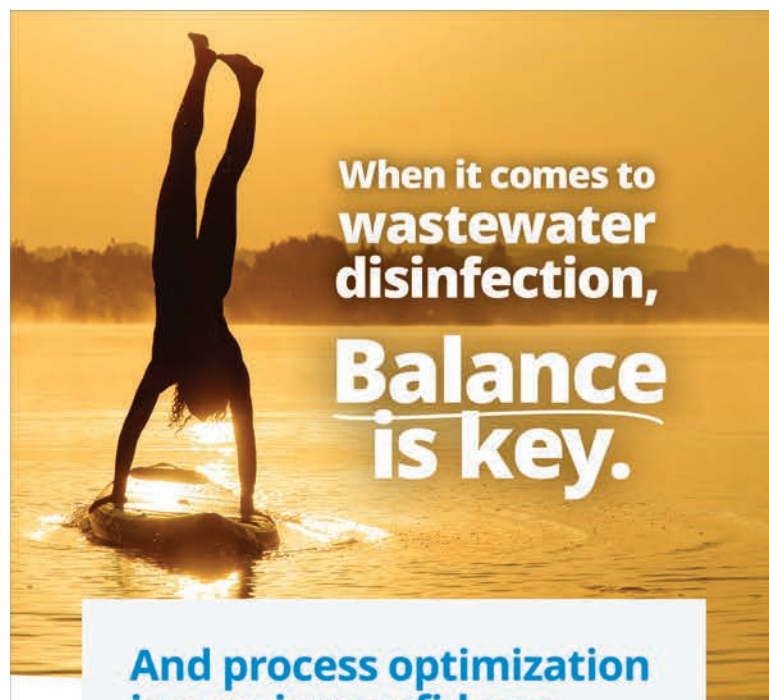
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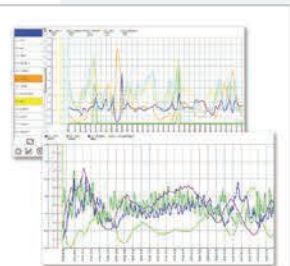
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Born for Lab Life

ANNA LEROUX'S ROLE WITH BRUNSWICK COUNTY PUBLIC UTILITIES
FULFILLED A CHILDHOOD AMBITION AND GAVE HER A REWARDING CAREER

STORY: **Scottie Dayton** | PHOTOGRAPHY: **Michael Cline Spencer**

As a child Anna leRoux was mesmerized by the laboratories depicted in horror films. She knew instinctively that was her environment, not to create monsters, but to analyze microbes.

She used the microscope in her beginning chemistry set to study organisms growing on neglected food at the back of the refrigerator. She combined her mother's perfumes in test tubes until a mixture of two exploded with a pop that ejected the stopper.

Following her passion, leRoux worked 15 years in private analytical laboratories and earned a master's degree in environmental studies. The next 13 years with Brunswick County (North Carolina) Public Utilities unleashed her full potential. She is now laboratory supervisor for the West Brunswick Regional Wastewater Treatment Facility in the city of Supply. Under leRoux's leadership, the lab's workload expanded tenfold and received a bacteriological lab certification for water chemistry. In time, leRoux became the county's unofficial consulting environmental chemist.

"When odd stuff happens, my phone rings," she says. Callers include many former co-workers and wastewater or water personnel from Brunswick County, neighboring counties, and even private laboratories. In 2019, the North Carolina AWWA-WEA presented leRoux with the Wastewater Laboratory Analyst Excellence Award.

EARLY DAYS

In 1993, leRoux began her career preparing samples at Environment 1, a private laboratory analyzing mostly drinking water. By the time she advanced to metals analysis, she knew the full range of analytical parameters, and that prepared her to become the microbiology supervisor.

"I was having fun because my true love is microbiology, but I always wanted to do environmental remediation," says leRoux, in her spare time a scuba diver

and kayaker. "When a friend told me that the U.S. Coast Guard Reserve had such a program, I enlisted in September 2000 as a marine science technician."

On 9/11, leRoux's dreams of saving otters and seals evaporated as she was instructed in the use of shotguns, 9 mm pistols and rifles. Eventually, she did check water samples for oil and grease and photograph coastlines looking for oil spills, but she never worked with furry sea mammals. Lt. j.g. leRoux mustered out at the end of her five-year tour, having found a new career path.

"I was based in Wilmington, loved the city, and wanted to stay," leRoux says. Her opportunity arose when local Oxford Laboratories hired her as a chemist in September 2004. Four years later, she was the laboratory supervisor when the business was sold and the new owners consolidated operations in Raleigh.

To stay in the Wilmington area, leRoux took the position of wastewater laboratory supervisor at the West Brunswick plant. Today, the

lab serves three water reclamation facilities, four wastewater treatment facilities, and two water treatment plants.

INITIATING CHANGE

In September 2008, the West Brunswick lab unexpectedly lost its supervisor. Donald Dixon, wastewater superintendent, asked leRoux to start in the lab while finishing her last two weeks at Oxford. "I worked two hours in the morning at Oxford, then until 4 o'clock at the plant, and finished the rest of a long day at Oxford," leRoux says.

On her first day at the West Brunswick lab, leRoux was stunned to see scant instrumentation on which her predecessor ran only five analytical parameters. A private laboratory processed the remainder. "Its minuscule budget precluded any 20th-century equipment," says leRoux. "That was unacceptable."

Working both jobs enabled leRoux to salvage Oxford's BOD bottles, desiccator cabinets and jars, and Imhoff settling cones destined for the trash



When odd stuff happens, my phone rings."

ANNA LEROUX



The Brunswick County lab serves three water reclamation facilities, four wastewater treatment facilities, and two water treatment plants.



Anna leRoux, West Brunswick (North Carolina) Regional Wastewater Treatment Facility

POSITION:
Laboratory supervisor

EXPERIENCE:
28 years

EDUCATION:
**Doctorate, environmental microbiology,
Appalachian State University**

CERTIFICATIONS:
**Class III Wastewater Treatment Laboratory
Technician**

MEMBERSHIPS:
North Carolina AWWA-WEA

GOALS:
Expand the laboratory to run all analytical parameters

and transport them to her new lab. The lab's outdated equipment included a small distillation unit producing 12 to 15 liters per day.

"This was far too little, and the water had high conductivity," leRoux says. She convinced the county to purchase a Barnstead deionized water system (Thermo Fisher Scientific) producing 200 L/day of high-quality water. From then on, leRoux was the driving force behind increasing the lab's annual budget: "My justification is in-house testing saves money; sending out samples costs money."

leRoux also saved money by repairing equipment. She mended most glassware with a propane torch and soldered broken circuits and connection points.

For example, the vibration from the autosampler assembly on the AQ400 discrete analyzer (SEAL Analytical, a Porvair Co. brand) loosened the connections on the conductivity cable and probe. "I spent hours on the telephone with technical support guiding me through those repairs," says leRoux, who solders stained glass as a hobby.



Anna leRoux (right) and Dana Nelson run samples on a Hach DR3900 spectrophotometer.



STEADY EXPANSION

As the county brought more wastewater treatment plants under its umbrella, officials wanted faster test results to allow operators to make critical adjustments on the same day the samples were run. leRoux asked for more money, equipment and help. In 2010, Brian Blanton, a county employee, became her part-time analyst and the pretreatment coordinator with local industries.

“Brian hadn’t been in a lab for years, so bringing him up to speed while expanding parameters was a double challenge,” leRoux says. “I needed him full time, but his work as coordinator is vital to the health of the treatment plants.”

Blanton works with businesses to make changes needed to maintain their discharge limits and protect treatment plant processes. For example, a maker of starch-based pulp fiber cup carriers washed refuse into the sewers. “The biodegradable fiber broke down into what looked like mashed potatoes and gummed up the plant,” leRoux says. “Brian persuaded the owners to put rejected carriers and scraps into the recycle bin.”

By 2017, leRoux had increased in-house parameters from five (fewer than 200 samples monthly) to 15 (650 samples monthly). “I’m extremely proud of the accomplishment,” she says. “Now operators have data practically on the same day the tests are run. Previously, it could take more than two weeks before they had the results.”

The workload was almost overwhelming for one and a half people. Then the hammer dropped: John Nichols, Public Utilities deputy director, told leRoux to establish a drinking water laboratory.

SAFE TO DRINK

Why? Because Supply is in the center of the county. When a waterline breaks, almost always at night, it can introduce microbial contaminants such as *E. coli* into the distribution system. Consequently, residents are asked to boil water before consuming it.

“After the line is repaired, one of three Public Utilities workers must collect bacteriological samples from access points closest to the break and upstream and downstream from it,” leRoux says. “It takes more than an hour to drive from the farthest borders south to our drinking water lab in Northwest. Supply is a 30-minute drive for everyone.”

It took two weeks to outfit the lab with the proper new equipment, two more weeks to run the required two sets of unknown samples and get the results, and another two weeks for the state to certify the lab. Then leRoux trained

the utility workers to test the samples for bacteria using the IDEXX Coli-ert-18 method, ensuring that the result would be ready when she arrived the next morning. The 18 indicates the hours needed for the test hours.

“Previously, the result could take 24 to 48 hours when we used m-ENDO media and vacuum filtration,” leRoux says. “Now communities know within 18 hours if it is safe to rescind the boil water advisory.”

The additional work required another part-time assistant; Dana Nelson arrived in 2017. “She was right out of school and didn’t have laboratory experience, so I trained her on top of everything else,” leRoux says. Nelson was promoted to full-time technician a year later.

leRoux has overseen a major expansion of the lab’s testing volume. She’s shown calibrating an oxygen meter for BOD analysis (MultiLab 4010-2W from YSI, a Xylem brand). *(continued)*

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LeRoux's technical and operational expertise has made her the go-to person for people seeking advice, checking protocols, or identifying unexpected microbes. "Even if we're not certified for some tests, I can still give operators process-knowledge-only results to help them better understand what they're up against," she says.

Her most recent case was identifying the source of waves of zinc washing through the West Brunswick plant. "Science is mostly eliminating hypotheses," leRoux says. "We eliminated the zinc oxide powder in medical gloves and an iron bacteria that uptakes zinc."

After a thorough investigation, Dixon stated: "Although we never reached a limit violation, we ran samples for each lift station, each septage truck, and our influent over several months. We have concluded that a one-time septage dump containing high zinc levels made its way through the plant and into the autothermal thermophilic aerobic digestion tanks."

Meanwhile, flows at the Northeast Brunswick Regional WWTP in Leland increased so rapidly that sampling went from three to five days per week. "That strained us further, because many tests have only a two-day holding time," leRoux says. However, her ultimate challenge lay just around the bend.

By Thanksgiving 2018, leRoux was too exhausted to eat or walk across the parking lot to her car without resting. She saw her doctor. "On Dec. 13, I was told to pack an overnight bag and head to the hospital emergency room in Chapel Hill," leRoux says. "I anticipated returning to work on Monday, but stayed 10 months undergoing treatments for leukemia."

INNOVATIVE TRIO

Blanton took over the lab with Nelson assisting, but both needed leRoux to answer questions and review data. Initially, Blanton would text, email and send photos and data when leRoux wasn't impaired by chemotherapy brain fog, but the three needed real-time communications.

“My justification is in-house testing saves money; sending out samples costs money.”

ANNA LEROUX

Enter Anna 2.0, a scarecrow frame wearing Anna's lab coat and outfitted with a puppy camera beneath the head of a stuffed toy dog. "The nursing staff set it up in my private room, then later at home, enabling me to see, hear and speak directly to Brian and Dana at any time," leRoux says. "They kept me informed and acted as my liaison with the state Environmental Quality Division

while we worked to increase our number of certification methods."

To accelerate the sorting and organizing of data, the team gave each test a different colored bench sheet. Their third innovation was setting up the rAPID-T Discrete Analyzer (Astoria-Pacific) in the afternoon and letting it run overnight, making the data available in the morning. Throughout all of this and months of sheltering in place, leRoux studied online to earn her doctorate degree in environmental microbiology from Appalachian State University.

Now back with her test tubes and samples, leRoux, 53, wants to:

- Make the lab completely self-sufficient by adding metals analysis
- Implement a new laboratory information management system that incorporates waterproof tablets to upload bench sheets for immediate review and data entry
- Add a second Hach DR3900 spectrophotometer to run different Test-n-Tube sets simultaneously

"I have no plans to retire. Ever," leRoux says. "That's what happens when you truly love your career. I have the greatest job, the most amazing team, and it is a pure joy to come to work each day." **tpo**



The lab team at the West Brunswick Regional Wastewater Treatment Facility includes, from left, Anna leRoux, supervisor; Dana Nelson, technician; and Brian Blanton, technician/pre-treatment coordinator.

WALKING FOR CURES

To support a friend diagnosed with multiple sclerosis, Anna leRoux formed Team Wild Poodles in 2006 to raise funds through the annual Wilmington Walk MS.

"It was so much fun that my team of 10 and their dogs participated for 12 years," she says. "We averaged \$700 per event and even had McAllister and Solomon Used and Rare Books as a sponsor one year." The team is too small to attract large corporate sponsors.

LeRoux walks with Echo, her standard poodle, who enthusiastically drags her along the four-mile course. Echo's teammates, two toy poodles, lack her stamina. "I always wind up carrying the toys in a tandem pouch for most of the distance," leRoux says. "My back hurts the next day, but they'd be devastated if I left them home."

Team Wild Poodle hopes to support the Leukemia & Lymphoma Society's Light the Night Walk in October 2021. "It's contingent upon my immune system being strong enough to go outside and play," says leRoux, a leukemia survivor. "I owe the society and my doctors a lot."

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An aerial view of the thermal hydrolysis process at the Hampton Roads Sanitation District's Atlantic Treatment Plant.



Heat and Pressure

A BIOSOLIDS STORAGE ISSUE LED THE HAMPTON ROADS SANITATION DISTRICT TO A NEW THERMAL HYDROLYSIS PROCESS THAT YIELDS A CLASS A MATERIAL

By Steve Lund

When the Hampton Roads Sanitation District ran short of storage space for biosolids, it had a choice: Add capacity for Class B biosolids or produce Class A material requiring less space.

The district went with Class A, and now the Atlantic Treatment Plant in Virginia Beach, Virginia, uses a high-temperature, high-pressure thermal hydrolysis process. The result is a drier, easily stored and more marketable product.

"We could just build another shed," says Christopher Wilson, chief of process engineering and research. "Or we could do a process to make a better aesthetic cake and create opportunities for other beneficial-use outlets." The Class A product is easier to handle and stacks higher, so the existing storage is more than adequate.

The storage issue arose when the district decided to divert the flow from another treatment plant to Atlantic. The plant was operating far below its 54 mgd capacity but did not have the capacity for additional biosolids.

The district installed a Cambi reactor that heats the solids to 338 degrees F, under pressure so that the mixture doesn't boil. The process sterilizes the solids and breaks them down so that they dewater more easily after going through the digester.

Although the Cambi process uses substantial energy, much of the heat is recovered, and more biogas is produced in the anaerobic digesters. There-

fore the process is energy neutral and could become energy positive. The Class A biosolids have potential applications in landscaping and gardening.

EXTENSIVE INFRASTRUCTURE

The thermal hydrolysis reactor is just one part of the new biosolids process; extensive pre-reactor and post-reactor infrastructure is required. "It's not that thermal hydrolysis is overly complex or extremely expensive, but it takes a lot of solids handling around that process to make it work," Wilson says.

"Heating up a lot of water to 338 degrees takes a tremendous amount of energy. So, the efficient way to do it is to dewater the materials initially, pull out as much water as possible, and then only heat up what's left. That dewatering step is a significant adjunct facility. There is a whole building associated with that."

The plant uses belt presses (Huber Technology Strainpress) and older centrifuges to bring the material to 18-22% solids. The dewatered material then enters a pulper tank where it is warmed to 190 degrees F before being pumped to the reactor.

After the reactor, the material is cooled and sent to the digesters. That process captures heat that is used to warm up the pulping tanks. "It's a relatively efficient process," Wilson says.



Some of the infrastructure for the thermal hydrolysis process at the Atlantic Treatment Plant.



Heat exchangers recycle heat and help cool down the biosolids before they go to the digesters.

STERILIZED SOLIDS

The solids going into the digester are sterile, and that presents another challenge. “In most treatment plants you always have live bacteria coming into the digester,” Wilson says. “Here, you’ve sterilized everything. You have to be very protective of the bacteria already growing in the digester, because you are not constantly re-seeding it. You definitely don’t want to overheat the digester, or you would lose those bacteria, and there’s no easy way to re-seed.”

Before launching the thermal hydrolysis process in 2020, the Atlantic plant was producing Class B biosolids spread on farm fields. That arrangement is continuing with the new product for the short term.

“We still have the same partners, the farmers, and they still need the nitrogen and phosphorus from biosolids,” Wilson says. “Until we figure out our upgraded product, which is more suitable for landscape use, we’ll still use the bulk spreading.”

At one time, the district worked with an industrial company to produce a compost called Nutri-Green. The company still makes the product, but not under the Nutri-Green brand, which the district retained and will use on the new product: “It has very good name recognition.”

The district still needs to decide how the new product will be distributed. “There’s always the possibility that from a public relations and exposure standpoint, some of it ends up in bags,” Wilson says. “It helps for the public to see it as a commercial product.”

The Atlantic plant produces about 20 tons of the product per day (dry weight), but that could increase by adding solids from other district treatment plants to the Cambi system.

A GREASE SOLUTION

A district as large as Hampton Roads (16 wastewater treatment plants with a 249 mgd total design capacity serving 1.7 million people) can undertake more than one major sustainability project at a time. The 30 mgd Nansemond Treatment Plant in Suffolk is installing a Greasezilla grease-processing system developed by Downy Ridge Environmental.

The system heats the grease and separates it into a commodity-grade fuel, a lower-grade fat and water. “If you heat up a water-grease emulsion, the water and the grease tend to separate really nicely,” Wilson says. “You heat it up and drain off the water; you take what’s left and heat it and drain it off again. You keep on doing that until what’s left is highly refined with very little water in it.”

The water is returned to the wastewater treatment process; the top-grade fat known as brown grease can be traded on a commodity exchange. The district expects to use some of that material to fuel a boiler to heat the process, but the rest will be sold through a broker. The other component of the grease, known as batter, will go into the anaerobic digesters.

DUAL MOTIVATION

The plant takes in about 20,000 gallons of grease-trap waste per day at about 95% water; that will yield about 1,000 gallons of brown grease. Generating revenue from the grease is a plus but is not the only motivation for the project, which is to go online in December 2022.

“We view this as part of our core business, to manage environmental protection in the most cost-effective and most environmentally positive way pos-

sible,” Wilson says. “Producing a renewable fuel that has an economic and environmental benefit, while preventing that material from causing blockages and overflows in the collection system, is kind of a win-win.”

Wilson is confident that the Cambi process and the Greasezilla system are good fits for their plants, but he notes every plant has unique characteristics that make finding workable solutions complicated.

“When you add something that’s intended to solve a problem, you want to make sure it’s not creating another problem,” he says. “There are a lot of good technologies out there, and each of them solves a set of problems. The challenges are specific, and the technological solutions are specific as well. A really good process for one plant could be a poor fit at another plant.” **tpo**

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A NEW-GENERATION AUTOMATED BAR SCREEN HELPS CLEAN-WATER PLANTS MAXIMIZE SCREENING EFFICIENCY AND RELIABILITY AND ACCOMMODATE PEAK FLOW EVENTS

By Ted J. Rulseh

Effective debris removal screening is an essential step in preliminary treatment at clean-water plants, and bar screens are the devices of choice for many.

Automated screens free operators from the miserable job of manual cleaning. A key issue is how to balance optimum debris capture and hydraulic capacity to handle high-flow events.

Duperon last January introduced two next-generation versions of its FlexRake bar screen. The FlexRake IQ is designed to enhance debris removal by automatically increasing capacity and speed to accommodate rising flows. The FlexRake IQ2 adds capability to widen the bar openings automatically during peak events, providing greater resiliency under challenging flow conditions.

Both incorporate primary features of the original FlexRake that are designed to enable simple operation, reliable performance and low maintenance. Bryce Funchion, mechanical engineer and product owner, and Mark Turpin, company president, talked about the new versions in an interview with *Treatment Plant Operator*.

tpo: What qualities have made the original FlexRake popular in the marketplace?

Turpin: The FlexRake has been around for about 30 years, and a couple thousand have been installed. In designing the product, our founder Terry Duperon focused on minimizing complexity for operators. His basic philosophy is that two parts are one too many. He tries to eliminate as many wear parts and moving parts as possible. In that way you end up with a machine that's very simple to operate and maintain and has a very low life-cycle cost.

tpo: Was the machine designed with any particular operating challenges in mind?

Turpin: There is a propensity for bar screens to get jammed by large debris that tries to enter near the headworks channel floor. When that happens, the channel has to be dewatered, and an operator has to enter that confined space and clear the jam. To combat that, Terry developed a link formed into a chain that eliminated the lower sprocket and shaft, so there is nothing down there to maintain. Now if a large object meets the screen at the channel floor, the link system reaches out over it with a scraper, which engages the object and brings it up the screen. So we can bring very large debris out of the channel without creating a jam.

tpo: What market need were you looking to meet with the new-generation screens?

Turpin: In looking at what operators are dealing with, we've found there is huge variability in flows. That can be because of I&I issues. It can be because a developer created a new subdivision and now plant flows are significantly higher. Perhaps they have a college in town and the flows are much higher when the students are on campus. Or maybe that college has a football stadium and there are massive flows on game days.

tpo: How does that affect the screening process and the choice of screening equipment?

Turpin: The dilemma it creates is the screens have to be designed with an opening wide enough to address those peak flows. That sub-optimizes the operation of the plant, because 90% of the time when those high flows are not occurring, they could be screening at a much finer opening.

“We asked: What if engineers didn't have to modify their design to accommodate changing flow conditions? What if the screen itself adapted to them?”

MARK TURPIN

tpo: How did you address that issue with the new screens?

Turpin: We asked: What if engineers didn't have to modify their design to accommodate changing flow conditions? What if the screen itself adapted to them? We created the new design to provide a larger safety factor that assures system reliability during normal flows and worst-case events. We also recognized that there is a large hydraulic load on the machine in high-flow events, but that early in those events there can be a very significant load of solids and grit. So we developed a machine that responds to those conditions.

tpo: How exactly do the two models accommodate those conditions?

Turpin: In the FlexRake IQ we redesigned the scraper and some other



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components to handle grit more effectively. In addition, during a high-flow event, if the machine engages with a large piece of debris, it will do what the original FlexRake does. And the link will re-engage more rapidly, so the screen remains clean during those extreme events. The IQ2 is an additional feature. If the hydraulic head continues to build ahead of the screen, then the screen will automatically change to a larger opening.

tpo: How is the change to the larger screen openings accomplished?

Turpin: After the first flush comes in and the debris is removed from the channel, the bar screen changes from a 1/4-inch opening to a 3/4-inch opening. This occurs without any operator interaction. When the high-flow event is over, the speed and the screen opening return to normal. This also occurs automatically.

tpo: What triggers the change in the screen opening?

Functionion: There are ultrasonic transducers that detect the water levels upstream and downstream of the unit. From there an algorithm calculates the headloss across the screen. We set parameters to change the bar opening at a certain head differential.

tpo: Are these screens designed mostly for plants with highly variable flows?

Functionion: They are good technologies for any treatment plant. There are probably some plants that have very stable flows, but the vast majority have high-flow events to manage. And in case a plant should encounter an extreme event or some other form of variability in the future, the FlexRake IQ2 especially gives them a belt-and-suspenders approach, so they have flexibility to allow more flow at any given time.

“When we show it to people, they say it just makes sense. People understand the logic of what we’re doing and the advantages to it.”

MARK TURPIN

tpo: What was done to prove out this product?

Functionion: We did an alpha test at the wastewater treatment plant in Saginaw, Michigan, where we’re located. We studied it at high speed for six months and simulated roughly a five-year life cycle. It didn’t show any wear, so we know the service life is going to be much longer than that. We also installed a beta unit in Saginaw Township. They purchased the unit, and it has been running since June 2020.

tpo: What are customers saying about these technologies so far?

Turpin: When we show it to people, they say it just makes sense. People understand the logic of what we’re doing and the advantages to it. The feedback has been favorable. **tpo**

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A B C D E F G H I

The team at the Northeast Wastewater Treatment Plant includes, from left, Mikeal Farr, senior plant operator/shift supervisor; Shane Eckard, Brandon Burdett and Sabine Wagner, operators; Doug Kirby, heavy equipment operator; Keith Rhyne, plant superintendent; Lonnie Laird, Randy Keene and Paul Solomon II, operators; John Sain, maintenance worker; and Heidi Fox, operator.



Upgrade on the Fly

A NORTH CAROLINA TEAM FINISHED A MAJOR PLANT UPGRADE WITH NO SHUTDOWNS AND NO PERMIT VIOLATIONS. THE NEW EQUIPMENT AND TECHNOLOGIES NOW SERVE THEM WELL.

STORY: **Jim Force** | PHOTOGRAPHY: **Nancy Pierce**

It was a little like trying to put on a new shirt while removing the old one, without baring any skin in the process.

As part of a major facelift in 2012, the Northeast Wastewater Treatment Plant in Hickory, North Carolina, had to upgrade and improve all its old processes without missing a beat and staying in compliance.

"Some of our equipment dated to the 1960s, and the original plant was built in 1940," says Keith Rhyne, superintendent. "Some of it was falling apart." The plant, far out in the country when built, is now hemmed in by new developments; the tight footprint was a limiting factor.

But it all worked out, thanks to a dedicated management and operations team. They received the North Carolina AWWA-WEF Operations and Maintenance Award in 2019 for that and other efforts to serve their communities with clean, compliant effluent.

"I think the key was communication and collaboration between the contractors, engineer and staff," Rhyne says. Even though many of the staff members on hand for the upgrade have retired, their example lives on in their replacements. The goal then and now is to provide clean water, educate the public about the value of wastewater treatment, and support the city's programs of teamwork and customer focus.

CHALLENGING UPGRADE

Rhyne recalls the process to upgrade the old facility, starting in 2002 and concluding with the refurbished facility in 2012. "At first, our bids were way too high — \$38 million," he recalls. "We went back to the drawing board and cut out some things to make the project more affordable." The revised bid was around \$23 million, and the project got the green light.

Team members regularly measure the sludge blanket in the facility's secondary clarifiers (WesTech Engineering).

"We decided to use as many of the existing structures as possible," Rhyne says. "It was challenging for our operators because we couldn't shut anything down as the new construction went along. How do you rebuild a clarifier while it's still in use?"

Temporary power, temporary pumping and temporary disinfection enabled the transformation. The headworks building was reused for equipment storage. The return activated sludge building stayed and was re-equipped inside. Eliminating the primaries opened up space for the new oxidation ditches.

But it was communication that really led to success. "Operators were constantly asked what they thought about an upcoming plan or phase," says Rhyne. "We did it, it worked, and we had no violations. As we ran the old process, we trained up on the new. That was good."

A MODERN PROCESS

Today, the Northeast Plant (6 mgd design, 3 mgd average) serves about 40,000 people. Flygt pumps (a Xylem brand) bring the influent to the preliminary treatment area, equipped with Vulcan bar screens and a Smith & Loveless grit removal system.

Then the flow moves to the oxidation ditches, an Ovivo A2C system that operates with anaerobic, anoxic and aerobic zones. While the plant has no permit limits for nitrogen and phosphorus now, Rhyne expects that to change. The plant will be ready, as it already reduces total phosphorus to less than 0.5 mg/L and TKN to 4 to 5 mg/L.

Secondary clarifiers (WesTech Engineering) settle the treated water, and a Capital Controls system provides chlorination-dechlorination. Effluent is discharged through an aerated channel to Hickory Lake, a reservoir on the Catawba River. Biosolids are pumped to a Charter Machine gravity belt thickener by rotary lobe pumps (Boerger). The material at about 4% solids is trucked to a composting site.

Hach samplers keep the staff informed of wastewater conditions, and a Rockwell Automation system controls process equipment. The plantwide SCADA is from MR Systems. Two types of odor control are in operation. A carbon adsorption system (Pure Air Filtration) scrubs air from the grit removal area, and biological controls (Azzuro) are installed in the solids building.

Northeast Wastewater Treatment Plant

Hickory, North Carolina

BUILT:
1940; upgraded 1969, 1988, 2012

POPULATION SERVED:
40,000

FLOWS:
6 mgd design, 3 mgd average

TREATMENT PROCESS:
Oxidation ditch

TREATMENT LEVEL:
Secondary

RECEIVING WATER:
Lake Hickory



BIOSOLIDS:
Composted

AWARDS:
2019 Operations and Maintenance Award, North Carolina AWWA-WEF

ANNUAL BUDGET:
\$1.0 million (operations)

WEBSITE:
www.hickorync.gov



“Operators were constantly asked what they thought about an upcoming plan or phase. We did it, it worked, and we had no violations.”

KEITH RHYNE

EDUCATION: MAKING IT PERSONAL

When talking to residents about wastewater treatment, Keith Rhyne likes to use the human body as a frame of reference.

“The headworks building is like the mouth, and the aeration system is the lungs, equipped with blowers and diffusers,” says Rhyne, superintendent of the Northeast plant in Hickory. “The return sludge pumps are like the heart. The digestion process is just like the one you have in your body. And the central nervous system is the SCADA and staff. Keep that body healthy and it will take care of you.”

Rhyne and his staff make an extra effort to keep customers and their families informed about the need for treatment and the Northeast plant’s role.

“Basically, we’re telling people that without clean water, there would be no city for them to inhabit,” Rhyne says. “If they’re squeamish about what we deal with here, we make sure to let them know that they are the source of it and we’re here to prevent pollution.”

The public education program includes a regular schedule of tours. “In normal times, we probably average five tours a month,” Rhyne says. “When school is in session, we’ll have busloads of kids arriving here every month.”

College sends students who are studying the sciences and middle schoolers enrolled in STEM programs are frequent visitors, as are scout groups. Rhyne uses clean water videos from AWWA (such as *Our Water Cycle: Where Does Water Come From and Go?*) as keystones of the presentation and tour.

“A lot of people have the false idea that we’re causing the pollution,” Rhyne says. He explains that the plant discharges to Lake Hickory, and these days, everyone wants to live on or near the lake. What used to be a rural area with a gravel road is now full of pricey homes and developments. A brand-new park is being developed across the street from the treatment plant.

“People are curious,” Rhyne says. “We always keep the door open so they can see what we do here. We’re an important function of life today.”



Keith Rhyne, plant superintendent

Northeast Wastewater Treatment Plant PERMIT AND PERFORMANCE			
	INFLUENT	EFFLUENT	PERMIT
BOD	200 mg/L	3.6 mg/L	30 mg/L
TSS	232 mg/L	4.2 mg/L	30 mg/L
Ammonia	25 mg/L	0.19 mg/L	6 mg/L
Total Nitrogen	38.9 mg/L	5.1 mg/L	N/A
Total Phosphorus	2.8 mg/L	<0.3 mg/L	N/A

tor/supervisor; Shane Eckard, Paul Solomon II, Sabine Wagner and Lonnie Laird, operators; John Sain, maintenance; and Doug Kirby, heavy equipment operator. Heidi Fox and Brandon Burdett are on second shift; Randy Keene is on the third.

An electrical support group is offsite and available for work Rhyne calls “very helpful.” Six team members work in the laboratory, which conducts sampling and testing for all five plants that serve the greater Hickory area. David Cox is pretreatment coordinator, and Paula Prestwood is lab supervisor.

(continued)

QUALITY WORKPLACE

The Hickory facility is staffed 24/7 with nine certified operators doing eight-hour shifts during the week and 12-hour shifts on weekends and holidays. Six serve the first day shift, including Mikeal Farr, senior plant opera-

The newly upgraded Northeast Wastewater Treatment plant uses an oxidation ditch process to handle a 3 mgd average flow.





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Lonnie Laird (left) and Mikeal Farr use SCADA software (MR Systems) to monitor plant functions.

“This is a good place to work. It’s well run and new, and we frequently host regional operators’ meetings.”

KEITH RHYNE

“This is a good place to work,” says Rhyme. “It’s well run and new, and we frequently host regional operators’ meetings.” While many members of the original crew have retired or are about to, the city has attracted a good crop of applicants for open positions. “We may not get as many applicants as we used to, but the ones we see are good candidates,” Rhyme says. “They are willing to go the extra mile.”

VALUED CONTRIBUTORS

The new technology helps, as well. Rhyme remembers when controls consisted of a panel and red and green lights that flashed on and off. The technology may have seemed intimidating at the beginning, he says, but once it’s learned, the benefits are obvious.



Sabine Wagner adjusts controls on the grit removal system (Smith & Loveless).



A Hach probe monitors pH in the process flow.

That effort reflects the city’s new credo called “Be CITY.” The C stands for customer focused, the I for innovative, the T for teamwork, and the Y for you. “It’s designed to emphasize being the best you can be and helping the city succeed in the process,” Rhyme says. “We follow those guidelines.”

Rhyme and the staff felt they were making a contribution when they received the Operations and Maintenance Award from fellow clean-water professionals. “The city recognized us at one of their monthly council meetings,” Rhyme says. “The workers felt very proud, but what really made me proud was knowing I work with such a great team, all the way up and down the ladder.” **tpo**

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BIOLOGICAL TREATMENT SYSTEMS HELP THE CITY OF LAGUNA BEACH ELIMINATE NUISANCE ODORS COST-EFFECTIVELY AT THREE MAJOR LIFT STATIONS

By Ankur Shah

Laguna Beach is a small California community of beaches, hiking trails, a walkable downtown, and summer art festivals.

Laguna Beach occupies 8.84 square miles in southwest Orange County, has a population of 23,000, and welcomes some 6 million visitors each year. Services include recreational activities and cultural arts events. The sanitary sewer system incorporates 85.71 miles of gravity sewers, 9.44 miles of force mains, 25 lift stations and 2,674 manholes.

In recent years, the city has installed biological odor-control systems to eliminate odors and community complaints at three major wastewater lift stations.

REVIEWING ALTERNATIVES

The Laguna SOCWA Lift Station, built in 1981, is the city's second largest and pumps about 1 mgd of wastewater, first to the Bluebird Lift Station and then on to the Coastal Treatment Plant in Laguna Niguel. After decades in service, the wet well at the Laguna SOCWA station became dilapidated, requiring a full reconstruction in 2016. Because odors around the lift station had been a nuisance, a long-term odor-control solution was included.

When evaluating options, the city reached out to odor control consultant, Donald King, P.E., of DHK Engineers. King considered safety, reliability and cost in making a recommendation. Aesthetics was also a factor, as it was imperative that the system have a compact footprint and a low vertical profile, and that it be screened from view while allowing proper dispersion of the scrubber exhaust.

City leaders wanted a system using no hazardous chemicals, with minimal moving parts and low noise. They also wanted flexibility to handle high and low influent hydrogen sulfide odor profiles, as well as other odorous organic compounds. A plug-and-play system would allow for minimal on-site construction and commissioning activities.

The city ultimately selected the I-BOx 6000 biological odor-control system from Integrity Municipal Systems for meeting the requirements with minimal operating and maintenance costs. The system requires only off-the-shelf, locally available additives and no proprietary products; the supplier offered a clearly defined scope of services, a strong warranty and initial operating service.



The I-BOx 6000 biological odor-control station (Integrity Municipal Systems) as installed at the Laguna SOCWA Lift Station.

“The IMS team has a track record for over 30 years of doing whatever it takes to resolve any issue, even if not directly connected to the IMS equipment,” King says. “They are a highly knowledgeable team in all aspects of odors, control technologies, ventilation and air permitting.”

READY TO RUN

The system was pre-assembled, piped, wired and tested in the IMS factory to enable fast installation and startup. The packaged biological system includes an air exhaust fan and odor-control vessel made of fiberglass-reinforced plastic, a water and nutrient feed panel, a nutrient tank, and an electrical control panel. All components are mounted on the low-profile vessel deck for easy access and maintenance. The control panel is remote-mounted on a wall next to the odor-control system and outside the hazardous Class 1, Division 2, Group D area.

The fan in the packaged, once-through system continuously pulls the odor-laden air from the wet well and surrounding manholes into the odor-control system for treatment before release to the atmosphere. There are two treatment stages:

Stage 1

The biological process stage removes primarily hydrogen sulfide by providing an environment that promotes the natural growth of acidophilic, sulfur-oxidizing bacteria. The media is an inert, porous, mineral-expanded

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clay designed to resist compaction and degradation from the acidic sulfates created by the biological oxidation of the hydrogen sulfide.

This stage operates with an independently controlled irrigation system to provide the media with enough moisture to sustain bacterial growth and remove toxic byproducts. Irrigation is controlled by a programmed timing sequence that actuates a solenoid valve on the water-supply piping. Nutrients are trickled down over the media to enhance and sustain the biological activity. The nutrients are housed in an integrated tank and are dosed by a pump mounted in the water and nutrient feed panel.

Stage 2

A second-stage pelletized coal activated carbon media removes any remaining hydrogen sulfide and other odorous organic compounds, polishing any sharp hydrogen sulfide spikes that break through Stage 1. The cleaned air is discharged through a stack at the top of the unit.

FAST RESULTS

While the odor-control system was being manufactured, IMS within a few days delivered two temporary activated carbon adsorber systems. They were immediately deployed at the wet well and the manhole, protecting the nearby business community from odors.

After a contractor installed the biological system, IMS performed commissioning and operator training. While the city had seen well over 100 ppm of hydrogen sulfide in the wet well before installation, the new system recorded 10 ppm at the inlet and 0 ppm at the outlet, solving the odor problem with a reliable, efficient, cost-effective, and sustainable technology.

"The IMS team is highly experienced and provided dedicated customer service every step of the way," says Hannah Johnson, project manager for the city. "Installation and commissioning went seamlessly. We've received positive feedback from members of the community about how much the unit has improved the nuisance odors."

MORE APPLICATIONS

Based on the success at the Laguna SOCWA Lift Station, the city applied the same solution to the Bluebird SOCWA Lift Station, about 1 mile away. As the city's largest lift station, it conveys all wastewater within the city's service boundaries — about 2 mgd — to the Coastal plant at Laguna Niguel.

Built in the early 1980s, the Bluebird station had a long history of odor complaints. The I-BOx 6000 system was installed there in November 2019. Testing after startup showed an average hydrogen sulfide loading of 15 ppm and a peak of 229 ppm at the inlet and none detectable at the outlet. Inlet and outlet gas samples analyzed by an accredited testing laboratory confirmed the system's performance.

The city turned to IMS again to address odor concerns at the Victoria Beach Lift Station. The city selected the MCS carbon adsorber system, a single-stage, skid-mounted, dry-media system, designed for relatively lower odor levels and organic odors. The media can be virgin activated carbon or any of a number of specialty catalytic carbon media.

Johnson states, "We've purchased several odor control units from IMS and have had great success with every installation." **tpo**



The I-BOx 6000 odor-control system (shown here at the Bluebird Lift Station) has provided reliable odor control for the City of Laguna Beach.

The Power of UV

AWARD-WINNING RESEARCHER KARL LINDEN SEES BIG POTENTIAL FOR ULTRAVIOLET LIGHT, NOT JUST FOR DISINFECTION BUT TO TREAT PHARMACEUTICALS AND EVEN ATTACK COVID

By Ted J. Rulseh

The value of UV light for disinfection is well known. It's highly effective against a broad range of pathogens, and it eliminates the chemical costs and the handling risks of disinfecting with chlorine.

But there's more good news about UV, according to Dr. Karl Linden, a civil engineering professor at the University of Colorado Boulder. It's already part of a treatment process for pharmaceuticals in reuse water. It could come into play against the virus that causes COVID-19. And UV LED lamps are on the horizon.

Linden last November received the Clarke Prize for Excellence in Water Research from the National Water Research Institute for his work with UV technology. He began his academic work in 1992 as a research assistant at the University of California, Davis; he received his doctorate degree in environmental engineering in 1997. He then moved to professorships at the University of North Carolina and Duke University before arriving at University of Colorado Boulder in 2008.

Linden and colleagues have made breakthroughs that influence how clean-water plants deploy UV disinfection. He has published or contributed to hundreds of papers on the topic. His studies include investigating low-cost, compact UV systems for developing countries and remote areas.

In 2012-15, Linden and his research team worked with the Bill & Melinda Gates Foundation to develop a toilet that focuses sunlight to disinfect waste and produces useful fuel called biochar. Among numerous honors, Linden earned the 2013 Pioneer Award in Disinfection and Public Health from the Water Environment Federation. He talked about his work and the role of UV in an interview with *Treatment Plant Operator*.

tpo: How did you become interested in UV?

Linden: It started when I was in graduate school, working on a wastewater treatment project at UC Davis. We were piloting different types of filters and disinfection systems and working with a UV system. A project opened up in UV for applications in wastewater reuse. To me it made a lot of sense, and I was really excited about the technology.

tpo: What was it about UV that you found so fascinating?

Linden: The way it works is really interesting. It uses the energy of photons in light to achieve disinfection. It doesn't use chemicals, and there are no byproducts that form. It was an interesting field scientifically, and it had a lot of promise from a sustainability standpoint. It was fascinating to explore the interaction of light with matter, whether pathogens or chemicals.

tpo: How exactly does UV light deactivate pathogens?

Linden: The target of the photons is actually the nucleic acids — the DNA and RNA of the pathogens, whether bacteria, viruses or protozoa. Nucleic acids absorb UV light very strongly. The light energy breaks the bonds that hold the DNA double helix together. That destroys the organism's

ability to replicate itself, and so it can't cause infection.

tpo: What are the benefits of UV from an operator's perspective?

Linden: UV works in a matter of seconds. Instead of having a 30- to 60-minute contact time in a chlorination chamber, you're talking about one to five seconds that the water is in the UV chamber. That's a paradigm shift in operation and maintenance. And there is no danger of operators getting exposed to UV light, because the UV lamps are always contained in a channel or a vessel of some sort.

tpo: Does the technology use any specific type of UV light?

Linden: Not all photons get absorbed by nucleic acids. It has to be a certain wavelength of light. UV at 254 nanometers is one of the best wavelengths, and that is the typical output of a conventional UV lamp.

tpo: Does UV work effectively on *Cryptosporidium* and *Giardia*?

Linden: After the *Cryptosporidium* outbreak in Milwaukee in 1993, everyone was looking for solutions for its inactivation. Chlorine is completely



Dr. Karl Linden

“The way UV works is really interesting. It uses the energy of photons in light to achieve disinfection.”

KARL LINDEN

ineffective. At the time there were some studies going on with *Crypto* and UV, and it turned out that UV was very effective against it.

tpo: Why was UV at first thought to be ineffective against *Cryptosporidium*?

Linden: It used to be “common knowledge” that UV didn't work against *Cryptosporidium* and *Giardia*, or that it took an extremely high dose that wasn't realistic. But basically, people were asking the wrong question. UV doesn't kill organisms. It inactivates them. If you assay and in effect ask the organism, ‘Are you alive?’ after it got hit by UV, it might say, ‘Yes, I'm alive.’ But if you ask, ‘Can you replicate?’ it would say ‘No.’ Once people did activity studies with *Crypto*, they realized that UV actually worked very efficiently against it. After that point, UV was clearly the best available technology for *Cryptosporidium* inactivation. In fact, it's easier to inactivate *Crypto* than to kill *E. coli* with UV.

tpo: How does UV compare with ozone for treating *Cryptosporidium* and *Giardia*?

Linden: Ozone also works with both, but it works differently. Ozone is a chemical oxidant that tears apart the cell membrane, the cell wall and the oocyst structure. UV goes through the cell membrane and destroys the cell from the inside out. Ozone takes quite a high dose for *Giardia* and *Crypto* inactivation as compared to viruses and bacteria.

tpo: Are you saying that UV is more cost-effective than ozone for that purpose?

Linden: I definitely believe UV is more cost-effective than ozone for disinfection of *Crypto*, because *Crypto* is basically the easiest thing to kill with UV — it requires one of the lowest doses possible. But ozone and chlorine might be more cost-effective for viruses, which require a higher UV dose than for *Crypto*. There are tradeoffs with all technologies.

tpo: How does UV figure in treating pharmaceuticals in wastewater streams?

Linden: That's a different process in that you have to add a precursor chemical, typically hydrogen peroxide. It's an advanced oxidation process. UV light gets absorbed by the peroxide; it breaks down to form hydroxyl radicals that then destroy the pharmaceuticals.

tpo: Is this type of process commercially viable or still experimental?

Linden: It's completely viable, and it's actually one of the most standard processes in wastewater reuse, especially for potable reuse. Usually the UV and hydrogen peroxide process is added after membrane treatment, such as microfiltration, to clean up any pharmaceuticals and other organic contaminants that got through the membrane. It's also used in drinking water to treat taste- and odor-causing chemicals.

tpo: How might UV light be used to help control the spread of COVID-19 virus?

Linden: UV is very effective against viruses, and there are wavelengths of UV that are less harmful to human skin and eyes. At wavelengths below 230 nanometers, the light actually doesn't penetrate into the skin much farther than the very top layer, so there is less risk of causing cancer and other mutations. You can use those wavelengths in public spaces to disinfect aerosols between people, and also to disinfect surfaces.

tpo: Where and how might UV light be deployed in those applications?

Linden: It could be used inside the air-handling units of HVAC systems. It could also be used in the spaces around the ceilings of rooms. If there is good airflow so that the air gets up to the ceiling levels, you could end up killing a good portion of any pathogens that might be in the air at the time. That could be helpful for the control of respiratory viruses like the COVID-19 virus.

tpo: Would there be any limits on UV light exposure for health and safety reasons?

Linden: There are certain regulations around the amount of exposure you're allowed to have per day. But you can effectively disinfect viruses while adhering to those maximum exposure levels. You find the sweet spot where you're not overdosing but have enough UV light to kill the viruses on surfaces and in the air.

tpo: Where else might UV technology contribute to water and wastewater systems?

Linden: We're looking at applications for UV LED technology. Usually UV lights are tube lamps, but LED technology is just really small points of



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“Regular UV lamps are pretty efficient. LEDs aren't quite there yet, but they will be. It's just a matter of time.”

KARL LINDEN

light. You could think about distributing those LEDs throughout a network of pipes, for instance, or at certain booster spots in a system. UV in water holding tanks might be another application. In New York City, every building has a water storage tank. Lots of microbial changes can go on in those tanks, and you could have UV systems inside them. The nice thing about LEDs is that they are DC-powered, so you can run them off of solar panels. They are much more flexible in how you operate them and much more robust and less sensitive to breakage.

tpo: Is it possible that UV LEDs could eliminate the need for a chlorine residual in drinking water distribution systems?

Linden: There are a lot of questions to answer first, but that's one of the visions I have. It certainly is possible to design a treatment system so you don't need a chlorine residual; many countries don't use chlorine as a secondary disinfectant. In those cases there could be a role for UV at the point of entry to a building, or at the point of use in a faucet. Using very small LEDs, you could actually protect the public from any unknown potential contaminants that might get into a distribution system where you don't have a chlorine residual.

tpo: Will UV LEDs mean lower energy costs for disinfection?

Linden: That's the hope. They are definitely ready for prime time for operation now. The energy efficiency is constantly improving. Regular UV lamps are pretty efficient. LEDs aren't quite there yet, but they will be. It's just a matter of time. **tpo**



Always Learning

AWARD-WINNING LAB SUPERVISOR TYLER BRAGG FUNCTIONS AS AN
INTEGRAL PART OF A FULLY CROSS-TRAINED CLEAN-WATER PLANT TEAM

STORY: **David Steinkraus** | PHOTOGRAPHY: **Martin Cherry**

The wastewater treatment plant in the Kentucky city of Glasgow has the same responsibilities as any big plant when it comes to keeping the public safe.

Key to that is the laboratory work that tells operators what is happening inside the plant. In Glasgow the lab is run by Tyler Bragg, who came to the industry right after high school. He came looking for a job, but instead he found a career. It's a job that fits.

TOTAL RESPONSIBILITY

The Glasgow lab is state-certified, and the process of gaining certification began shortly before Bragg became the lab supervisor. Superintendent Jacob Billingsley wrote the operating and quality

assurance procedures for certification. Then the state auditors showed up for their inspection.

Bragg had spent a year training with David Huffman, the previous lead lab analyst, who retired a few months before the audit. All of a sudden, Bragg had a different perspective on the job. "It's my name and initials on everything going to our permit and the data. So it was kind of nerve-wracking," he says.

Yet the inspection wasn't a bad experience. Afterward, everyone sat around a table to hear the auditors' opinions: what they liked, what they didn't, and what needed to change. "Not to toot our own horn," Bragg recalls. "But they said, 'Guys, we're going to be honest with you. The first audit that we do is normally just to get you back



Tyler Bragg won the 2020 J.C. Chambers Award from the Kentucky Water and Wastewater Operators Association for commitment to improving management and technical progress in operations.

Tyler Bragg, Glasgow (Kentucky) Wastewater Treatment Plant

POSITION:
Primary lab analyst/laboratory supervisor

EXPERIENCE:
14 years

DUTIES:
Run all lab samples for permit compliance; help operate and maintain treatment plant

EDUCATION:
Associate degree, general science, South Central Kentucky Community College

CERTIFICATIONS:
Level IV wastewater operator, Level I laboratory certification

to where you need to be, but we couldn't find really a whole lot to recommend." That was music to Bragg's ears.

DUTY

Every year it's up to Bragg to look at the lab procedures, and revise them if needed, and review and revise the quality-assurance plan. One procedure he revised this year involved the carboys. They now must be rinsed with deionized water in order to produce a good base reading. The change started because of a variance in the BOD tests. Carboys that were blank (water and nutrients only, no microbes) were showing a positive result.

The cause remains unknown. Bragg and his teammates did research and made numerous phone calls looking for solutions to the problem. They found a cure, if not an answer: washing the carboys with Liquinox detergent (Alconox), rinsing with tap water, and then rinsing with deionized water.

Before settling on the carboy washing procedure, the lab installed a UV disinfection system in a waterline just after the deionizing filters. "A mixture of everything could be what's helping us," Bragg

says. "It seems like maybe there was a biofilm — maybe." But it was definitely enjoyable to work on the problem, he adds.

ACTIVATED SLUDGE

The Glasgow plant (4 mgd design, 2.2 mgd average) uses the activated sludge process. Influent flows through screens (Parkson) and a PISTA Grit system (Smith & Loveless). Four submersible pumps (Flygt, a Xylem brand) send wastewater to seven aeration tanks, five or six in use at any time.

Dissolved oxygen sensors supply information for the Hoffman blowers. Two circular clarifiers separate sludge, and four Gorman-Rupp pumps and two Vogelsang pumps recirculate sludge. All motors are equipped with variable-frequency drives tied to the SCADA system. Solids go through a Fournier press and are landfilled. In summer the Glasgow team can use nine drying beds when maintenance is being done on the press.

In the lab, the team uses a Hach DR3900 spectrophotometer for phosphorus, ammonia, total nitrogen and other critical tests. There are also a number of Hach HQ40D meters for DO and BOD testing.



Tyler Bragg, primary lab analyst/lab supervisor

An IDEXX Quanti-Tray sealer handles bacterial counts. There is also an Orion Star A211 pH meter (Thermo Fisher Scientific), a Thermo Fisher Scientific incubator and a Quincy Lab Model 30 oven for drying TSS test papers.

LENDING A HAND

On most days Bragg works mainly in the lab. Samples are taken three days per week. On the other days, he prepares for the next set of samples or helps the operators in the plant. Helping means a bit of everything: whatever needs to be done.

“There are three of us down here, and it’s not like we’re a great big wastewater treatment plant,” Bragg says. “Whatever needs to be done, all of us can

“There are three of us down here, and it’s not like we’re a great big wastewater treatment plant. Whatever needs to be done, all of us can do.”

TYLER BRAGG

do. I am the primary lab analyst, but that doesn’t mean Jacob or Adam (Headrick) can’t do the same thing. We’re cross-trained from top to bottom, and it’s a great benefit to have.”

Headrick is a Level IV wastewater operator. The Glasgow plant also employs two part-timers: Ronnie Poynter and Huffman. Both are retired but still have their state licenses and an inclination to help. Hours for the team are 7:30 a.m. to 3:30 p.m. Monday through Friday.

THE POWER OF A NETWORK

Involvement in a state operators association is helpful in many ways — to the organization, to other people in the state, and to the person involved. It helped Tyler Bragg when he had a problem to solve at the wastewater treatment plant in Glasgow, Kentucky.

Bragg joined the Kentucky Water and Wastewater Operators Association because he wanted to grow with it. He has been in the industry for about 14 years. For him, the benefit of the association is meeting people: “The more people you know, the more apt they are to help you.”

When the Glasgow plant had trouble with its BOD test results, Bragg called people he knew through the association to gain insights into the problem and potential solutions.

In 2019, Bragg was an officer for the central chapter, and for 2021 became chapter vice president. In that role he assists the president in organizing training sessions, finding sponsors for activities and running meetings.

He will also be part of the group evaluating plants nominated for the chapter’s annual awards. Those visits will allow him to see how other people operate their plants, and that may give him ideas about how to improve his own.

The three full-time operators and two part-timers take turns working four hours on Saturday and Sunday and four hours on holidays. At other times, the SCADA system calls Billingsley in the event of a problem, and he drives to the plant or asks one of the other operators to go in.

CAREER FINDS HIM

Bragg began his water career the way many professionals do. He learned of an opening at the plant after he finished high school in Glasgow, where he grew up. “I wasn’t looking to make a career out of it. It was more a part-time job to make extra money,” Bragg says. “At that time I was 18 or 19 years old, so I really didn’t think big picture.”

His part-time work was mowing (“a lot of mowing,” he says), cleaning, sweeping, mopping and doing whatever needed to be done. He stayed, and after about two years his co-workers invited him to start learning how the plant worked and how to operate it. “A couple guys were ready to retire, and the company thought that if I took the initiative to learn, maybe I could be a good fit here,” Bragg says.

In high school, science had not been his favorite subject. His attitude changed when he began learning about plant operation. “Something changes every day,” he says. “It’s not like going to a factory and a machine. Sometimes the work is routine. And then again there are days when you have to put your brain to it and provide a good service for you customers and the community.”

HANDLING A CHANGE

Bragg prefers the lab work to plant operations because of what he learns. He enjoys seeing how all the chemistry works: “It’s pretty cool to me.”

The biggest change in his job in the last few years came from the switch from chlorine to peracetic acid for disinfection. That happened because of the danger to the community of storing large amounts of chlorine, and the risk to operators working with it. Through Bragg’s lab work, the operators had to figure out what dose of peracetic acid produced the best result in the disinfection chamber.



Bragg, right, with Adam Headrick, Level IV operator, has helped update the lab's standard procedures.

Bragg went back to school in 2015 at South Central Kentucky Community College to study for an associate degree in general science, which he completed. It became a busy five to six years. Around the same time, Huffman retired and the state performed its certification audit. Meanwhile, his wife Lauren was pregnant with their second child, daughter Palmer (now age 2), and there was son Harrison (now 6) to look after.

They also bought and remodeled a house. "We pretty much gutted the whole thing," Bragg says. "They had carpet just about through the whole house, and underneath it was hardwood flooring. So we redid the flooring, redid all the plumbing, all new LED lights. It was about nine months of good, steady work. And we did it all ourselves, too, with the help of my father-in-law."

“Sometimes the work is routine. And then again there are days when you have to put your brain to it.”

TYLER BRAGG

PRAISE FROM THE BOSS

Superintendent Billingsley came to the Glasgow plant after earning a degree in biology and about three years after Bragg started. The degree gave him credit for four years of experience, but Bragg helped teach him the plant basics, such as what to look for while walking through the plant and how to change seals and pumps. He has been superintendent for about four years.

Although he wrote the procedures for the lab, he says, Bragg has built on those. It's much easier to do the lab work now. "He has made the lab forms, the logbooks, all of that more efficient," Billingsley says. "It's a lot easier to read. It all flows a lot better. He has definitely improved it tenfold since he took over in the lab."

When Bragg finishes the lab work, Billingsley says, he shows up in the plant to help and doesn't have to be told what to do. His experience and teamwork are great assets, especially at a plant running with only three full-time staff members.

Bragg spends his time off with his kids, watching University of Kentucky football or basketball, or playing golf if he can find a moment. "I'm pretty boring," he says. His son is taken with gaming, "so with him, you can sit in front of the TV and play the Wii for hours upon hours. With Palmer, she's our little daredevil. She's into everything and anything you can think of."

Travel is another pleasure, especially around Kentucky to admire its scenic beauty. "I love going up to Lexington in the bluegrass area," Bragg says. "It's really pretty, seeing the horse farms, and going to a UK basketball game."

Once a year Bragg and his wife go to Destin, Florida, a recreation community on the Gulf of Mexico near Pensacola in the Florida panhandle. In the 12 years they have been together, "We've seen it grow exponentially, and it's to the point now where we're trying to find some different places down in Florida to vacation and get away from a lot of people."

AMPLE RECOGNITION

All of his work has brought Bragg a couple of awards. In 2019 he won the Wastewater Operator of the Year award from the Central Chapter of the Kentucky Water and Wastewater Operators Association; in 2020 he received the J.C. Chambers Award, a statewide honor reserved for people with 10 or more years of professional industry experience and who have a demonstrated commitment to improving management and technical progress in operations.

In 2020 the Glasgow plant was named Wastewater Plant of the Year for the central chapter of KWWOA. As for his own accolades, Bragg observes, "I had no clue, to be honest with you, that I was even in the ballpark for the J.C. Chambers Award, which is voted on by our state KWWOA board members. So it was really an honor to have that recognition." **tpo**



Bragg (shown with the Qdos chemical metering pumps from Watson-Marlow), came to the industry just looking for a job, but instead found a satisfying profession.

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A Traditional Celebration Goes Virtual

A PANDEMIC COULD NOT STOP THIS COLORADO UTILITY FROM CONTINUING
A CHILDREN'S WATER FESTIVAL WITH A LEGACY THAT SPANS THREE DECADES

By Sandra Buettner



Children line up to for a chance at the Wheel of Misfortune while a classmate gets soaked. This activity teaches about extreme events, flooding, flood safety and water quality. (Photos are from the live water festivals in previous years.)

This year for the first time in 30 years, the Fort Collins Utilities annual water festival was held virtually due to COVID-19.

“Because it was virtual, we took advantage of broadening our audience to include all of our residents who have been to the festival over the years,” say Pete Iengo, senior communications specialist. “Our customers are all ages and every resident, no matter their age, appreciates learning how important water is in their lives.”

Before the pandemic, the festival consistently attracted 1,800 third graders including public, private and home-schooled children. It was held on the third Wednesday in May.

“Since our festival has been ongoing for 30 years, some of our past attendees, now in their late 30s, have kids themselves who are attending,” says Crystal Shafii, senior project manager. “They still comment on how much they enjoyed it when they were young, what they learned, and how it impacted their lives.”

The utility has two wastewater reclamation facilities with a combined 29 mgd capacity, serving 337,000 residents. Fort Collins, 65 miles north of Denver, receives its water from the Cache la Poudre River and the Horsetooth Reservoir.

PROMOTING THE FESTIVAL

Teachers, science coordinators and school office administrators each year receive a save-the-date email about the festival in December. In January, an email blast invites them to register. This year’s virtual event was also promoted through the utility’s website, social media and outreach to teachers, staff and volunteers from previous years.

Traditionally, the children descend from their school buses for two hours of fun and learning at a morning or afternoon session of the festival, held at the local community college. They attend four 20-minute events out of 32, including attending an exhibit hall with multiple booths. They also attend one indoor and outdoor activity.

An outside activity, Wheel of Misfortune, focuses on the probability of encountering various flood events in the area. The children put on raincoats and rubber boots and enter an enclosure that simulates different flood situations. Other outdoor activities include relay races and a “Bucket Brigade” in which children carry buckets representing how much water it takes to water their lawn or flush the toilet.

The exhibit hall includes a Wastewater Fundamentals display that teaches how wastewater is treated before it is returned to the river. Another exhibit, Enviro-scape, is a hands-on interactive demonstration that shows how people’s daily actions directly and indirectly affect bodies of water and wildlife and downstream users.

What's Your Story?

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



Students run back down a hill after learning to climb to safety through a flash flood simulation.

“I’ve heard from several people over the years who commented that the festival inspired them to work at the utility or pursue an environmental field of study.”

CRYSTAL SHAFII

VIRTUAL FESTIVAL

This year, for the festival’s 30th anniversary, the theme was celebrating the event’s rich history and its popularity throughout the years. The virtual event allowed the utility to make the festival a campaign all during May instead of just one day.

In addition to new presenters and exhibitors, it featured staff and presenters from previous years to highlight the festival’s legacy. The staff accomplished that by using e-learning pages on its website that featured live demonstration videos and educational materials. “We also worked to align the festival with our chief issues, which included water awareness, safety and wildfire recovery due to the wildfires we experienced this past year,” Iengo says.

More than 50 staff members and 40 volunteers from the utility and city organizations help pull the festival together and change it up every year to enhance the experience for the kids and educators. That is one reason it has lasted 30 years and has such a big following.

Surveys are sent each year to the teachers after the event to ask what the utility can do to improve it and what specifically the children enjoyed. Volunteers, presenters and exhibitors are also surveyed. Staff members at the event observe student participation and excitement and report on their



A Larimer County Dive Rescue team member hoists a student by his life vest straps. The activity teaches students how to stay safe in the water.

findings. After all the data is collected, the staff holds a debrief meeting on lessons learned.

“I’ve been working on the event for 14 years, and the impact of the festival is long-ranging,” Shafii says. “I’ve heard from several people over the years who commented that the festival inspired them to work at the utility or pursue an environmental field of study.”

One teacher was so impressed with the festival that she posted a thank you from her class in the local newspaper, *The Coloradoan*. Says Shafii, “To be recognized that way was so special to utility staff.” **tpo**

Conveyance and Distribution Systems

By Craig Mandli

Blowers

HOWDEN ROOTS EASYAIR ROTARY

The Roots EasyAir Rotary factory package blower from Howden is configurable to meet the unique requirements in both pressure and vacuum wastewater applications. It is integrated with controls and has variable-speed drive capability while maintaining easy maintenance and fully removable enclosure panels for 360-degree access. The small footprint and side-by-side installation allow for more efficient use of available space, all while having limited free field noise levels to 80 dBA. It provides the customer with air at a given pressure and flow. The unit can come equipped with analog gauges or an integrated color display controller for package health monitoring. Its enclosure design allows it to be installed in either indoor mechanical rooms, or outdoors closer to the customer's process. **800-557-6687; www.howden.com**



Roots EasyAir Rotary blower from Howden



EBS 410 blower from Kaeser Compressor

KAESER COMPRESSORS EBS 410

Available in 30 to 100 hp models, Kaeser Compressors' energy efficient EBS 410 expands the range of rotary screw blowers for wastewater and fluidization applications and provides up to 1,448 cfm with pressures from 4 to 15 psig. They are suitable for municipal and industrial wastewater, flotation, fluidization, and other low-pressure applications where energy efficiency is critical. They are shipped completely assembled with high-efficiency motors, inlet filters, silencers, integral starters/drive and a full complement of sensors for reliable operation and an efficient package. 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. With Sigma Control 2, the units can be seamlessly integrated into plants that are implementing IoT or Water 4.0 strategies. **866-516-6888; www.us.kaeser.com**

Couplings/Fittings

AGRU AMERICA PE PIPES AND FITTINGS

AGRU America offers pipes and fittings made from polyethylene 100/4710 for durability and corrosion/abrasion resistance, used in many municipal and industrial applications. The pipe and fitting products include large-diameter pipe, HDPE pipe fittings, Mine-Line pipes, electrofusion fittings and equipment, ball valves, metric solutions, and semi-finished products. Product benefits include long-term service



Pipes and fittings from AGRU America

life and reduced operational costs, suitable flow and weight characteristics, manufacturing in both butt fusion and electrofusion fittings, and proven performance in gas, water, industrial and municipal applications. **800-373-2478; www.agruamerica.com**

Motor and Pump Controls

BADGER METER DYNASONICS TFX-5000

The Dynasonics TFX-5000 ultrasonic clamp-on flowmeter from Badger Meter accurately measures the volumetric flow of clean liquids and those with small amounts of suspended solids or aeration, such as surface water or raw sewage. It is suitable for water and wastewater applications such as lift stations, booster pump stations and water mains. This meter provides accuracy up to 0.5% and flow rates ranging from 0.07 to 33,000 gpm on pipes as large as 48 inches. Designed to clamp onto the outside of pipes, the meter does not contact the internal liquid, allowing for installation without shutting down operations in new and retrofit applications. It is equipped with an internal clock and built-in 8 GB data-logging capabilities to log flow down to one second. It also pairs with dual clamp-on resistance temperature detectors for Btu energy measurement. **877-243-1010; www.badgermeter.com**



Dynasonics TFX-5000 flowmeter from Badger Meter



MS6 Ultrasonic Chemical Flow Meter from Blue-White

BLUE-WHITE INDUSTRIES SONIC-PRO MS6

The MS6 Ultrasonic Chemical Flow Meter from Blue-White uses transit time technology to closely track chemical being dosed from a chemical feed pump into the system. This allows the operator to make certain the proper amount of chemical is being injected. Data advising the exact flow rate being dosed is delivered directly from the MS6 to the SCADA system. The MS6 gives a precise measurement of chemical being fed so that proper dispensing/dosing can be easily verified thus avoiding an overdose or underdose. **714-893-8529; www.blue-white.com**

FORCE FLOW CHLOR-SCALE AND HALOGEN ECLIPSE

To protect chlorination systems from dangerous leaks, the Halogen Eclipse emergency valve shut-off system instantly closes the container valve when a signal is received from a leak detector, panic button or SCADA. The actuator quickly installs on the tank without the use of any tools and allows manual operation of the valve while in place. During an emergency shutdown event, the system measures the actual torque applied to the valve to ensure that the valve is closed to Chlorine Institute recommended standards and provides remote confirmation that the emergency close operation successfully closed the valve. The Chlor-Scale from Force Flow safely cradles a chlorine ton container while providing critical feed and chemical inventory information. Know in real time exactly how much chlorine has been fed and how much remains in the tank. It can warn of excessive or insufficient feed rates and can be remotely monitored from a PLC or SCADA system. **925-893-6723; www.forceflow.com**



Chlor-Scale and Halogen Eclipse from Force Flow

ORENCO SYSTEMS 4-IN-1 CONTROLLER

The 4-in-1 Controller from Orenco Systems supports numerous electrical configurations and dosing schedules within a single panel. Both Simplex (MVP-S2DM) and Duplex (MVP-DAX2DM) models are available and can be configured in the field for timed or demand dosing. While the control circuit operates on 120-volt power, the pump circuit is dual-rated for both 120- or 240-volt power, meaning installers and service providers can reduce their panel inventories for new installations and repairs. It includes a programmable logic unit with multiple timing intervals for changing flow conditions and has a built-in elapsed-time meter and counter. It also displays float position and has a float error indicator. Each panel includes a reference chart to assist with troubleshooting during installation and testing, as well as wiring diagrams. It is completely touch safe. **877-257-8712; www.orencosystems.com**



4-in-1 Controller from
Orenco Systems



Pump Watch Express
from PRIMEX

PRIMEX PUMP WATCH EXPRESS

Pump Watch Express from PRIMEX is a comprehensive family of 4G LTE/3G compact cellular RTUs and gateways used for monitoring pumping systems. It offers a simple tool for management of multiple sites, including alarm notification, data logging and graphic system visualization. It includes a lithium-ion backup

battery for power loss detection and notification, SMS/email/web portal alarm notifications, graphic HMI with simple and clear station status display, interactive pumping station map, data logging and historical trending, first year of service included, and optional web portal customization. The NEMA 4X control panels come in three versions: lite, premium and gateway. **844-477-4639; www.primexcontrols.com**

Pipe/Parts/Components

PATTERSON DAVIT CRANE

Patterson Mfg. Davit Cranes are manufactured with a low maintenance, easy-to-assemble design. They are available in 1/2- and 1-ton capacities with key features such as a reliable brake with long life and readily available parts, a hot-dipped galvanized finish, and no plastic sheaves or pulleys. **800-322-2018; www.pattersonmfg.com**



Davit Cranes from
Patterson Mfg.

RELINER/DURAN STAINLESS STEEL PIPE SUPPORTS

Stainless Steel Pipe Supports from RELINER/Duran are easily installed adjustable clamping pipe brackets available in noncorrosive 11-gauge type 304 or 316 stainless steel. Often used as part of an inside drop in sewer manholes, they are also used to secure pump discharge

lines, conduit, pumps, roof leaders and any other pipe to structure walls. In a marine environment they are used around piles to mount equipment. The slotted legs are adjustable to allow for variations in the offset distance between the pipe and the wall, and to accommodate irregular mounting surfaces. Clamps are

stocked for 1.5- to 30-inch pipes including SDR35, Sch 40, IPS, HDPE, C900 and DN. **800-508-6001; www.reliner.com**



Stainless Steel Pipe Supports
from RELINER/Duran

Pumps

ASHLAND PUMP EFFLUENT PUMPS

Heavy-duty effluent pumps from Ashland Pump are available in multiple horsepower sizes for various performance requirements and have efficient permanent split-capacitor motors. The oil-filled pumps have an upper and lower ball bearing design and handle solids up to 3/4 inch. They are made of heavy cast iron, with cast iron impellers and equipped with a piggyback switch (20-foot standard cord) or in manual configurations. They are offered in 3/10, 4/10, 1/2, 3/4, 1 and 1 1/2 hp models. **855-281-6830; www.ashlandpump.com**



Heavy-duty effluent pumps
from Ashland Pump



BLUEline rotary lobe
pump from Boerger

BOERGER BLUELINE

The BLUEline rotary lobe pump from Boerger is a self-priming, valveless, positive-displacement pump used to convey viscous and abrasive materials. There are 21 pump models in six series with pulsation-free operation, fully reversible rotation, dry-run capabilities and flow rates up to 7,500 gpm. The pumps are manufactured to be stable and

wear resistant with a maintenance-in-place design that allows for all wetted parts to be easily replaced through the front cover without removing the pipe or drive systems. The pump conveys sludge, biosolids, grease, sewage, scum, lime slurry, alum sludge, permeate and polymers. **612-435-7300; www.boerger.com**

EPIC INTERNATIONAL LANDUSTRIE ARCHIMEDIAN

Landustrie Archimedeian screw pumps from EPIC INTERNATIONAL are suitable for pumping unscreened liquids due to their capability to carry large solids. They are a suitable choice for large flow applications, as the wire-to-water efficiency averages in the 80% range for units mounted at 30 degrees. Their most common applications are flood control, sewage lift stations and primary influent. The design is based on a maximum desired capacity with a linear torque curve. They will self-regulate without needing to adjust the speed or any other parameter, and the power draw will reduce accordingly. Open-flight screw pumps can run continuously, both empty and overfilled, with no detrimental effects on the equipment. **804-798-3939; www.epicintl.com**



Landustrie Archimedeian screw
pumps from EPIC INTERNATIONAL



5-in-1 Dual Auger System
from Duperon

DUPERON 5-IN-1 DUAL AUGER SYSTEM

The Duperon 5-in-1 Dual Auger System is deployed in targeted high-ragging manholes/wet wells to remove problematic debris and prevent chronic pipe and pump clogging. Removing wipes at, or near, the point they enter the sewer stops the problem where it starts without impacting downstream operations. The system captures, dewater, compacts, conveys and stores problematic debris in a below-grade discharge pipe, where it can be emptied by vacuum trucks. This creates an opportunity to transform emergency, dirty, unsafe and manual cleanouts into planned, safe

and coordinated debris removal. Simply uncover, insert vacuum truck suction tube into the discharge chute, remove debris and landfill.

800-383-8479; www.duperon.com

FPZ DOSEURO METERING PUMPS

FPZ's range of Doseuro chemical dosing pumps are available in three main versions: plunger pumps with packed plungers; plunger/hydraulic diaphragms; or mechanical diaphragms. High-pressure pumps are available upon request. The range of pumps also includes various driving methods, such as electric motor or electromagnetic solenoid operation.

262-268-0180; www.fpz.com



Doseuro chemical dosing pumps from FPZ



NEPTUNE CHEMICAL PUMP NSP SERIES AND NXP SERIES

Featuring a durable, low-maintenance solenoid drive equipped with double-ball valves, Neptune Chemical Pump NSP Series solenoid metering pumps ensure consistent and precise dosing of a variety of chemicals. The compact design and easy-to-use control provides more efficient operation and shorter setup times for operators. The small footprint allows it to easily integrate

NSP Series metering pumps from Neptune Chemical Pump

into dosing systems with limited space. It is available in manually, analog- and pulse-controlled models. Thanks to its compact design and intelligent-drive concept, NXP Series Stepper motor-driven metering pumps combine the advantages of a solenoid-driven pump with the precision of a motor-driven pump. This makes them a solution to safely feed chemicals in highly accurate, reproducible applications. They are fully adjustable to produce a constant supply stream during low-pulsation dosing, and the stepper motor with its wear-free tooth belt drive ensures a homogeneous and gentle dosing process. 215-699-8700; www.neptunel.com



POLYLOK PL-CPE4A

The Polylok PL-CPE4A is a submersible, 4/10 hp, 115-volt, single-phase effluent pump with a 2-inch NPT vertical discharge. It has a maximum head of 38 feet and a maximum flow of 56 gpm. The pump is designed with a 3,450 rpm oil-filled permanent split-capacitor motor and has an amp rating of 6.6 for 115 volts, a rugged cast iron housing and volute equipped with a cast iron vortex impeller capable of passing 3/4-inch-diameter solids. The stainless steel shaft is supported by two single-row, oil-lubricated ball bearings. The shaft seal is an

PL-CPE4A effluent pump from Polylok

inboard design with a secondary Exclusion V seal. It has a 20-foot UL/CSA-listed power cable suitable for submersible service and fitted with a three-prong plug. The unit is supplied with an integrated clip for the included piggyback mechanical float switch and used for automatic operation. 888-765-9565; www.polylok.com

PULSAFEEDER PULSAPRO

PulsaPro pumps from Pulsafeeder are positive displacement hydraulically actuated diaphragm metering pumps that combine the high efficiency of a plunger pump with the sturdiness of a diaphragm seal to eliminate leakage. Available in a wide range of materials and diaphragm designs, they offer a diverse range of fluid handling solutions. With flows up to 270 gph and pressures up to 3,100 psi and certified to NSF/ANSI/CAN

61 and NSF/ANSI 372, they have the features and functions needed for water treatment and industrial applications. Options include a Hypo-Valve for effervescent fluids to avoid the loss of prime caused by trapped gases and maintains accuracy while dosing; onboard hydraulic diagnostic windows that allow for easy evaluation of pump performance and troubleshooting; and Pulsalarm leak detection that increases operator and process protection. 800-333-6677; www.pulsa.com



PulsaPro pumps from Pulsafeeder

SCREENCO SYSTEMS PATZ SHAFT DRIVE PUMPS

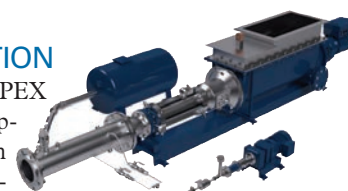


Patz Shaft Drive Pumps distributed by Screenco Systems

Patz Shaft Drive Pumps, distributed by Screenco Systems, are vertical pit pumps that can be used in aboveground or underground storage tanks and include choices of single- or three-phase electric motors. They have high solids and grit capacities with large centrifugal pumps and hardened steel impellers. High capacities include the 3333 series up to 500 gpm and the 4444 series up to 1,580 gpm. They can be deployed in depths from 3 feet to 12 feet, 8 inches. The 6000 and 8000 series have a three-point hitch with PTO drive and can offer up to 3,500 gpm at depths from 6 to 12 feet. They can be used with an agitator nozzle to mix and pump fast. The 616 vertical prop agitator is capable of mixing at 9,000 gpm, keeping grit and solids mixed at pit depths of 6 to 16 feet. 208-790-8770; www.screencosystems.com

SEEPLEX SMART AIR INJECTION

Smart Air Injection (SAI) is a SEEPLEX customized system solution for pumping over long distances. The system uses compressed air and polymer injections to convey sewage 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 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



Smart Air Injection (SAI) from SEEPLEX



CAPSULAR Underground Pump Stations from Smith & Loveless

SMITH & LOVELESS CAPSULAR UNDERGROUND PUMP STATION

CAPSULAR Underground Pump Stations with Safe-Stair entry from Smith & Loveless provide end-users with efficient and long-lasting high-capacity pumping performance and superior operator safety and operations and maintenance costs. Designed

for continuous human occupancy, the pumping system features reliable flooded suction pumps that deliver up to 29 mgd of wastewater conveyance. Accessible via the Safe-Stair entry module, entering the system is not considered confined-space entry. The system offers future adaptability through its multipump design and ability to adjust rotating assemblies and/or controls. The entire system is prefabricated and shipped directly to the job site. Excavation and installation services are also available. 800-898-9122; www.smithandloveless.com

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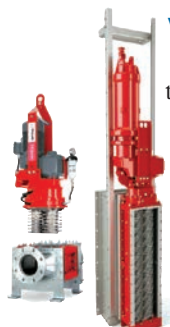
VAUGHAN SELF-PRIMING CHOPPER PUMP

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



Self-priming chopper pumps
from Vaughan



VOGELSANG XRIPPER

XRipper grinders from Vogelsang are designed with twin Ripper Rotors, which are one-piece cutting elements that ensure maximum torque is delivered when grinding tough solids. The refined design of the teeth is suitable for shredding wipes, plastics, rags and other troublesome waste. The rotors allow the unit to be easily serviced as compared to other units that feature individual blades and spacers. By loosening just a few bolts, the wet-end of the unit is pulled from the housing and easily serviced. Units can be serviced on site in a matter of hours, as opposed to days. Drop-in replacement units are available for all common pipeline, channel, lift station and hopper-fed applications. 330-296-3820; www.vogelsang.info

XRipper grinders from Vogelsang

Valves

FLOMATIC MODEL 4082S6 BALL CHECK VALVE

Designed for use with sewage pumps and applications involving viscous liquids or slurries, Flomatic's Model 4082S6 ball check valve design is simple yet efficient. The AISI-compliant valve is constructed in 316 stainless steel with an access port, flanged class 150 connection, a Nitrile (Buna-N) covered metal sinking ball, and stainless steel fasteners. Additional components such as a proximity sensor are available. They are designed with no moving parts except for the ball, which automatically moves out of the flow path, minimizing headloss and maximizing efficiencies. 800-833-2040; www.flomatic.com



Model 4082S6 ball check
valve from Flomatic

JAECO FLUID SYSTEMS STAINLESS STEEL CHECK VALVES



Inline check valves from
JAECO Fluid Systems

JAECO Fluid Systems offers a broad line of inline check valves to control backflow of critical fluids. They feature male-x-male NPT threads and a durable design that is suitable for injection line and metering pump applications. They are 316 stainless steel, compact, and provide maintenance-free, dependable service. Options include spring-loaded ball or poppet valves with 2 or 10 psi cracking pressure and Viton or PTFE O-rings. 877-778-3456; www.jaecofs.com tpo

By Craig Mandli

Quiet bypass pump a fit for lift station repair in urban area

Problem

During a lift station pump repair in Hollywood, Florida, all sewer lines had to keep flowing. The homes are tightly squeezed in the palm-dotted area, making the job difficult.

Solution

The city deployed a 6-inch **BA150KS sewer bypass pump** from **BBA Pumps**. The centrifugal pump with screw channel impeller handles up to 4-inch solids. The sound-attenuated pump prevented neighborhood noise disturbance. The city bought the pump under a Florida Sheriffs Association contract. The flow is controlled with auto-floats connected to the lift station.



RESULT:

As the sewer level rises, the pump starts automatically and stops when the level is low. This saves fuel and reduces run hours and related maintenance. **843-849-3676; www.bbapumpsusa.com**

Valves withstand corrosive hydrogen sulfide in digester gas service

Problem

A large wastewater treatment facility in the eastern U.S. installed a digester system that breaks down biosolids with steam and pressure. The challenge was to find valves able to withstand the caustic gases and chemicals generated by the process, especially hydrogen sulfide, which can attack iron and other metals.

Solution

DeZURIK 3-Way Plug Valves were specified for their ability to control and divert corrosive gases. The valves with lift-turn-reseat chainwheel actuators and resilient-faced plugs provide dead-tight shutoff, even with dirty solids in the flow. The heavy-duty bearings resist corrosion, prevent binding and assure lasting, easy valve operation. Multiple V-ring packing provides a reliable seal that rarely needs adjustment or replacement.



RESULT:

The valves provided trouble-free service. The treatment plant produces 10 MW of electricity from biogas, nearly a third of the plant's demand. **320-259-2000; www.dezurik.com**

Peristaltic pumping system designed to regulate pH levels

Problem

A water treatment plant in Phoenix needed multiple peristaltic pumps to deliver treatment chemicals and regulate pH. The plant intended to use sulfuric acid to counterbalance sodium hypochlorite for odor removal and disinfection and finally sodium hydroxide to raise the pH.

Solution

Flowrox created **custom-designed package systems**.

Two of them have a single suction equipped with a standby for when tubes need to be changed on one pump. Enclosed in an engineered skid system, they offer plug-and-play operation. Each package included a calibration column, two pressure relief valves, two pressure gauges with a diaphragm isolator, and two pulsation dampeners.



RESULT:

pH analyzers tied into SCADA communicate to the three chemical feed skids. The SCADA sends signals to increase or decrease flow based on the current pH levels. The pumps' output controls signal alarms back to the control room such as tube failure, start/stop status and signal failure. The plant can treat groundwater or rainwater. **410-636-2250; www.flowrox.com**

Delivering big bypass needs on a tight schedule

Problem

For decades, a Midwestern city with almost half a million residents had been experiencing sanitary sewage overflows after high precipitation events. They needed a solution that would allow them to bypass a relief sewer that picked up wastewater to avoid basement backups or sewer overflows.

Solution

Partnering with a major construction company, **Franklin Electric** designed and built four custom **Pioneer Prime 18-inch sound attenuated diesel pump packages** — each engineered to handle 10,800 gpm. With a sound attenuated enclosure rating of 69 dBA, the units operated quietly, assuring they would not disturb the residents whose homes were located within 10 feet of the pumps. In addition, Franklin Electric manufactured and delivered the packages in three months.



RESULT:

The pump packages operated as anticipated on the job site and provided a reliable bypass pumping solution that exceeded performance expectations. The skid design has also been especially beneficial to the construction crew in decreasing downtime for maintenance and inspection. **866-271-2859; www.franklinengineered.com**

Flowmeter app makes installation and troubleshooting easy for polymer feed line

Problem

Superior Analytical Instruments was tasked with finding a flowmeter from a sand mine's polymer feed line for dewatering sludge in West Texas. The flowmeter would be used to quantify the effectiveness of various polymers.

Solution

The company selected the **2580 FlowtraMag magnetic flowmeter** from **GF Piping Systems**. Jon Cleveland, SAI owner, had used GF products on other installations. During setup, irregular flows were observed on the flowmeter. The installation of the GF back pressure valve eliminated the irregular flows and enabled more precise dosing. The backpressure adjustment was optimized using real-time data observed on an app. "The key reason the 2580 was chosen was its compact size for fitting into tight spaces," says Cleveland. "Other factors included simple installation and setup, price, and the easy-to-use app." The GF Configuration Tool Bluetooth app helps users configure and calibrate the flowmeter to the required parameters. Users can then monitor and adjust performance settings on their Android or iOS devices.



RESULT:

Using the app, Cleveland was able to remotely instruct field service technicians to install, commission, and verify calibration of the flowmeters. This gave the sand mine confidence in the measured flows. The app also enabled technicians to do troubleshooting and diagnostics. 800-854-4090; www.gfpiping.com

Screw pumps show their strength over three decades

Problem

In 1988 the Calhoun (Georgia) Wastewater Treatment Plant invested in two Lakeside Equipment 60-inch, 75 hp open screw pumps and two 72-inch, 50 hp screw pumps. Due to population growth, the plant needed more treatment capacity.

Solution

Original concrete construction left an empty space for a third pump in each capacity. This space was filled in 2012 by a new 60-inch, 75 hp **Lakeside screw pump**. A year later one of the original 60-inch pumps was replaced; the other 60-inch pump was replaced the following year.



RESULT:

John Banks, plant manager, observed, "The pumps were only beginning to wear out, but they were certainly not on their last legs. The original 60-inch pumps far exceeded their life expectancy and required very little maintenance. Once per week we check oil levels and our operators also monitor the grease levels on the bottom bearing. All very simple, and with Lakeside's stainless steel tubing, we don't have to worry about corrosion. These routine checks have seen our screw pumps work very reliably for 25 years plus." 630-837-5640; www.lakeside-equipment.com

Piston pumps used to pump dewatered cake

Problem

Citizens Energy Group operates the Belmont Advanced Wastewater Treatment Plant for Indianapolis; it treats a peak flow of over 300 mgd. Biosolids are dewatered by centrifuges to up to 30% solids and pumped to incineration. The existing Schwing Bioset piston pumps had been in service for more than 15 years and were approaching the end of their service life.



Solution

Citizens Energy chose **Schwing Bioset piston pumps** as still the best technology to meet challenging pressure and flow requirements while keeping maintenance costs down.

RESULT:

The new model KSP45 pumps transport cake at up to 30% solids to the incinerator feed ports. With increased automation and improved flow control, the new pumps reduce the need for staff attention. 715-247-3433; www.schwingbioset.com tpo



“Our guys are the boots on the ground and the reason for our success. We let them learn hands-on, not just identify problems, but what to do, what to try, what’s the best solution. We trust people. That’s how we roll.”

Dan Langguth
Division Superintendent
Crystal Lake (Illinois) Wastewater
Treatment Division

People.

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DeZURIK AWWA butterfly valves

DeZURIK's AWWA butterfly valves are designed for applications demanding thoroughly tested, high-quality valves for trouble-free service. Numerous design features and material options make this rubber-seated butterfly valve suitable for water/wastewater treatment plants and collection/distribution systems. These valves conform to AWWA Standard C504 and C516 standards, and are certified to NSF/ANSI 61/372. Features include a corrosion-resistant shaft; self-compensating shaft seals; long-life, low-friction bearings; proven disc-to-shaft pinning; and a stainless steel disc edge. Molded-in-body seat with disc locators provides positive sealing and longer seat life on sizes 3 to 20 inches. Large 24- to 144-inch valves feature adjustable, replaceable seat, nonhollow disc structure, and a rubber seat retained within a dovetail groove in the valve body that is locked in place by an epoxy wedge.

320-259-2000; www.dezurik.com



FCI Profibus ST and MT Series thermal flowmeters

ST and MT Series thermal flowmeters from Fluid Components International combine highly accurate, repeatable thermal flow measurement performance with digital bus communications technology flexi-

product spotlight

wastewater

Detector helps municipalities stay on top of suspended solids

By Craig Mandli

Even if you have good blanket control, unsettled solids can sometimes rise and be carried over into the final effluent. The suspended solids level in the final effluent can break consent levels, leading to expensive fines for your municipality. That's why a reliable sludge blanket level detector can be a long-term financially sound investment.

One of the newest on the market is the **Sludge Sleuth**, which is the latest addition to the line of reliable **sludge blanket level detectors** from **Markland Specialty Engineering**. Its optical sensor is ideal for diverse tanks, sumps and pits, providing accurate readings even in obstructed or constricted installations such as lamella separators, and helping plants avoid process upsets such as septic sludge conditions, carryover from clarifiers, and solids wash-out through DAF unit baffles.

"The Sludge Sleuth meets the needs of customers who are seeking a fixed installation meter to provide single point detection of the sludge blanket level," explains Scott Langstaff, general manager of Markland Specialty Engineering. "As well, it fulfills their request that it automate pumps/valves and alert operators when the preferred concentration set-point is reached. These customers do not require the more comprehensive tracking of the liquid-solids interface level as it rises and falls."

With simple and effective damping and concentration controls, it accommodates thin or thick sludge and slurries, and even light flocs, automating pumps or valves when the preferred liquid-solids interface level is reached and alerting operators. The Sludge Sleuth helps maximize water removal and optimize



Sludge Sleuth from Markland Specialty Engineering



feed density and, in turn, reduce energy/haulage costs and improve outflow for reuse. "It is ideal for diverse applications wherever solids are separated from liquids, including clarifiers, SBRs, inclined plate separators, DAF units, sumps, pits and more," says Langstaff.

According to Langstaff, the Sludge Sleuth features simple installation, no moving parts, a compact design, adjustable sludge concentration set-point control, adjustable response time or damping, a relay that indicates sludge detection and pumps or valves activated, advanced self-diagnostics and an optional delay-off timer.

"Markland has a history of responsiveness to customer needs in the field, as seen with the design and manufacture of our hand-held Sludge Gun and Automatic Sludge Blanket Level Detector," he says. "The same responsiveness to customer inquiries and feedback led to the development of the Sludge Sleuth. So far feedback received by our sales staff, reps and distributors, while limited, is encouraging."

905-873-7791; www.sludgecontrols.com

bility. Depending on the model, the meters can be configured as either a field instrument PA-type device or a system RS-485-based DP-type device. The ST80 Series is available with both Profibus-PA and Profibus-DP, while the ST100A Series is available with Profibus-PA. The MT100 Series is available with Profibus-PA. In addition to flow rate, FCI's Profibus compatible flowmeters also provide totalized flow, temperature and instrument health diagnostics over the Profibus communications link.

800-854-1993;
www.fluidcomponents.com



Kaiser Optical Systems Raman spectrometers

Kaiser Optical Systems, an Endress+Hauser company, released its embedded Kaiser Raman Rxn analyzer suite, featuring Raman Run-Time embedded control software. The analyzer collects in situ process measurements, enabling real-time process monitoring, optimization

and control. To ease maintenance, Raman Rxn2 and Rxn4 analyzers perform self-calibration, utilizing spectral correction methods in applications when periodic system calibration is not required. Additionally, they provide flexible installation options including benchtop, mobile wheeled cart, and rack-mounted, or in stainless steel enclosures for lab, pilot plant or dedicated manufacturing applications. The rugged analyzers and applicable sampling probes are also certified for installation in hazardous areas.

888-363-7377; www.endress.com

product spotlight

water

Multiparameter controller easily configured to exact needs

By Craig Mandli

Not only are municipal potable water quality testing requirements diverse, they are also constantly evolving. The quality of the water is a make-or-break, critical characteristic that determines the success or failure of your plant. The instrumentation needed to meet the needs of drinking water plants must be reliable, accurate, simple to use, and also must be extremely flexible.

The **900 Series multiparameter monitor/controller** from **Myron L** includes a suite of signal inputs that can be configured to display a variety of measurement types, including conductivity, resistivity, salinity, TDS, pH, ORP, temperature, mVDC, flow, pulse and percent rejection. It also includes a 4-20mA current loop, two-wire transmitter input that can be defined and scaled to display measurements how you need them displayed. The instrument's display can show from one to four of these inputs simultaneously or constantly cycle through a series of single measurements.

"The 900 Series combines accuracy, reliability, simplicity and flexibility," according to the company. "The user-intuitive graphical user interface allows easy and complete programmability of the instrument all from the LCD touch screen. These highly accurate instruments have the ability for simultaneous monitoring and controlling of multiple inputs/outputs."

The 900 Series' outputs also provide flexibility. Standard outputs include a 0-10 volt DC recorder output and a single alarmable relay output. An optional output card adds a 4-20mA current loop output, an RS-485 digital data output and two additional alarmable relays. Alarm status is clearly displayed with attention-getting alerts. "Because no two applications are exactly the same, the 900 Series' large suite of signal inputs can be configured for a variety of measurement types," says the company.

According to Myron L, the 900 Series is a high-level performer for applications where high-level performance is an absolute requirement, designed for use in a wide range of water-related applications. "It's designed to be exactly what is needed whether water is your end product, an ingredient, or a secondary but vital process component," according to the company. "The design includes a variety of inputs, measurement types, and several different types of control and data outputs, all of which can be combined and configured to operate in the most complex water quality applications."

760-438-2021; www.myronl.com tpo



900 Series multiparameter monitor/controller from Myron L

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The management team at Fuquay includes, from left, Dauphen Jackson, CFO; John Fuquay, CEO; and David Kallfelz, president.

EnBiorganic expands its network into Texas

EnBiorganic Technologies welcomed Fuquay of New Braunfels, Texas, to its licensed network of EBS-Di Installers and service providers. Fuquay will be able to implement and deliver EnBiorganic's Treatment As A Service solution to wastewater utilities and commercial entities throughout Texas. The firm has been in the fields of infrastructure rehabilitation, underground utility construction, environmental construction and asset life extension of water, wastewater and stormwater infrastructure throughout the Southwest since 1985.

Escondido begins construction on new treatment facility

Construction has begun on Escondido, California's \$65 million Membrane Filtration Reverse Osmosis Facility for Agriculture. The MFRO Facility will treat a portion of the city's existing Title 22 recycled water supply from the Hale Avenue Resource Recovery Facility through membrane filtration and reverse osmosis technologies. The MFRO product water will then blend with recycled water untreated by the MFRO process to produce up to 4 mgd of water with a salt concentration appropriate for agricultural irrigation.

Stantec launches Institute for Water Technology and Policy

Stantec unveiled its newest initiative, the Stantec Institute for Water Technology and Policy, to explore the real-world impacts of a changing climate on the sustainability of water and the role of emerging technologies in water science and policy. The institute engages scientists, engineers and technology specialists across the globe to investigate questions at the forefront of transforming the water industry's future.

Glanris raises \$2M to produce green hybrid filtration media

Glanris raised \$2 million in a Series A funding round from investors Riceland, Pittco Capital, Innova and Sage for the world's first green hybrid water filtration media, bringing total investment to \$2.8 million. Glanris' manufacturing process and technology for removing contaminants turn rice hulls into a customized filtration media, the Glanris 901x.

Glanris also announced the opening of a new 60,000-square-foot production facility in Olive Branch, Mississippi, where Glanris plans to produce up to three tons of Glanris 901x media per day.

Eastern Controls expands Northeast territory

Endress+Hauser announced its representative partner, Eastern Controls, is its exclusive authorized sales and service provider for the municipal market in northern New Jersey and the New York City metropolitan area. Eastern Controls has been an Endress+Hauser sales and service representative in the Northeast for almost six years in various markets.

USALCO appoints John Sobchak CFO, Jason James COO

USALCO appointed John Sobchak as chief finance officer and Jason James as chief operations officer. Sobchak has served as the CFO of public and private equity sponsored chemical companies for the last 20 years. Most recently, John served as CFO of Gelest, a specialty silicones and silanes producer recently sold to Mitsubishi Chemical. James most recently served as senior vice president of operations at Covanta and prior to that was vice president of the integrated supply chain for Honeywell's Performance Materials and Technologies division.

Aquatic Informatics awards Ripple Effect grant

Aquatic Informatics awarded a Ripple Effect grant to the Upper Fraser Fisheries Conservation Alliance. The Ripple Effect is a software and service donation program that will enable UFFCA to build in-house capabilities for data-quality management and reporting using the Aquarius analytics software.

GF Piping Systems earns quality award from Intel

GF Piping Systems announced it earned Intel's Preferred Quality Supplier Award for 2020. The PQS Award recognizes success in the Intel SCQI Program, a multiyear road map for continuous improvement for high-performing Intel suppliers. **tpo**

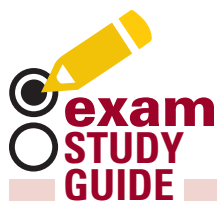


“Treating and distributing drinking water is a significant **responsibility** that takes dedication, training and skill. Our operators welcome the challenges our plant expansion will bring, and I know they'll continue to excel.”

Melissa Kahoun
Aqua Illinois Area Manager
Kankakee and Will Counties
Joseph Donovan Regional Water Treatment Plant, Kankakee, Ill.

Read what **matters** to operators in every issue of *TPO*.

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WASTEWATER

By Rick Lallish

The myeloproliferative neoplasms (MPN) method for fecal coliform testing has become one the most common methods for testing. What is a disadvantage for MPN fecal coliform analysis?

- A. Sample toxins are diluted
- B. Samples cannot be analyzed by membrane filtration
- C. Difficult to interpret, either by observation or gas emission
- D. Results are not very accurate and have a high probability of false positives

ANSWER: D. It is important for operators to understand the many types of laboratory procedures and analysis so that they can properly operate a wastewater treatment facility. Fecal coliform testing is required on most if not all NPDES permits. MPN has become the most common method. The advantages of MPN are ease of interpretation, sample toxins are diluted, and it is very effective on highly turbid samples, and samples that cannot be analyzed by membrane filtration. However, the method has distinct disadvantages that need to be considered, such as the amount of time to get the results (up to 48 hours), the requirement for more glassware and media, probable false positives and sometimes inaccurate results. More information may be found in the OWP, CSU-Sacramento textbook: *Operation of Wastewater Treatment Plants* Vol. 2, (seventh ed.), Chapter 16 and *Bacteriology, Microbiology for Beginners* (Nisha Rijal).

DRINKING WATER

By Drew Hoelscher

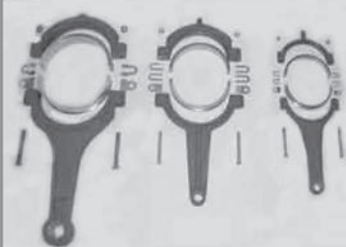
In the distribution of potable water, where is the beginning of the service line located?

- A. At the meter
- B. At the curb stop
- C. At the corporation stop
- D. Where the line enters the building

ANSWER: C. Corporation stops are threaded either directly into the distribution main or a service saddle. The corporation stop is then connected to the service line, which provides water to the customer. It is recommended that the service line be installed in an S-curve down from the tap so that the line has plenty of slack to allow for earth settlement and pipe expansion/contraction. In addition, the service line should be buried at a depth below the maximum frost line for freeze protection.

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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Wastewater Treatment Plant Operator Salary Range: \$51,112 - \$96,050. The **Florida Keys Aqueduct Authority** is hiring **2 WWTP Operators**. Minimum Requirements: Must have a Florida Class "C" WWTPO license or higher. Responsibilities include performing skilled/technical work involving the operation and maintenance of a wastewater treatment plant according to local, state and federal regulations and laws. An employee in this classification must have the technical knowledge and independent judgment to make treatment process adjustments and perform maintenance to plant equipment, machinery and related control apparatus in accordance with established standards and procedures. Salary is commensurate with experience and license classification. Benefit package is extremely competitive! Must complete on-line application at <http://www.fkaa.com/employment.htm> EEO, VPE, ADA. (007)

people/awards

The **First Utility District of Knox County** was honored by the Tennessee Department of Environment and Conservation for meeting drinking water goals under the U.S. EPA Area-Wide Optimization Program, administered by the TDEC Division of Water Resources.

EPCOR USA received 41 safety and operational excellence awards from the AZ Water Association for water and wastewater facilities.

Art Nunez, operations director at EPCOR USA, received the Arthur Sidney Bedell Award from the AZ Water Association for extraordinary personal service to a WEF Member Association.

Dylan Chase, superintendent of the New Shoreham (Rhode Island) Water Pollution Control Facility, won the 2020 Regional Wastewater Treatment Plant Operator of the Year award from the U.S. EPA New England Office. The South Kingstown (Rhode Island) Wastewater Treatment Facility, led by superintendent Kathy Perez, received a 2020 Regional Wastewater Treatment Plant Excellence Award.

The **City of Marianna, Florida**, received a Pisces Award for innovation from the U.S. EPA for its solar-powered wastewater treatment facility.

Aqua Pennsylvania's **Bristol Water Treatment Plant** received a Phase III Directors Award from the Partnership for Safe Water.

Mark Batorski, chief operator of the Farmington (Connecticut) Water Pollution Control Facility, was named 2020 Regional Wastewater Treatment Plant Operator of the Year by the U.S. EPA New England Office.

Michael Brown, a former utilities administrator for Flint, Michigan, was named the city's public works director.

Pat Smoker was named the director of the Richmond (Indiana) Sanitary District. He had been interim director since May 2020.

Emily Sinkhorn was named director of environmental services in Arcata, California. She will oversee the parks, natural resources, facilities, recreation, streets, utilities and water and wastewater divisions.

The **Veolia wastewater treatment plant** in Sturbridge, Massachusetts, received a Water Fluoridation Quality Award from the U.S. Centers for Disease Control and Prevention.

events

July 11-14

Georgia Association of Water Professionals Annual Conference and Expo, Savannah Convention Center. Visit www.gawp.org.

July 12-14

WEF Forum 2021: Particles and Colloids – the Next Frontier in Intensifying Water Resource Recovery, Fort Lauderdale, Florida. Visit www.wef.org.

July 14

AWWA Examining the Importance of Corrosion Control Research Webinar. Visit www.awwa.org.

July 19-22

AWWA 2021 Membrane Technology Conference and Exposition, Palm Beach Convention Center, West Palm Beach, Florida. Visit www.awwa.org.

July 26-29

ONE Water Technical Conference, Duke Energy Convention Center, Cincinnati. Visit www.onewaterohio.org.

July 30-Aug. 4

Alabama/Mississippi Joint Water Annual Conference, Mobile Convention Center, Alabama. Visit www.awea-al.com.

The **Southwest Water Authority** received a certificate for safe drinking water from the North Dakota Department of Environmental Quality, one of five public water systems so recognized in the state.

Qingzhi Zhu, Ph.D., associate professor in the School of Marine and Atmospheric Sciences at Stony Brook University, received a SUNY Technology Accelerator Fund award for his research to develop a low-cost, high-accuracy nitrogen detecting system for wastewater systems. The technology has potential to greatly improve testing processes and quality of water.

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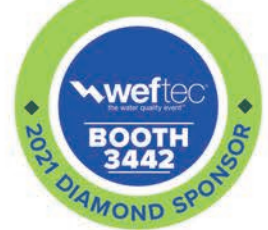


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