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HEARTS AND MINDS:
Stars of the
screen | 16

HOW WE DO IT:
Large-bubble mixing
in Warwick,
Rhode Island | 8

Jay Irwin
Chief Wastewater Operator
Sherman, N.Y.

Rural Renewal

THE NEW YORK VILLAGE OF SHERMAN RESURRECTS
ITS WASTEWATER AND DRINKING WATER FACILITIES

18

SUSTAINABLE OPERATIONS:
Getting aggressive
against leaks | 38

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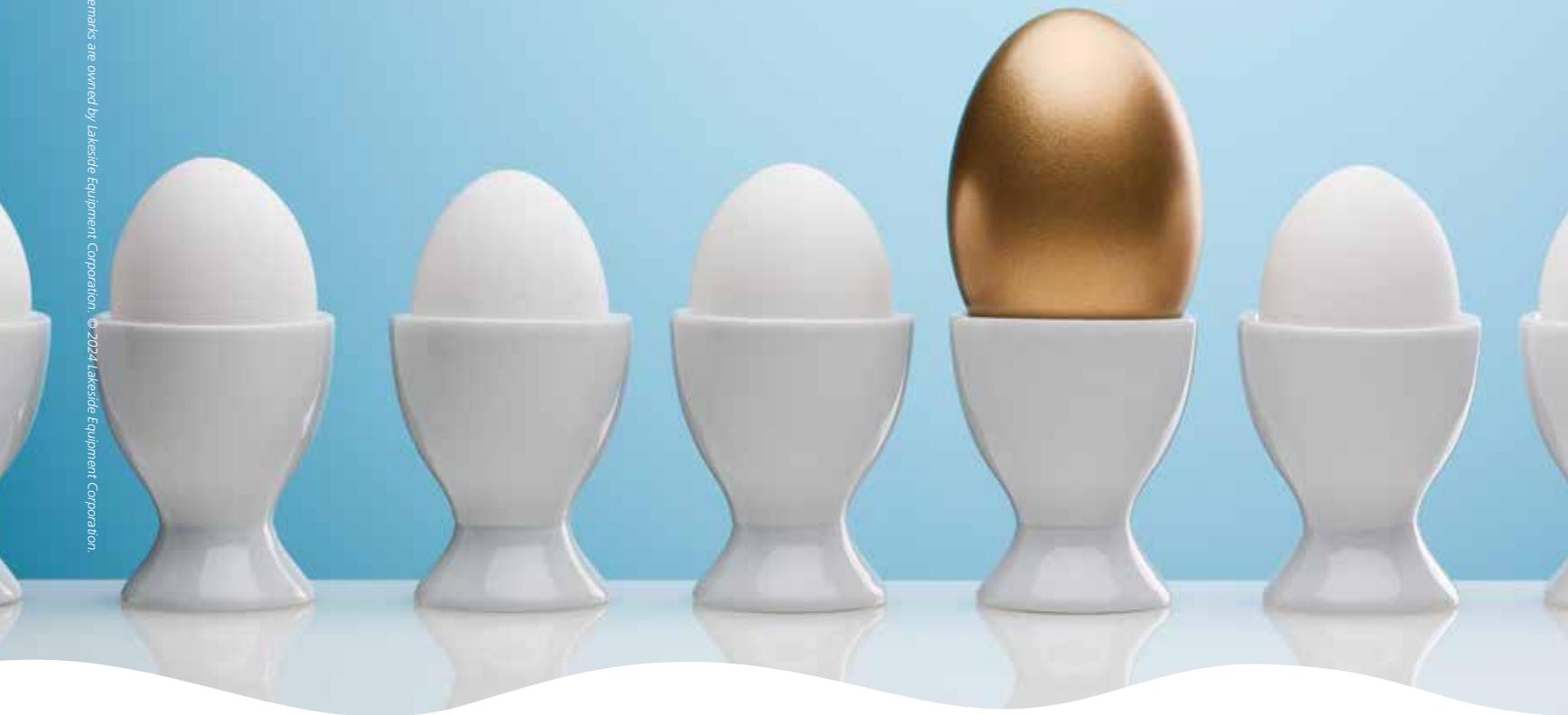
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- FalconRake® Bar Screen
- Rotary Strainer Screen
- Wash Press

contents **June 2024**

- 6 **LET'S BE CLEAR: THE FUGITIVES**
Methane releases from wastewater treatment plants are gaining attention as contributors to the greenhouse gas load that is driving global climate change.
By Ted J. Rulseh, Editor
- 8 **HOW WE DO IT: GREASE BE GONE**
Fast-payback large-bubble mixing devices help a Rhode Island sewer authority eliminate many lift station cleanings and reduce odor complaints.
By Ted J. Rulseh
- 16 **HEARTS AND MINDS: STARS OF THE SCREEN**
Action heroes, time travelers and rap bands unite to promote water education and conservation in a children's video contest.
By Sandra Buettner
- 24 **TECHNOLOGY DEEP DIVE: ONE STOP FOR SCREENINGS**
The Auger Monster ALT can provide a complete solution for handling screenings. It's designed to suit small municipal treatment plants and other facilities with limited space.
By Ted J. Rulseh
- 32 **PRODUCT FOCUS:**
Odor Control, Disinfection and Chemical Treatment
By Craig Mandli
- 36 **IN MY WORDS: BLAZING THE TRAIL**
Kathy Bates was the first woman instructor in her technical college environmental health and water quality program. She encourages young women to explore careers in the field.
By Ted J. Rulseh
- 38 **SUSTAINABLE OPERATIONS: STOPPING LEAKS, SHARING RESPONSIBILITY**
De Pere Water Utility works aggressively to detect and eliminate water losses, and empowers customers to do likewise in their homes and business.
By Steve Lund
- 40 **TECH TALK: TESTING FOR PFAS**
"Forever chemicals" in wastewater increasingly challenge water utilities. Here are some validated methods for detecting and quantifying PFAS concentrations.
By Paul Jackson
- 42 **CASE STUDIES:**
Odor Control, Disinfection and Chemical Treatment
By Craig Mandli

top performers



- 10 **WATER OPERATOR:**
CLEAN WATER FOR FIRST NATIONS PEOPLE
Water quality is still an issue for First Nations People across Canada. Operator Robert Budway works in partnership with communities to change that.
By James Careless
- 18 **WASTEWATER PLANT:**
RURAL RENEWAL
The New York Village of Sherman rehabilitates its wastewater and drinking water facilities in projects totaling \$9.5 million.
By Ted J. Rulseh
cover story
ON THE COVER: Water infrastructure can last a long time when well maintained. But sooner or later it wears out and needs replacing. The Village of Sherman in far western New York this year finished extensive upgrades to its wastewater treatment and drinking water facilities, investing a total of \$9.5 million. And that's in addition to a new 9.58 MW solar energy array built on the wastewater treatment plant property (Photography by Jessica Hunter)
- 26 **WASTEWATER OPERATOR:**
CHALLENGE ACCEPTED
Doug Armstrong learned from mentors to lead from the front. He takes that approach in preparing his staff for a challenging future.
By Suzan Marie Chin-Taylor and Stormy Shafer
- 44 **PRODUCT NEWS**
Spotlights:
Water - Metering pump features compact footprint, easy operation
Wastewater - Biosolids system uses nonchemical means to produce Class A product
By Craig Mandli
- 47 **EXAM STUDY GUIDE**
By Rick Lallish and Drew Hoelscher
- 49 **WORTH NOTING**
People/Awards; Events
- 50 **INDUSTRY NEWS**

coming next month: July 2024 FOCUS: **Conveyance and Distribution Systems**

» Let's Be Clear: The power of commitment » TOP PERFORMERS – Wastewater Plant: Cheshire (Connecticut) WWTP | Water Utility: Council Bluffs (Iowa) Water Works | Wastewater Operator: Mark Hierholzer, Sioux Falls, South Dakota » How We Do It: ZeeLung helps an Illinois plant add capacity, reduce phosphorus » In My Words: The power of apprenticeships » Sustainable Operations: Broad energy reduction measure is Essex Junction, Vermont » Hearts and Minds: Youth education and public involvement in Santa Fe, New Mexico » Technology Deep Dive: Dewatering challenging materials with Volute Duo screw press

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let's be clear

The Fugitives

METHANE RELEASES FROM WASTEWATER TREATMENT PLANTS ARE GAINING ATTENTION AS CONTRIBUTORS TO THE GREENHOUSE GAS LOAD THAT IS DRIVING GLOBAL CLIMATE CHANGE

By Ted J. Rulseh, Editor



For years digester methane has been a valuable renewable fuel that can be burned to supply heat and electricity for wastewater treatment plants.

But researchers today claim it also has a dark side: They describe methane (biogas) that escapes from treatment plants as a meaningful contributor to the greenhouse gas emissions blamed for promoting climate change.

At many treatment plants, biogas fuels boilers and engine-generators. At others it is scrubbed clean of contaminants and fed into utility pipelines as renewable natural gas. At still others, it is flared. But at many facilities, researchers say, some amount of biogas escapes into the atmosphere (fugitive emissions).

This matters because, according to the U.S. EPA, methane is a greenhouse gas 28 times more potent than carbon dioxide. Clean-water plants are far from being the biggest source of methane emissions – the three largest are wetlands (a natural source); agriculture; and the oil, gas and coal industries. Landfills are also substantial contributors.

At the same time, a compelling case can be made for continuing to develop biogas-to-energy projects at wastewater treatment plants as a remedy for these fugitive emissions.

MEASURING EMISSIONS

Treatment plants' methane emissions have come under the spotlight in recent scientific studies. One found that the wastewater sector emits nearly twice as much methane to the air as previously indicated in estimates made according to established EPA guidelines.^[1]

Another study measured losses of methane from 23 biogas plants (some municipal, some agricultural) and found that losses averaged 4.6% of total gas production. The rate of loss was generally lower for large plants than for smaller ones^[2]. These studies suggest that for utilities interested in sustainability and reducing their carbon footprint, fugitive methane emissions should be on the radar screen.

To no great surprise, the researchers found that in general, plants with anaerobic digesters had the most leakage – more than three times as much as those without digesters. Although only an estimated 10% of U.S. clean-water plants have anaerobic digesters, they tend to be large plants that treat more than half of the nation's wastewater.

Researchers also noted that methane releases from sewers may be significant; that is a much more diffuse and challenging issue to resolve, given that U.S. communities collectively have more than a million miles of sewer piping.

THE BRIGHT SIDE

On the other hand, it's not all doom and gloom for biogas. For one thing, researchers noted that reducing emissions of fugitive methane means both a reduction in greenhouse gases and more of the methane recovered for productive use as a renewable fuel. Meanwhile, they state, methane has a relatively short life span in the atmosphere, and so if fugitive emissions are curtailed, their impact on climate change will diminish fairly soon.

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One recent study found that the wastewater sector emits nearly twice as much methane to the air as previously indicated in estimates made according to established EPA guidelines.

And, of course, when biogas is put to productive uses, it is a carbon-neutral and arguably even carbon-negative fuel. A backgrounder on methane emissions provided by Anaergia^[3] observes, “While biomethane does emit carbon dioxide when combusted, the CO₂ is a far less potent greenhouse gas than the methane that would have emitted from the landfilled organic waste...”

In addition, that CO₂ comes from plant matter that already fixed the gas from the atmosphere: “The formerly living material from which biomethane is made took carbon dioxide from the air while growing. Therefore, the combustion of biomethane does not increase the amount of CO₂ present in the atmosphere but makes it circulate in short carbon cycles. Thus, anytime biomethane replaces fossil fuel, CO₂ emissions are prevented.”

Putting more methane to work for heating and power makes both economic and environmental sense. So perhaps the bottom line is that it would be wise to invest in reducing fugitive emissions such that biogas remains a high-value fuel.

References:

^[1] Underestimation of Sector-Wide Methane Emissions from United States Wastewater Treatment, *Environmental Science and Technology*, March 2023.

^[2] Total methane emission rates and losses from 23 biogas plants, *Waste Management*, September 2019.

^[3] *Backgrounder: Methane Emissions from Waste*, June 30, 2022, anaergia.com/backgrounder-methane-emissions-from-waste/. tpo

advertiser index June 2024

Asahi/America, Inc.	6	 KELLER	
Badger Meter	9	Keller America Inc.	21
 BDP Industries, Inc.	37	 LAKESIDE	
 Blue-White Industries	back cover	Lakeside Equipment Corporation	3
Byo-Gon, Inc.	48	Moleaer	17
Carollo Engineers, Inc.	13	Park Process	48
Core & Main	15	Paxxo	49
DeLoach Industries, Inc.	7	Pentair	29
 Eagle Microsystems, Inc.	45	Prime Solution, Inc.	43
Emerald Coast Manufacturing ...	46	Pulsed Hydraulics, Inc.	48
Flomatic Valves	39	 SAF-T-FLO	
Force Flow	30	Saf-T-Flo Chemical Injection	47
 scientific		SEEPEX.	
HF scientific, a Watts Brand	35	SEEPEX Inc.	22
In-Situ	25	 United Rentals	
 JDV		United Rentals, Inc.	31
JDV Equipment Corporation	39	 Vaughan	
 JWC		Vaughan Company, Inc.	51
JWC Environmental Inc.	23	VEGA Americas, Inc.	5
		xylem	
		Xylem	2
		YSI, a Xylem brand	41
		CLASSIFIEDS	48

Grease Be Gone

FAST-PAYBACK LARGE-BUBBLE MIXING DEVICES HELP A RHODE ISLAND SEWER AUTHORITY ELIMINATE MANY LIFT STATION CLEANINGS AND REDUCE ODOR COMPLAINTS

By Ted J. Rulseh

Flat topography in the Rhode Island city of Warwick requires multiple lift stations and force mains to deliver wastewater for treatment.

Some of the city's 49 lift stations experienced grease buildup that ultimately restricted flow in force mains and created odors in residential neighborhoods. The Warwick Sewer Authority tried chemical treatments with limited success.

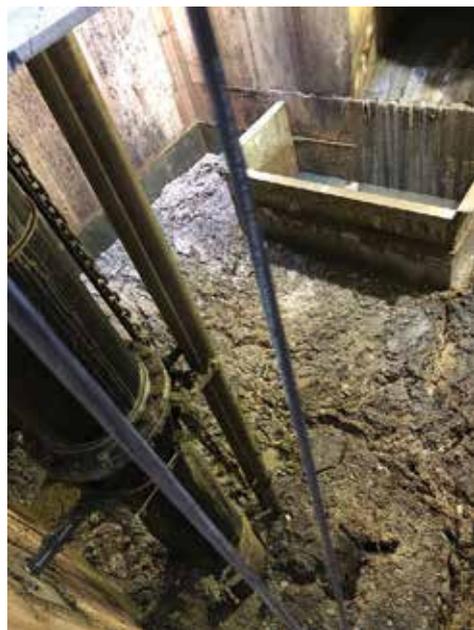
Then three years ago, staff members learned about a mixing device offered by C3ND Environmental Consulting, based on technology from Pulsed Hydraulics.

After a successful trial at one of the most problematic lift stations, the authority purchased the unit; it has since added eight more. "We had usually cleaned that pump station twice a year," notes Joe Colicchio, senior collection inspector. "We haven't cleaned it in two years. There is no grease buildup, and there are no issues downstream in the sewer mains."

MAINTENANCE HEADACHES

Before installing the mixers, the Warwick team faced substantial labor and expense for lift station cleaning, according to Mike Bedard, superintendent. Some stations needed cleaning two or more times per year. Cleanings meant hiring a combination vacuum-jetter truck and often performing a confined-space entry. A single cleaning event costs as much as \$5,000.

The mixing system, a PHi-CA (Constant Air), is a simple device that uses the upward surge of large bubbles from the bottom of the lift station wet wells to mix the contents. The mixing action keeps grease from coming out of solution and solidifying, Colicchio observes.



Before-and-after images show the effect of the PHi-CA large-bubble mixing system on a problematic lift station in Warwick, Rhode Island (C3ND Environmental Consulting).

“Previously, grease would start forming days after we cleaned the wet well.

Now it just doesn't form.”

JOE COLICCHIO

The device consists of a 1 hp linear air pump, stainless steel couplings and clamps, 50 feet of air hose and an 8-inch stainless steel bubble-forming plate that sits just above the suction side of the lift station pumps.

The hose directs air to the bubble-forming plate, which then ejects bubbles several inches in diameter. As these bubbles rise to the surface, they keep grease as well as rags and other debris in motion so that the pumps can push them out in a controlled manner. The bubbles also break grease mats that otherwise would form on the surface.

GIVING IT A TRY

The technology was first tested at a 1 mgd lift station in a residential neighborhood where grease had been a persistent problem. The Warwick team installed a full-scale unit inside the station. Improvement was evident “right off the bat,” says Colicchio. “Previously, grease would start forming days after we cleaned the wet well. Now it just doesn't form.”

Bedard observes “We're adding the PHi-CA units to all our bigger pump stations. We're also looking at smaller problematic wet wells. We're not done. If our field people see issues at a given lift station, we will make the investment.” Bedard notes that odor complaints have dropped “dramatically” in neighborhoods where the mixers have been deployed.

Installation is simple and takes less than an hour, Colicchio says. Maintenance consists of cleaning and replacing a single filter on the air pump, which operates quietly and is suitable for outdoor or indoor applications.

Steve Buckley, director of business development with C3ND, says that in addition to pump stations the mixers have been used in locations such as primary clarifier scum pits, sludge holding tanks, equalization basins and aerobic digesters.

“The Warwick team has been going to every pump station where they have a problem with grease and other buildup of debris and putting mixers in,” Buckley says. “They have saved hundreds of hours of labor and thousands of dollars by not having to clean the wet wells.

“Warwick is a very well run authority. Mike and Joe have been champions of this mixer, along with Chuck Labbe, director of maintenance and operation. They are a very professional staff and furnish reliable, high-quality services for the city and its environment. They believed in the product. C3ND has supported them and will continue to do so.” tpo

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Robert Budway, an operator with the Ontario Clean Water Agency, has helped a number of indigenous communities secure reliable water supplies.



Primary clarifiers at the Amherstburg (Ontario) Wastewater Treatment Plant.

Clean Water for First Nations People

WATER QUALITY IS STILL AN ISSUE FOR FIRST NATIONS PEOPLE ACROSS CANADA. OPERATOR ROBERT BUDWAY WORKS IN PARTNERSHIP WITH COMMUNITIES TO CHANGE THAT.

STORY: **James Careless** | PHOTOGRAPHY: **Dax Melmer**

If stereotypes were reliable, one could safely assume that Canada is a land of abundant fresh-water and that the First Nations people in remote communities there have unlimited access to it.

But that isn't always the case: Aging water treatment plants and infrastructure, leaking and otherwise damaged water pipelines, supply chain issues and availability of local operators have made long-term drinking water advisories a fact of life for many First Nations communities.

As of last August, 28 of these advisories were in force in 26 such communities. The only good news, according to Indigenous Services Canada, is that 143 other advisories have been lifted since November 2015 as a result of remediation.

Robert Budway is one of many people who, in partnership with the communities, are helping put an end to the advisories. He is a distribution, operations, collection system and maintenance team lead with the Ontario Clean Water Agency. OCWA is an agency of the province of Ontario that provides water and wastewater operation, maintenance, management and support services for more than 800 client-owned facilities across the province.

In recognition of Budway's support for First Nations drinking water systems, *Water Canada* magazine named him its 2023 Water Operator of the Year. "Robert Budway represents the operator every community wants on their team," says the award citation. "During the last two years, in the midst of the worst pandemic Canada has seen, Robert offered his support to the remote First Nation community of Neskantaga for 186 days in 2020 to 2022."

Budway observes, "My career in this profession started way back in 1980 as a student in a water plant just outside of Port Stanley. Since then, I've got 41 years of hands-on experience." He holds a Class 4 Water Treatment Operator license, a Water Distribution System and Supply Class 1 certificate, and Class 3 Wastewater Treatment and Wastewater Collection licenses.





ABOVE: Aeration tanks at the Amherstburg Waste Water Treatment Plant. LEFT: Robert Budway, named 2023 Water Operator of the Year by *Water Canada*, checks SCADA system readings.

Robert Budway, Ontario Clean Water Agency Mississauga, Ontario



POSITION:
Distribution, maintenance and collection system team lead

EXPERIENCE:
43 years

EDUCATION:
Graduated General Amherst High School Class of 1980

CERTIFICATIONS:
Class 4 Water Treatment,
Class 3 Wastewater Treatment,
Class 3 Wastewater Collection,
Class 1 Water Distribution System and Supply

GOAL:
Keep making water clean

MAKING A DIFFERENCE

The story of Budway's award can be traced back to October 2020, when the Neskantaga First Nation, about 280 miles north of Thunder Bay, shut down its water plant after an oily substance was discovered in the reservoir. The next day an evacuation began and OCWA was contacted by the contractors to provide emergency support services.

“I don't go in and try to change things right away. I have to see why it's running the way it is.”

ROBERT BUDWAY

members took turns on-site to address any issues that came up and to keep the clean water flowing.”

Another example of OCWA assistance in a First Nation community is a water emergency that occurred in December 2017. Budway and another OERT staff member traveled to Slate Falls First Nation to review a newly constructed water plant.

“We traveled over an isolated winter road back and forth from Sioux Lookout, to Slate Falls, 108 miles each way,” says Budway. “While there we conducted a plant tour with the First Nation community operators and com-

pleted an assessment of the new plant's treatment process equipment, chemical feed system, lab equipment, low-lift building equipment and health and safety equipment.

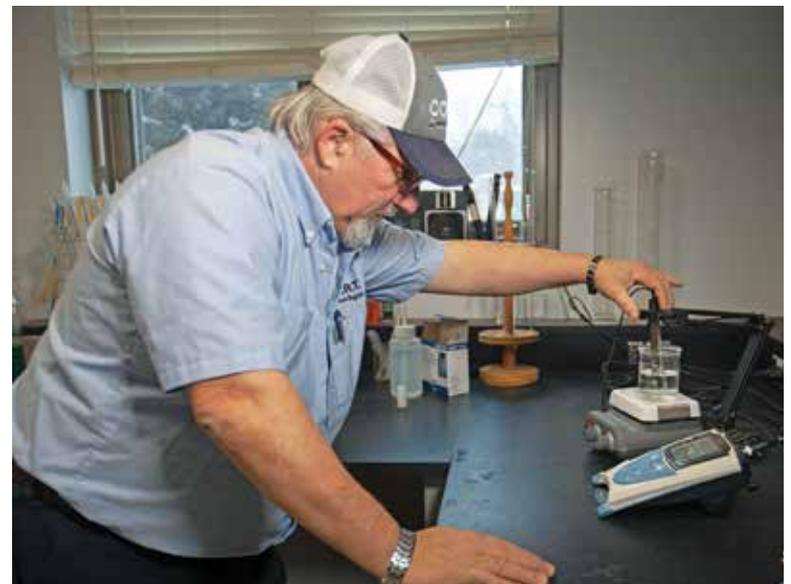
“The new plant uses two nanofiltration treatment trains and is backed up by a diesel-powered emergency generator. It was a really good experience working with the community.”

A LIFE IN WATER

Budway was born in 1962 in the southwest Ontario town of St. Thomas. He and his mother and brother then moved west to Amherstburg, across the St. Clair River from Detroit. “I graduated from General Amherst High School in June 1980 and then went back to St. Thomas, where I was living with and helping my grandparents,” he says.

“During the course of going back there after I turned 16, I got a summer job at the Elgin Area Water System and found it interesting. I got a part-time contract position after I graduated, and I kept working under contract at that facility.”

After marrying his first wife in 1985, Budway moved back to Amherstburg where he got a contract job at that community's water treatment plant,



Budway sees his job as more than “writing down numbers and mixing chemicals.” His aim is to provide communities with the cleanest drinking water possible.



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which was run by the province. That became a full-time operator position in 1989. Budway then worked on his certifications while moving between water and wastewater.

A LIFE-CHANGING EVENT

In May 2000, Canada's worst-ever outbreak of *E. coli*-contaminated drinking water occurred in the small Ontario town of Walkerton. When it was over, seven people had died and about 2,300 had become ill with diarrhea and flu-like illnesses.

According to a Canadian Broadcasting Corp. news summary of the Walkerton Inquiry report issued by the Ontario government, *E. coli* and *Campylobacter jejuni* entered the Walkerton system through a well on or soon after May 12. The report said the outbreak would have been prevented by keeping a continuous chlorine residual and maintaining turbidity monitors at the well.

After the public inquiry, the utilities manager was sentenced to a year in jail and the water foreman was placed on a nine-month conditional house arrest. Four and a half years earlier, heavy rain had caused contamination in the community's water but, according to the CBC report, the two "apparently did little despite complaints from the town's residents about vomiting and diarrhea."

Established in 1993, OCWA was called in to lead the remediation in Walkerton, a tragedy that shook the Canadian water industry to its foundations. Provincial standards and industry oversight were tightened, and OCWA's OERT teams were created. Budway joined the team that headed to Walkerton.

"A bunch of operators from across the province went to Walkerton to help with the recovery," he says. "That was my first time being involved in an actual emergency response team, and I've been an OERT member ever since. When I am not out with one of our five OERTs, I am doing daily water treatment duties for OCWA's Essex Hub office in southwestern Ontario."

BUDWAY'S METHOD

The Neskantaga First Nation, Slate Falls, and Walkerton are just three communities that Budway has supported to help bring their water up to safe drinking standards over the years. Another was the water plant on Boblo Island, an abandoned amusement park off the Amherstburg shore.

"The original water plant dated back to 1911 and was in need of repair, leading to a boil water advisory," says Budway. "We went there through an order by the Ministry of the Environment, and the first thing I did as part of the OERT was to look at how the plant was running and ask the operator, 'How are you doing this? How are you doing that?' We then changed how the coagulation was handled and brought in polymer filtration. Within a couple of days, we got the plant running a lot better for the community."

When assessing the problems at these water plants and others, Budway bases his method on doing little things first: "I always start by making small adjustments one at a time to see how it would affect the rest of the processes. I don't just go in and try to change things right away. I have to see why it's running the way it is.

"I've also learned to use the five senses to see how things look, smell, taste or feel. I listen when I hear something running unusually. When everything's running normally the way it's supposed to and performance levels are very



Budway likes to use his five senses to assess whether treatment systems are operating properly.

“It's more for me than just going in and writing down numbers and mixing chemicals.”

ROBERT BUDWAY

LEISURE TIME

When not troubleshooting Ontario water systems, Robert Budway takes time off with his second wife, their combined family of four kids and three grandchildren. At least, he tries to.

"Unfortunately, my wife thinks I don't put enough time into recreation; I'm always doing something work-related," says Budway. "But I have been starting to get into woodworking. We've made a customized kitchen island. We've made barn doors for ourselves, and I do some carvings now. And then I do some handyman stuff based on all the experience I have.

"We have also made plans to travel here and there, but right now with the economy being the way it is we can't do that. Still, I hope to do some traveling maybe when I retire, along with the crafts and woodworking things that I like to do now — just to stay active."

high, I like to paint that mental picture so that as soon as I get into a different situation, I can identify why the plant is not operating the way it should."

All of this work is aimed at achieving Budway's goal, which is to provide communities with the consistently cleanest drinking water possible. "It's more for me than just going in and writing down numbers and mixing chemicals," he says.

"The overall picture for me has always been that I'm providing an essential service to my community, to my family, to the general public and, most particularly, our clients. After all, that's why they hire us to perform the operational services that we do." tpo



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Nigel Browne of the City of Fairfield with video contest first-place winner Sachi Bansal, and sponsoring teacher Lynn Larsen, with the Fairfield City Council.

Stars of the Screen

ACTION HEROES, TIME TRAVELERS AND RAP BANDS UNITE TO PROMOTE WATER EDUCATION AND CONSERVATION IN A CHILDREN'S VIDEO CONTEST

By Sandra Buettner

The next generation of rising film stars showcase their originality every year during Solano County's annual water awareness student video contest.

The competition, in its 14th year, is open to grades 6-12. Shea Kinser, education program manager with the Solano Resource Conservation District and contest supervisor, observes, "It's about getting kids involved in water conservation and getting the word out on how students can do their part and educate their peers."

The contest is implemented by the SRCD and sponsored by the Solano County Water Agency, a wholesaler that serves the county's cities and agricultural districts. Located in Vacaville, California, 35 miles from Sacramento, it provides untreated water from the Solano Water Project and the North Bay Aqueduct of the State Water Project.

Resource conservation districts are nonregulatory special districts spread across the state. They deal with flood and watershed protection.

MAKING VIDEOS

The contest is promoted through flyers posted in libraries and on its social media, and from relationships the two entities have built with educators and schools. It is also promoted on the district's websites. All teachers can sponsor videos with their students, but the majority who do so teach science and media arts.

Contestants have three months starting January 1 to submit their entries. Videos are limited to 60 seconds, must be on water awareness and conservation and is scored according to a judging criteria:

- Creativity and entertainment value
- Organization
- Techniques and videography
- Sound quality
- Accuracy of the content

“It's about getting kids involved in water conservation and getting the word out on how students can do their part and educate their peers.”

SHEA KINSER

The theme of the contest for 2024 is "Think Beyond the Sink." Judges differ every year but always include local officials from both water agencies, and in some years professors from colleges with media arts degrees. A radio personality has been a judge for many years.

Every year about 100 entries are submitted. There are three grand prizes, all shared equally by the student and sponsoring teacher. First place is \$1,500 in cash, second place is \$1,000 and third place is \$500. The three teachers who sponsor the most eligible videos each receive a \$200 gift card (the minimum for consideration is 10 videos).

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FAR LEFT: High school students Regina Perez and Sophia Villaruel, video contest second-place winners, with Lee Ascencio of the Solano Resource Conservation District and Nigel Browne from the City of Fairfield. LEFT: Ascencio and Browne with Vanden High School teacher Darcy Pritchard, who had the highest number of student participants in the video contest.

SHOOTING STARS

The winning videos and winners' names are posted on the district's YouTube channel and are announced before the end of the school year. Representatives from State Sen. Bill Dodd's office also judge the entries and print certificates for the winners. The rising stars who shoot the videos are celebrated at school assemblies; last year one student also presented a winning entry at a city council meeting.

Ideas run the gamut, from a superhero telling how to conserve water to three friends who learned how to travel through time to prevent poor water habits. Some entries are rap songs on how to conserve water. In another video, a young lady detective tries to figure out why a house is losing so much

water. She goes sleuthing to see where the waste is coming from and then fixes the problem.

To avoid wasting water making the video, one student used blue paper mâché to represent water in all her shots. There is no limit to the students' creativity, and it shows in all the submissions.

To support the contest and continue water education efforts throughout the year, the district does classroom visits and presentations, sponsors field trips to parks and marshes, and provides intensive three-day teacher training through its water training institute. **tpo**

Rural Renewal

THE NEW YORK VILLAGE OF SHERMAN REHABILITATES ITS WASTEWATER AND DRINKING WATER FACILITIES IN PROJECTS TOTALING \$9.5 MILLION

STORY: **Ted J. Rulseh** | PHOTOGRAPHY: **Jessica Hunter**



Jay Irwin, chief wastewater operator, was named 2018 Wastewater Operation Specialist of the Year by the New York Rural Water Association.

Water infrastructure can last a long time when well maintained. But sooner or later, it wears out and needs replacing.

The Village of Sherman in far western New York (population 720) this year finished extensive upgrades to its wastewater treatment and drinking water facilities, investing a total of \$9.5 million. And that's in addition to a new 9.58 MW solar energy array built on the wastewater treatment plant property.

The \$7 million wastewater plant upgrade replaced an extended aeration activated sludge system with a sequencing batch reactor and a screw press for biosolids dewatering. "It's less labor intensive," says Jay Irwin, lead operator, who is also responsible for the drinking water side.

"It enables us to run an automated system without constantly worrying about operations. Before, everything was done manually. We had to waste manually, dewater manually, shovel the drying beds manually."

Village of Sherman (New York) Wastewater Treatment Plant

shermanny.org

BUILT:
1979, upgraded 2023

POPULATION SERVED:
720

STAFF:
1 full time, 1 part time

FLOWS:
140,000 gpd design,
30,000 gpd average

TREATMENT LEVEL:
Tertiary

TREATMENT PROCESS:
Sequencing batch reactor,
media filtration

RECEIVING WATER:
French Creek

BIOSOLIDS:
Dewatered, landfilled

ANNUAL BUDGET:
\$315,500 (operations)





The entrance drive to the Village of Sherman Wastewater Treatment Plant.

Now the entire process is automated, with remote monitoring and operation capability and an extensive alarming and notification system.

Melanie Wright, P.E, an environmental engineer with the New York Department of Environmental Conservation, Division of Water, observes, “Jay and the village of Sherman have done an excellent job of maintaining compliance with their permit despite an aging plant and difficulty retaining certified assistant operators.

“The treatment plant has become a point of pride for the community. They even held a 40th birthday party for the plant when trying to drum up community support for the upgrade, which has been in the works for several years. The village was able to leverage grant funding to make the project affordable. Overall, Jay has impressed me with his resourcefulness and skill, despite the village’s small size and limited budget.”

IN WITH THE NEW

Sherman, in far western New York near Lake Erie, is a farming community with only household wastewater except for influent from a few restaurants and commercial establishments.

“The treatment plant has become a point of pride for the community. ... Jay has impressed me with his resourcefulness and skill, despite the village’s small size and limited budget.” **MELANIE WRIGHT, P.E.**

Irwin started with Sherman in 2007 when the treatment plant’s previous chief operator Paul Fisher, a friend, told him the village was looking for an assistant. Fisher retired five years later, and Irwin became chief operator at age 26. “I absolutely love it,” he says. “I enjoy going to work. Every day there is something new, something different.” He runs the plant with part-time helper Craig Weinheimer.

Before the upgrade, the extended aeration process consisted of an aeration basin in a circular tank with a post-aeration process section, a contact stabilization zone, and a single clarifier stilling well in the middle of the tank. “It was over 40 years old, and things were starting to deteriorate beyond where we could bring them around,” Irwin says.

The upgrade took about four years, covering design (Barton & Loguidice engineers), grant writing and procurement, and construction, of which final details were completed in late 2023. Grants and low-interest loans from state and federal programs covered the bulk of the \$7 million cost. The COVID pandemic hit in the middle of the project, causing delays in equipment delivery and driving up prices. “It was the worst timing possible,” says Irwin.

The Sherman Wastewater Treatment Plant team includes, from left, Paul Fisher, operator; Jay Irwin, chief wastewater operator; and Craig Weinheimer, plant worker.





**Village of Sherman Wastewater Treatment Plant
PERMIT AND PERFORMANCE**

	INFLUENT	EFFLUENT	PERMIT
BOD	311 mg/L	4.0 mg/L	5 mg/L June-October 30 mg/L November-May
TSS	214 mg/L	3.5 mg/L	10 mg/L June-October 30 mg/L November-May
Ammonia	N/A	0.99 mg/L	2 mg/L June-October only

HANDLING THE FLOW

The upgraded Sherman plant has a design flow of 140,000 gpd and an average flow of 30,000 gpd. The village collection system feeds into a single pump station with an OverWatch system (Industrial Flow Solutions) that lifts the flow to the process.

The headworks building includes a FlexRake screen (Duperon) followed by 15-foot grit chamber. The flow then enters the SBR (Sanitaire, a Xylem brand) with continuous flow in two treatment trains. Aeration is regulated by automated dissolved oxygen control. “We have a certain setpoint so that the air is shut off when that setpoint is reached,” says Irwin. “The system also wastes automatically based on preset limits.”

The secondary effluent then goes through a pair of Hydrotech Discfilter units (Veolia) and next into a sample pit from which grab samples are taken for monthly BOD and TSS testing. The flow is disinfected in a noncontact UV system (Glasco) before post-aeration and discharge to French Creek.

Waste activated sludge is sent to two digesters created by repurposing one of the old circular process tanks and splitting it into two sections. From there the material is dewatered to 20% solids on a 12-inch-wide, 8-foot-long mobile screw press (BDP Industries).

“We had the press installed in a 26-foot enclosed trailer instead of a very expensive building,” Irwin says. “That saved us a lot of money for design and construction.” The dewatered material is hauled to a landfill 30 miles away by a contractor (Casella). Irwin hopes to generate revenue from the press by allowing other communities to rent it. He expects Sherman to operate it only for the equivalent of about two months per year.

EASY TO RUN

Daily plant operation is much simpler now. For one thing, the drying beds no longer exist. “The biosolids took 30 to 60 days to dry, and we had to shovel the beds by hand,” Irwin says. “There were two 20-foot-square beds to shovel.” The drying bed facility will be converted to a storage area for trucks and equipment.

Process control samples are taken daily for TSS, pH, settleability and temperature. “We do a maintenance Monday where we do all our greasing and any normal weekly maintenance,” says Irwin. “The decant on the digesters is still manual, but we don’t have to pull pumps and hoses. We just lower a decant pipe and it flows by gravity to the head of the plant.”

As of last October the remote control, alarm and notification system (RAFA Systems) was still being finalized. On completion Irwin expected to have alarms on “essentially everything — the SBR, blowers, filters, UV system. If anything has a fault, it will send a message so we can come in and address it. I have full access to the SBR, so I can change settings over my phone.”

Irwin staffs the facility 50 hours per week, Monday through Friday, and pops in on weekends. Helper Weinheimer works 20 hours a week. Irwin at present holds a 2A activated sludge operator license. The upgrade to an SBR means he will upgrade to 3A (second highest) in the next year and a half. Meanwhile Fisher, who holds a 3A license, will be on site a few hours per week to provide oversight as required by state regulations.

Irwin expects to need a full-time operator soon to help him run the treatment plant and the newly refurbished water system (54,000 gpd average flow), which consists of two wells, chlorine disinfection and a 300,000-gallon reservoir.

The \$2.4 million water system project replaced two well pumps, added a new treatment facility, and completed a 20-year water main replacement

“I have full access to the SBR, so I can change settings remotely over my phone.”
JAY IRWIN

SUN POWER

Two solar arrays on the Village of Sherman Wastewater Treatment Plant property total 9.58 MW capacity and are projected to yield \$3.1 million in revenue to the village over a 25-year agreement with the developer, Solar Liberty.

Irwin observes, “That is before the discounts on electric bills being negotiated for the residents, businesses, and the village municipality, and it does not include the economic benefits from employment of regional contractors and the local business they brought during construction.”

While the village retains ownership of the land, it is leased to two special entities that own and operate the arrays. The operation and maintenance agreement involves “agrivoltaic practices” that keep the land in agricultural production. The seed mix is designed for grazing and beekeeping while replenishing and enriching the soil.

The project, including the land purchase, was overseen by the village’s special legal counsel, local legal counsel, fiscal advisers and

bond counsel. An exhaustive environmental review by the engineering firm of Barton & Loguidice includes a decommissioning plan.

The state Historic Office of Preservation, the Department of Environmental Conservation, the U.S. Army Corps of Engineers, among many other agencies, reviewed the project for stormwater control and pollution prevention, wetlands and agricultural impact, glare, noise, contaminants and other impacts before giving approval. The electricity is immediately added to the grid.

“What started as an inquiry to expand existing solar panels to reduce electric utility costs at the treatment plant led to an opportunity to do what we believe has not been done anywhere else in New York,” Irwin says. “The full advantages of the community solar array benefit the public.

“It’s exciting to have found a way to creatively provide revenue to defray the increasing costs of supporting essential infrastructure in a rural village with fewer than 300 homes.”



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The plant instrumentation includes a multipoint alarm system (RC Systems).



Plant effluent undergoes UV disinfection (Glasco UV)



Kaeser aeration blowers deliver oxygen to the secondary treatment process.

initiative. Lateral connections from homes to the mains were covered by grants and village funds. "A 60% state Environmental Facilities Corporation grant for hardship due to the previous condition of the well pumps and treatment building is keeping the water rates well below what the state considers affordable," Irwin says.

WELL RECOGNIZED

The Sherman team's efforts over the years have not gone unnoticed. The plant received a 1998 Operations and Maintenance Excellence Award from the New York DEC, and a 2000 U.S. EPA Outstanding Wastewater Treatment Facility Operations and Maintenance Award.

Jay Irwin was recognized as the 2018 Wastewater Operation Specialist of the Year from the New York Rural Water Association, and he and former helper Paul Fisher won a 2021 Operator Ingenuity Solids Slicer Award for a low-cost method of reducing biosolids drying time on the beds.

With new equipment across the board in the wastewater and drinking water systems, good things surely lie ahead for the Village of Sherman. **tpo**

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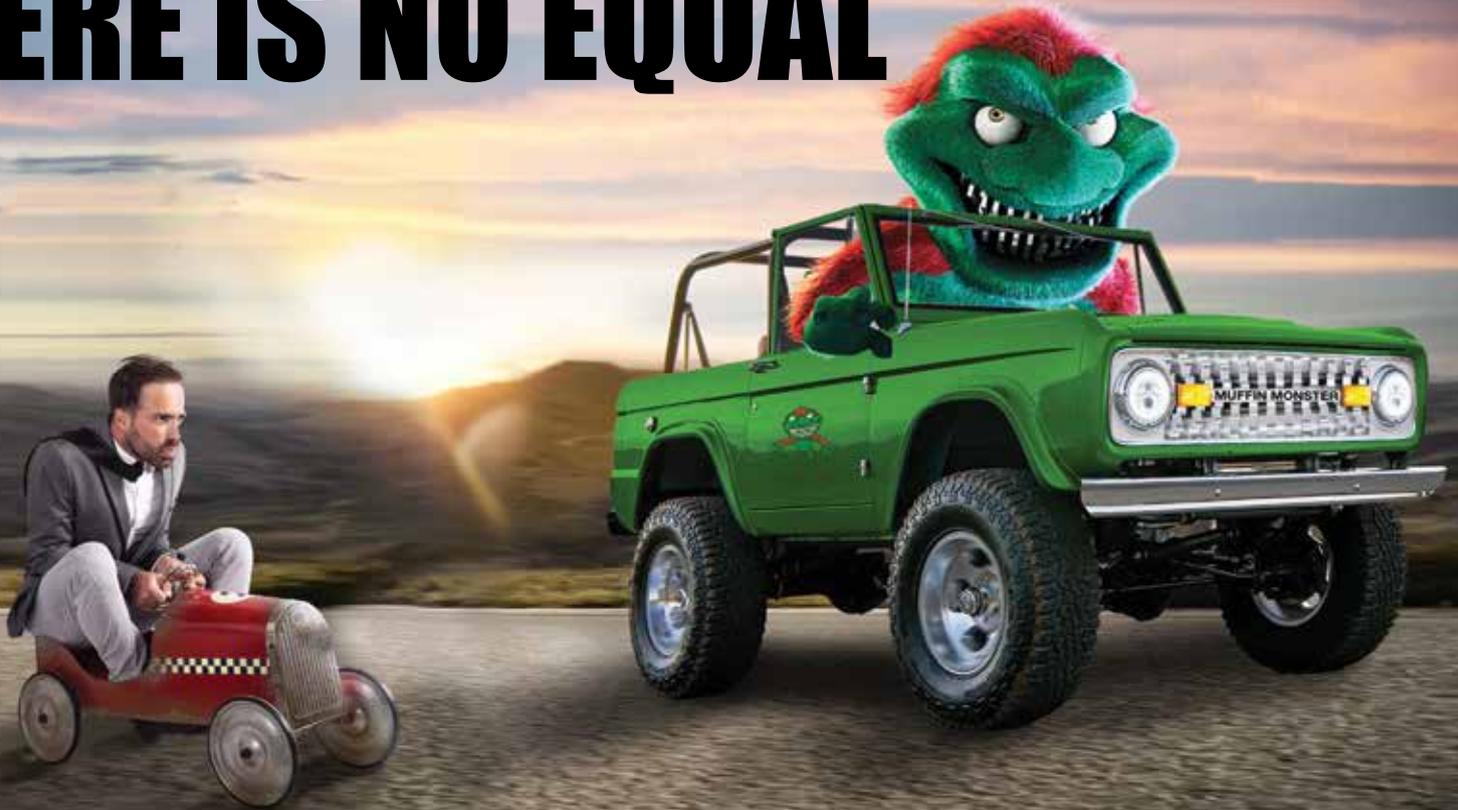
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- 1) The Auger Monster ALT is shown with Muffin Monster open-channel grinder and press zone options.
- 2) The Auger Monster unit includes brushes that keep the screw clean. Modular brush sections are available for ease of replacing only worn sections. A single-piece brush is standard.



One Stop for Screenings

THE AUGER MONSTER ALT CAN PROVIDE A COMPLETE SOLUTION FOR HANDLING SCREENINGS. IT'S DESIGNED TO SUIT SMALL MUNICIPAL TREATMENT PLANTS AND OTHER FACILITIES WITH LIMITED SPACE.

By Ted J. Rulseh

Screening management is ever more critical as clean-water plants deal with wipes and other materials that don't disintegrate in the collection system.

An efficient screening system saves on labor, keeps the treatment process flowing smoothly, and protects downstream equipment against fouling, unnecessary maintenance and potential damage. Now JWC Environmental (a Sulzer brand) offers the Auger Monster ALT as an all-in-one solution for screening, washing, dewatering, compacting and conveying.

The ALT is the latest evolution to the Auger Monster product line. When combined with the company's Muffin Monster or Channel Monster dual-shafted grinders, it effectively removes wastewater solids. The company says the device is well suited for plants 10 mgd and smaller, enabling them to avoid the cost of installing a bar or perforated plate screen along with a washer/compactor.

The unit can be installed with minimal construction or infrastructure changes. It operates in a manner similar to previous designs. A perforated screening trough captures solids, which are then removed and sent up an incline by a shaftless spiral auger. The debris is washed, and separated organic material is directed back to the headworks. Excess water drains by gravity.

An optional press zone squeezes out more water to yield a drier and more compact discharge. Rob Sabol, vice president of engineering with JWC, talked about the Auger Monster ALT in an interview with *Treatment Plant Operator*.

tpo: How serious is the problem of wipes and other trash in wastewater?

Sabol: The industry is still dealing with the increase in solids discharged to the waste stream. And given continued efforts to reduce water, the concentrations of trash are staying flat or going up. Nothing I am hearing says there has been a solution to the problem of people throwing their wipes, diapers, cloth and other things down the toilet. Keeping the pumps protected from these solids is an ongoing issue.

“The press zone is for customers who have a special need for a higher level of dryness. The more we can remove weight from the solids, the more the customer's disposal costs go down.”

ROB SABOL

tpo: What specific market need is the Auger Monster ALT designed to address?

Sabol: The Auger Monster spiral screw screen is a product we have sold since 1997. With any screen, the goal is to lift unwanted solids from the waste stream. We pioneered the use of an upstream grinder so that the screen does a much better job of separating items like rags and plastics while leaving the soft organics in the channel for the biological process to take care of. The Auger Monster ALT is the next generation.

tpo: What drove the development of the new version?

Sabol: When you've had a product in the marketplace for a number of years, you learn about areas where customers would like to see improvement, and you want to take the next step to address that market need.

tpo: Is the compaction capability the most significant addition to the technology?

Sabol: Yes. Generally, spiral screw screens would do washing and conveying, and there would be a limited amount of compaction and dewatering just by the natural action of lifting the solids across a perforated screen and conveying them over a distance before discharge. With the ALT, we introduced a press zone. Customers had told us about issues with material stall-

“We dispatch our technicians to the site for startup, and they perform an evaluation on running at the optimum performance.”

ROB SABOL

ing within press zones. We developed a solution to provide compaction and additional dewatering of the solids, but without stalling or other issues.

tpo: How is the compaction accomplished in the new design?

Sabol: We run the spiral up almost halfway through the perforated plate and then stop it. At that point the conveying action of the screw is removed, and now we're using the action of material pushing on material to compress the solids and squeeze out additional water. That water then passes through 5 mm holes and is fed through a discharge tube into the wastewater stream. To keep those holes clean, a washing system periodically puts a spray across those holes.

tpo: Why is the press zone offered as an option?

Sabol: With our spiral screw screen, especially with a grinder upstream to precondition the solids, the discharge coming off the auger is fairly dry and will pass a paint filter test. The press zone is for customers who have a special need for a higher level of dryness. The dryness correlates to a reduction in weight, and that helps with the cost to transport to the landfill. The more we can remove weight from the solids, the more the customer's disposal costs go down.

tpo: What other improvements have you made?

Sabol: We've expanded the material offering of the spiral auger. Traditionally we supplied the screw that lifts the solids in steel, but customers have told us that stainless steel is a valued option. So now we can supply the screw in 304 stainless, and by special request in 316 stainless. Also, for those concerned about the environment and sustainability, we've reduced the water consumption by up to 75% over the previous design. In addition, we took special care to reduce weight by removing over-engineered and nonvalue features. For example, we thinned out the transport spiral that conveys solids up to the dump container, while maintaining structural integrity. That means lower shipping cost and a unit that is lighter and easier to work with.

tpo: Were any changes made to improve maintainability?

Sabol: We made significant improvements and created options with the brush that sweeps the screw clean as it turns. We now offer a single brush and three options for segmented brushes, so that if a segment of brush needs replacing, the customer can replace just that one section. That is much more economical. We've also made it possible to replace the brush sections within the channel, without having to lift and remove the screw.

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

Sabol: The heavy development was done virtually on our CAD systems and through our engineering staff. Proving it out has involved significant factory testing. We created what's called a zero series product, where we took the production drawings and built the first unit. The assembly work was done by a team of product development engineers who then went through the unit to find areas where we were happy with the performance and areas to improve on. That allowed us to fine-tune the product.

tpo: How much operator attention does this equipment require?

Sabol: Other than at startup, there's really just monitoring of the system to make sure that the brush is in good condition and that the solids are

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moving properly. The system employs a PLC-based controller that has a factory-determined run sequence. It allows the auger to move forward, stop for periods of time, maybe reverse to break up plugs of solids or just continually move forward.

tpo: What is involved in setting up the equipment on a customer's site?

Sabol: We dispatch our technicians to the site for startup, and they perform an evaluation on running at the optimum performance. One key to the operation on any screw screen is to operate the screen as little as possible. The more the screen remains off, the higher the capture efficiency, because material builds up on the perforated screen and starts closing off those holes. Once that material builds up, the screen is capturing at an even higher rate. By running minimally, you also increase longevity by helping to reduce wear and tear. **tpo**

Challenge Accepted

DOUG ARMSTRONG LEARNED FROM MENTORS TO LEAD FROM THE FRONT. HE TAKES THAT APPROACH IN PREPARING HIS STAFF FOR A CHALLENGING FUTURE.

STORY: **By Suzan Marie Chin-Taylor and Stormy Shafer** | PHOTOGRAPHY: **Rob Hart**

In 1982 Doug Armstrong started as an operator trainee at the South Wastewater Treatment Plant in Addison, Illinois.

At age 20, he was just looking for a better job to support his family. Little did he know that he was starting a career leading to his present role as foreman of the city's North Wastewater Treatment Plant.

"Just out of high school, you don't even realize these plants exist," he says. "The thought of ever doing this was the farthest from my mind. I really didn't think that far into the future. I was recently married. I never thought I would be 61 and still here."

He's not only there – he excels, as shown by his 2023 William D. Hatfield Award from the Illinois Water Environment Association.

HUMBLE BEGINNINGS

Armstrong started with no certifications or experience but by 1989 had Class 1 (highest) Wastewater Operator certification. "I was always looking for opportunities to improve," he says. "Addison is a pretty great place to work. People tend to stay, so moving up the ladder through attrition takes quite a while. I was chief operator for about 20 years and had to wait for

Doug Armstrong, foreman at the North Wastewater Treatment Plant



another supervisor to leave before I could move up to foreman.”

One of Armstrong’s advantages is his attitude toward challenge, something he passes on to his team. “Something’s always breaking or changing,” he says. “There’s always something: all the moving equipment, the plant, the bugs. They’re always changing.”

“I’m 61, and I’m not looking to retire in the immediate future. I’m involved with a lot of things, and want to give those my full attention. Maybe sometimes I’ve bitten off a little more than I can chew, but we’ve always been able to handle it. It’s just more opportunity to work with other people. Meeting new people all the time is great. You are always going to need a hand. Having your personal Rolodex is priceless.”

TREASURED MENTORS

His most valued contacts include mentors from his long career: “My supervisor from my first day was Mitch Patterson, the foreman. He taught me the ideology, which I still believe in, of leading from the front. He pushed me to do things I wasn’t comfortable doing.”

“I do that with people now. I want you to read the book and then try it. That’s the only way you’re really going to learn. I’m not going to show you how to do it, but I’ll stand there and keep you from doing something really bad, running-with-scissors-type things.”

Armstrong also fondly recalls Greg Brunst, his superintendent: “He was very supportive of being part of organizations, getting involved in a bigger picture. He was very involved. So was his predecessor.”

Now Armstrong passes along what he has learned to his staff, which includes: Maureen Wright, chief operator; Zach Saucier, operator; and Mike Ryan, operator (all with Class 1 certification). Zach Froats is a trainee, and Chris Nanak is a maintenance specialist.



Armstrong and Chris Nanak, maintenance specialist, check the coupling on a Hayward Gordon mixing pump in the solids handling building.

“You are always going to need a hand. Having your personal Rolodex is priceless.”
DOUG ARMSTRONG

Doug Armstrong

Addison, Illinois

POSITION:
Foreman, North Wastewater Treatment Plant

EXPERIENCE:
41 years in the industry

EDUCATION:
Community college correspondence courses

CERTIFICATIONS:
Class 1 (highest) Wastewater Operator



MEMBERSHIPS:
Illinois WEA, Illinois Association of Water Pollution Control Operators

GOALS:
Prepare the staff for the future by encouraging initiative; instill teamwork



The North treatment plant (5.3 mgd design) has no effluent phosphorus or nitrogen limits at present, but that is expected to change soon.

TEAMWORK RULES

Armstrong's first task each morning is to sit down with the crew instead of just writing lists of tasks: "Talking it through really helps with personal interaction."

Then he walks the plant so he can observe more than lab numbers might reveal. He's also there to help team members, working side by side with them if need be: "Someone told me once that you don't assign a job you're not willing to do yourself. I still try to follow that. Camaraderie and teamwork

Doug Armstrong, left, shown helping with an Amiad filter removal in the secondary treatment building, believes in instructing operators and then letting them take the reins.



GIVING BACK

As his career evolved, Doug Armstrong took village leaders' advice and got involved in industry organizations. About 20 years in, he joined the Illinois Association for Water Pollution Control Operators, eventually holding all offices up through president. He's still very active.

"I've always enjoyed volunteering my time, and the rewards are awesome," he says. "Especially in this industry you realize you always need help. You don't know everything. I've been here 41 years, and I'm telling you: I'll learn something new today."

"It's always fresh. There are so many things to learn. I can be a cantankerous old guy sometimes, but you've got to be willing to change, because there are always more demands on you. The industry changes, regulations change, and that's why I've stayed. It's not widget-making. I love training, teaching people, too. That's what keeps me going."

are really critical." He preaches that work is easier and more pleasant when burdens are shared.

He also strongly advocates team members doing rounds. "I'm still old school, where you need to get your hands on it and look at it. Sure, everything is alarmed, but if the operators don't walk around at the end of the day, they may miss issues. Something isn't turning, an alarm isn't showing up where it should."

As for new challenges, "I always love them," he says. "Something gets broken, but if we fix it together, we're feeling some accomplishment. Or when there's operational trouble, if we can get together and find a solution, it's rewarding. It happens all the time. It doesn't become stale or stagnant. Problem-solving every day — the reward for that is what I enjoy."

TOUGH CHALLENGES

Addison is in DuPage County, one of the collar counties around Chicago. The North treatment plant (5.3 mgd design) went online in the late 1980s and has reached its life expectancy. The plant has no phosphorus and nitrogen permit limits at present, but that's about to change. In response the city is looking to consolidate the North and South plants.

"The South plant is way underdesigned for 3.2 mgd, and we're under-designed a little bit," Armstrong says. "So we need to consolidate them, rather than upgrade both plants to meet the nutrient requirements that are coming. By then we'll also be dealing with PFAS. We're also going to need biological nutrient removal."

OLD BUT RELIABLE

For now, although aging, the North plant works just fine, says Armstrong: "Our permit numbers are always great." Effluent enters a basin that captures normal flows; once that fills up the excess enters a 10 million-gallon equalization basin.

Flows pass through a Schloss bucket-style degritter followed by two 0.235-inch bar screens (Headworks). It is then pumped up to three Envirex primary clarifiers (Evoqua Water Technologies). Primary sludge is delivered by three Dorr-Oliver pneumatic piston diaphragm pumps (FLS) to the anaerobic digesters, which take primary and waste activated sludge.

Effluent from the primaries goes to first-stage and second-stage aeration and then to three Rimflo intermediate clarifiers (also Evoqua) and four Rimflo final clarifiers. Final effluent is disinfected with chlorine gas; sulfur

dioxide is used for dechlorination from May through November. Effluent is discharged to Salt Creek.

"A couple years back, we had new excess flow facilities put in," says Armstrong. "We have three Sulzer 84 hp/6,800 gpm PLC-controlled pumps for that. The overflow process is not really automated, it just overflows a weir and fills that up."

"We have some equipment that is PLC-controlled, including two Envirex primary anaerobic digesters. We just went through a complete upgrade of the solids facility. There are two Komline-Sanderson belt presses in that building."

The North plant received and processes biosolids from the South plant. All biosolids are land-applied as Class B material.

CONFIDENCE IN COMPETENCE

Armstrong knows that with a full plant upgrade not far down the road, the technology train will continue to speed through the treatment plants. He does everything he can to prepare and stay current. He gets access to training and networking through the IWEA and the Illinois Association of Water Pollution Control Operators.

"We're starting to get things into control through SCADA," he says. "We went with Wonderware software [AVEVA], and our water department uses it as well. We updated some of the controls and went to nice touchscreens."

"It took a lot for me to get used to all the technology. Some of the younger people were much better with it than me at first. But I've got to embrace it."

“Make it a career.
Don't just make
it a job.”

DOUG ARMSTRONG



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The team at the North Wastewater Treatment Plant includes, from left, Zach Froats, trainee; Zach Saucier, Class 1 operator; Doug Armstrong, foreman; and Chris Nanak, maintenance specialist. Other team members are Class 1 operators Maureen Wright and Mike Ryan.

I have no choice. It's great when it all works, but sometimes I get frustrated because I can't just fix it when it doesn't."

Armstrong believes his experience and industry service earned him the William D. Hatfield Award. His mantra when speaking to Junior Achievement groups and others: "Make it a career. Don't just make it a job. It's way more than that. You are protecting the environment. Take some pride. You can make it what you want it to be. Get involved in industry organizations and events. Learn to work with other people and embrace that teamwork mindset.

"This industry is full of down-to-earth people. I recently found an old permit from the '90s. It was about 10 pages long. Now ours is over 20 pages. This career is always evolving. It's always a challenge. If you're willing to accept that challenge, it will give back what you put into it." **tpo**

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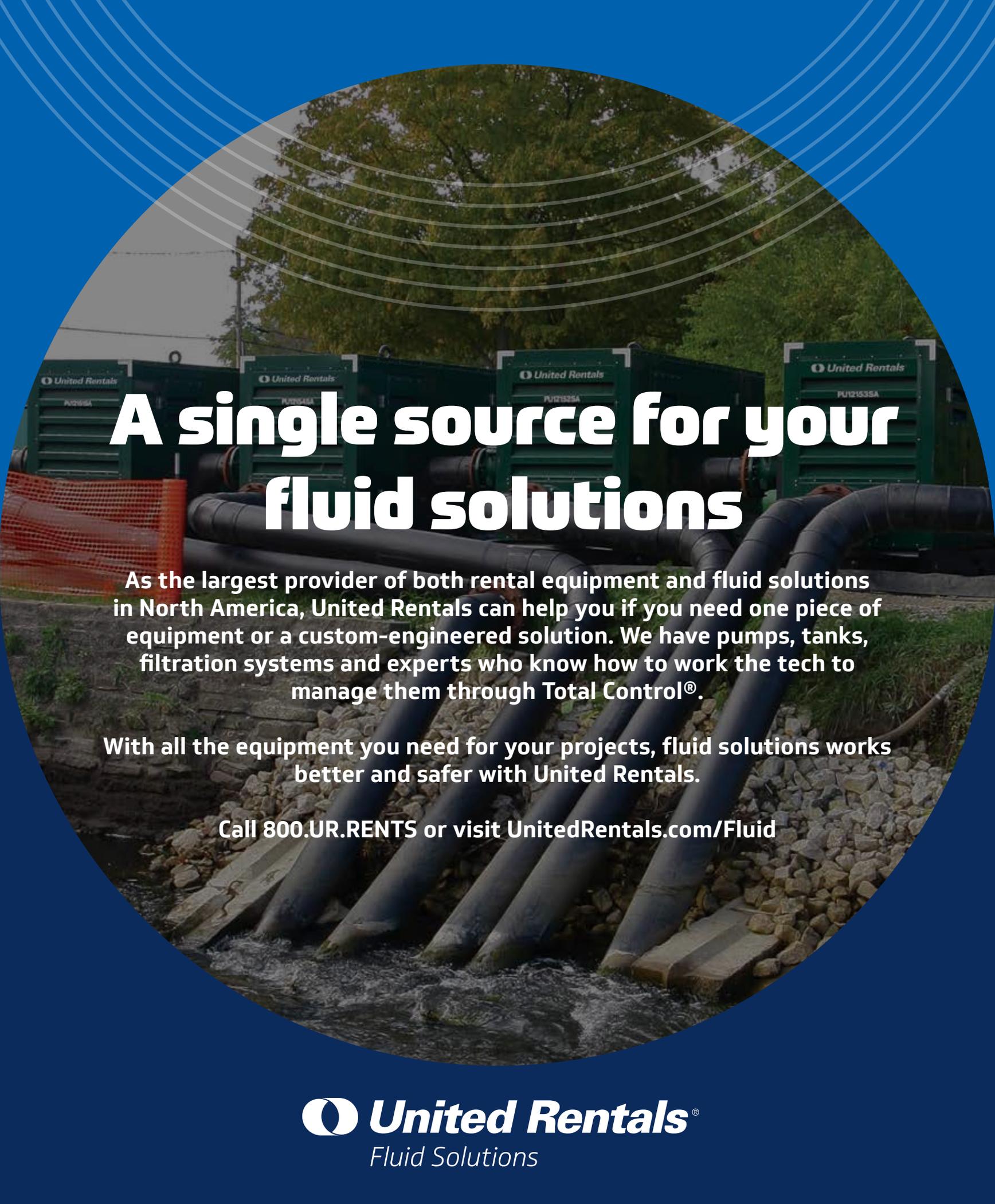
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Odor Control, Disinfection and Chemical Treatment

By Craig Mandli

Activated Carbon System

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AiraCarb Mobile Odor Control

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AiraCarb Mobile Odor Control Systems from Anua

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BYO-GON PX-109

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overcoming limiting environmental factors to stabilize wastewater systems. Its use promotes healthy biological systems, preventing the need for large capital expenditures as well as reducing costs. It is organically certified by OMRI. 888-296-4661; www.byogon.com

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The BTF-Bioscrubber biological odor control system from Evoqua Water Technologies is an advanced, nonhazardous biological air treatment system that integrates equipment, media and the NUCIRC process for optimal performance and flexibility. Utilizing a dual-stage bio-trickling filter system, which can be operated in both



BTF-Bioscrubber odor control system from Evoqua Water Technologies

single- or dual-stage modes, applications have achieved 99.9% hydrogen sulfide removal and up to 97.5% of total odor removal during performance testing. The process skid allows operation in recirculation or once through modes, delivering accelerated acclimation without separate startup equipment. Systems are available in both single- and dual-stage options with single-stage recirculated systems suited for treating raw biosolids odors found in pump stations, headworks and primary sedimentation, while dual-stage systems are better suited to handle entire plant odors. 800-466-7873; www.evoqua.com

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Halogen Eclipse and Chlor-Scale from Force Flow

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Covers/Domes

IN THE ROUND DEWATERING HORIZONTAL DRUM

The horizontal biosolids dewatering system from In the Round Dewatering features a stainless steel drum with perforated plastic tile lining. The drum is mounted on a roll-off frame for easy transport and unloading. Trays contain discharge water. An 18,000- to 25,000-gallon batch



Dewatering system from In the Round Dewatering

is mixed with polymer before being filtered in the rotating drum, which is driven by a 1/2 hp variable-speed electric motor with a heavy-duty chain and sprocket. Turning eliminates crusting and wet pockets to produce uniform, consistent results. The dewatered material dumps easily, and the drum is self-cleaning. **317-563-2072; www.itrdewatering.com**



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

Longopac Fill continuous bag system from Paxxo

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Covers from Tank Connection

Detection Equipment

CAS DATALOGGERS ODALOG G20 H2S GAS DETECTION LOGGER

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OdaLog G20 H2S Gas Detection Logger from CAS DataLoggers

monitoring the gas level in treatment plants, sewers, collection lines, pumping stations for odor control, hydrogen sulfide remediation and troubleshooting problems such as corrosion. **800-956-4437; www.dataloggerinc.com**



GD-4000 Premier Series gas detector from Eagle Microsystems

EAGLE MICROSYSTEMS GD-4000 PREMIER SERIES

The GD-4000 Premier Series hazardous gas detector from Eagle Microsystems safeguards against a spectrum of gases such as chlorine, sulfur dioxide, ammonia and methane. Engineered with an electro-chemical sensor and touchscreen color alarm indicator unit, it ensures reliable monitoring across various concentration levels. Designed for user convenience, the sensors can be strategically placed in potentially hazardous zones while the main monitor resides in a safe area, shielding operators from direct exposure to gas leaks. The system employs an audible alarm and a flashing display to promptly alert operators, ensuring quick response to potential threats. Furthermore, the alarm indicating unit seamlessly interfaces with up to four sensors, accommodating monitoring for the same or different gases. **610-323-2250; www.eaglemicrosystems.com**

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Distillation/Fluoridation Equipment and Microbiological Control

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GridBee and SolarBee Floating Wastewater Mixers from Ixom Watercare

LUTZ-JESCO AMERICA TOPAX MC

The TOPAX MC multichannel controller from Lutz-JESCO America has a modular design that makes it an adaptable and effective solution for all measurement and control technology requirements. It offers automated efficiency — freedom from repetitive control tasks while providing accuracy and reliability.



TOPAX MC multichannel controller from Lutz-JESCO America

Users can actuate the dosing pumps using an optocoupler or relay and servomotors by using a relay or a 20 mA

output. The high-resolution, 5-inch color display offers a user-friendly operating interface with a simple touch-control and intuitive navigation menu that can be set to multiple languages. Use four analog outputs (0/4-20 mA) or the network capability to transfer measured values to a web browser or a telemaintenance point. A programmable interval timer can be used to set automatic alerts for wear-related sensor change. **800-554-2762; www.lutzjescoamerica.com**

(continued)

PULSAFEEDER PULSATRON MP SERIES

Pulsafeeder's Pulsatron MP Series features an optional 4-20mA output signal that provides a remote indication of pump speed to remotely confirm the pump's speed is adjusting to process parameters, and more accurately estimate chemical usage over time. The pump transmits a 4-20 mA signal proportional to the actual speed of the unit and is factory-calibrated for easy installation in the field. It is a true microprocessor-controlled instrument delivering precise and accurate metering control. Packed with standard features, it includes automatic control via 4-20 mA or 20-4 mA inputs, an external pace function with a stop feature and a graphical LCD with support for English, French, German and Spanish languages. Models are capable of flows ranging between 3 and 504 gpd and pressure ranges from 20 to 300 psig with a turndown ratio of 1,000-1. **800-333-6677; www.pulsafeeder.com**



Pulsatron MP Series from Pulsafeeder

Scrubbers



Biological Tower Scrubber from DeLoach Industries

DELOACH INDUSTRIES BIOLOGICAL TOWER SCRUBBER

The Biological Tower Scrubber from DeLoach Industries represents a cost-effective, innovative approach to air purification, particularly in municipal applications. It functions as a self-contained ecosystem, relying on bacteria initially seeded onto internal media substrate. These bacteria attach, breed and multiply, directly contacting contaminated air. They break down and digest contaminants, utilizing them as a food source for

growth. In hydrogen sulfide treatment, the reaction produces sulphuric acid as a waste, lowering water pH and potentially harming the bacteria. To maintain a healthy environment, the scrubber requires the addition of a base like caustic. Gas-containing contaminants are forced into the tower, where they travel upward over a media bed cultured to support live microorganisms. Biological scrubbers require less maintenance and are easier to operate. Their adaptability may be challenged when faced with rapidly changing gas concentrations, and are best suited for concentrations that remain at a steady state. **941-371-4995; www.deloachindustries.com**

growth. In hydrogen sulfide treatment, the reaction produces sulphuric acid as a waste, lowering water pH and potentially harming the bacteria. To maintain a healthy environment, the scrubber requires the addition of a base like caustic. Gas-containing contaminants are forced into the tower, where they travel upward over a media bed cultured to support live microorganisms. Biological scrubbers require less maintenance and are easier to operate. Their adaptability may be challenged when faced with rapidly changing gas concentrations, and are best suited for concentrations that remain at a steady state. **941-371-4995; www.deloachindustries.com**

INDUSTRIAL ODOR CONTROL PCB-170

Industrial Odor Control's PCB-170 pollution control barrel is an economical solution for active ventilation odor control. It provides 170-200 cfm of airflow (depending upon static pressure of piping.) It can provide eight air exchanges per hour in a 1,500-cubic-foot space. This scrubber is built on an HDPE barrel with a 304 stainless steel manifold and an American Fan AF-9 pressure blower mounted directly on the lid, providing for a small footprint. It is easily installed and can be customized for any given environment or situation. It is paired with Norit Darco's H2S Sulfur-sorb Plus, a high-performance activated carbon developed specifically for removing hydrogen sulfide from biogas streams. Applications include



PCB-170 pollution control barrel from Industrial Odor Control

lift station wet wells where it helps prevent concrete erosion due to sewer gas. It also provides relief from nuisance odor and VOC control for small warehouses, campground septic vents, drum filling operations, sludge press rooms or anywhere active ventilation is required below 200 cfm. **973-846-7817; www.industrialodorcontrol.com**

UV Disinfection Equipment

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The MEGATRON Germicidal Ultraviolet Disinfection System from Atlantic Ultraviolet contains multiple UV-C lamps producing wavelengths lethal to bacteria and viruses. Four different models treat 90 to 450 gpm of clear freshwater (clear wastewater and high purity water are handled at other flow rates). Each model consists of a Type 316 stainless steel chamber with multiple UV-C lamps, making it completely self-contained. Units can be plumbed together to handle larger water flow requirements. Newly available remote electrical enclosure features HMI touchscreen, water temperature monitoring, and UV-C intensity monitoring. Additional standard features include a sight port for viewing lamp operation, digital lamp operation indicators, an elapsed time indicator and removable chamber heads. It is available with manual or automatic wiper systems to clean quartz sleeves around each lamp. The Model M250 meets Environmental Technology Verification Program standards. **631-273-0500; www.atlanticultraviolet.com**



MEGATRON Germicidal Ultraviolet Disinfection System from Atlantic Ultraviolet

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Blazing the Trail

KATHY BATES WAS THE FIRST WOMAN INSTRUCTOR IN HER TECHNICAL COLLEGE ENVIRONMENTAL HEALTH AND WATER QUALITY PROGRAM. SHE ENCOURAGES YOUNG WOMEN TO EXPLORE CAREERS IN THE FIELD.

By Ted J. Rulseh

It's easy to look at Kathy Bates as a woman pioneer.

She believes she was among the first 100 women in her home state of Wisconsin to receive a motorcycle license. She was also one of a small minority of women instructors, and women in general, in the state's water and wastewater sector.

Bates is the program coordinator, faculty lead and an instructor in the Environmental Health and Water Quality Technology applied associate degree program at Milwaukee Area Technical College. There she teaches young people pursuing careers in a wide range of disciplines.

She instructs in the water and wastewater treatment courses, introduction to environmental health and water quality, environmental biology, environmental chemistry, environmental bacteriology and others.

She landed what she considers her dream job in 2000 in the same program where she earned her associate degree in environmental and pollution control technology. Along the way she earned her bachelor's and master's degrees at other universities.

Bates would like to see more students, and especially more women, in her classes. In an interview with *Treatment Plant Operator*, she talked about her experiences as a woman in the water professions and what it might take to attract more women to water and wastewater treatment roles.

tpo: What is the background history of your program at MATC?

Bates: It's about the air we breathe, the water we drink, the food we eat and much more. Our program started in 1968 because jobs in treatment plants, in food safety inspection in the restaurant industry, and in other environmental and health careers required more than a high school diploma.

tpo: How did you discover water and environment as a potential career?

Bates: I'm a Milwaukee native. I graduated from Custer High School, and my goal was to be an accountant. Then life happened. My sister suggested I check out MATC. I found the program I'm in today, which then was called Environmental and Pollution Control Technology. My instructor was the late Al Lustig, and I could see his passion and commitment to the field. There was something in his classes that made the light bulb go on: "Aha, I know what I want to do one day. I want to come back and instruct in this program."

tpo: What did it take to actually make that happen?

Bates: I needed a master's degree and certain experience in the field. So I went on to the University of Wisconsin-Stevens Point and earned a bachelor's degree in water resources in 1992. In 1995 I got my master's in environmental and public health from UW-Eau Claire. I also attained a variety of certifications. Some of them I let expire, but I still hold certification as drinking water operator and a wastewater operator. I'm also a certified hazardous material manager and a registered sanitarian. I got my job here in January 2000 after Al Lustig retired, and I started working with another previous instructor of mine, Jerry Ortiz, who made my career transition easier.



Kathy Bates

tpo: At that time, were you among a very small group of women in the professions?

Bates: Yes. I was the first woman at MATC in this program. When I would go to wastewater and drinking water conferences and seminars, I was excited to see some women in the roomful of men. But when I started up conversations with them, it turned out they were support staff. They weren't operators; they were there for their supervisors. It wasn't until 2008 or so that I began meeting women at these events who were the engineers or operators or lab technicians.

tpo: In your view, why are the water professions so male-dominated?

Bates: First it's visibility. Maybe when they're going through school it's not discussed that these opportunities are available to them. Maybe they're not aware of the opportunities because they don't know people in those careers. And if they do show interest in the sciences, they're steered more toward being true biologists or true chemists, and they're not exposed to water and wastewater treatment and operations. Then for women in child care roles, rotating shift work can be an obstacle. It can be a juggling act finding child care at all times of the day.

“It wasn't until 2008 or so that I began meeting women at these events who were the engineers or operators or lab technicians.”

KATHY BATES

tpo: Have you seen a trend toward more women in your classes?

Bates: Currently, among my first-year students, I have a few more females than males. It doesn't mean all the women are looking to go into water treatment, but about seven of them are hoping to take the drinking water certification test. One woman student has applied for a summer internship on the drinking water or wastewater side. The interest is growing as the awareness level is improving.

tpo: Does your institution actively help recruit women into your program?

Bates: College recruitment tends to push the most in-demand programs like nursing, graphic arts, IT, fire and police science. They highlight the programs that have larger numbers and the larger amount of jobs. We're more of a niche. We bring something very important to our communities, but people don't realize we exist until they don't have clean drinking water coming out of their tap or they have sewage backing up in their basement. We are a hidden gem, a hidden treasure.



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tpo: What can be done to raise the profile of the drinking water and wastewater professions?

Bates: I sometimes wish there could be a big billboard on the I-94/I-43 interchange in Milwaukee: "Hey, get into water treatment. Great careers providing good-quality water and protecting the environment for your community." If these careers were really touted in a positive direction, maybe there would be more interest. And if everybody who's employed in water and wastewater operations and laboratory would go visit their kids' schools on career day, that might help. I am open to any suggestions and connections someone might have.

tpo: Are there intrinsically female traits that make women well suited for these roles?

Bates: I'm reminded of a former student, Georgia Paul, who worked in operations at the Milwaukee Metropolitan Sewerage District and is now 81 years old and retired. She said, "For the life of me, I can't understand why more women are not involved, because hey, treating wastewater is no different than changing diapers. We already know how to deal with poo. Why not deal with it on a more macro scale, get paid well, and have fun doing it?" Nurturing is another relevant trait – serving the greater good, protecting public and environmental health. We're also multitaskers, and doing operations is multitasking.

tpo: What messages do you give to your students, of either gender, to inspire them about the water and environmental professions?

Bates: I present that we're helping to save the world, making it a better place for today and tomorrow. Some students get excited about the variety of duties. It's not a sit-down, nine-to-five job. You're using your brain to figure out and troubleshoot things. I also tell them in their careers to be open-minded, be flexible. Things will always change, and that helps keep things fresh. Sometimes you're not going to get that pat on the back for what you

“It's a great feeling to see the students' confidence, skills, and knowledge grow.”

KATHY BATES

do, but at the end of the day you get to remember that the water is cleaner or safer because of your job. People can go swimming and fishing because you helped keep pollution out of the ecosystems.

tpo: How would you describe your own satisfaction with the career you chose?

Bates: I am thoroughly delighted. For the first couple of years in my job as an instructor, I thought I was living in a dream. I get to do what I love. I'm helping others learn about the environment and public health and how to protect it. Being able to give students the same passion, knowledge, encouragement and motivation my instructors gave me, I find that very satisfying. It's a great feeling to see the student's confidence, skills and knowledge grow.

tpo: What do your most satisfying days look like?

Bates: My wow moments are when the graduates tell me that they've applied so much of what they learned in my classes to their career, that they listened to my suggestions and took advantage of opportunities, or that they encouraged a family member or friend to come into and complete the program. It brings me great joy to see my graduates working in their desired careers. I'm so proud of them. **tpo**

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Stopping Leaks, Sharing Responsibility



Water operator Kim Johnson, right, and a contractor work with acoustic equipment to identify and locate an underground leak.

DE PERE WATER UTILITY WORKS AGGRESSIVELY TO DETECT AND ELIMINATE WATER LOSSES, AND EMPOWERS CUSTOMERS TO DO LIKEWISE IN THEIR HOMES AND BUSINESS

By Steve Lund

Finding and fixing leaks in the delivery system has been a high priority since 2007 when the De Pere Water Utility began buying water instead of pumping it from its own wells.

De Pere, a city of 25,000 near Green Bay, Wisconsin, is a member of the Central Brown County Water Authority, along with six other municipalities. The authority buys water from Manitowoc Public Utilities, which draws its water from Lake Michigan about 40 miles away. De Pere still maintains and regularly tests four wells, but they are now the emergency backup system.

“Since our water is purchased at a substantial cost, it’s imperative that we do as much as we can to find any leaks and identify where we’re having any kind of water loss,” says Eric Zygarlicke, water department supervisor. “Water that’s not being billed through meters is something we have to absorb, and ultimately the ratepayers absorb that cost, too.”

The utility has done such a good job of leak detection that it won the 2023 Water Efficiency Award from the Wisconsin Section AWWA. Now the utility wants to take its water loss control to a new level. After working with a variety of contractors over the years, De Pere this year is buying its own acoustic leak detection equipment (Sewerin) and training staff to use it.

“We’re looking to get staff to do leak detection on at least half the city every year,” Zygarlicke says. “The hope is that when we get efficient at it, we’ll be able to do the entire city every year.”

PRIVATE SYSTEMS

Zygarlicke and Scott Thoresen, director of public works, have also targeted private systems supplied by the municipal utility. Those systems supply subdivisions or multi-unit buildings and have their own hydrants, valves, shutoffs and mains.

Without a mutual agreement, the city is not able to test the private systems, but an ordinance passed last January that would require the owners of those systems to work with the city or contractors to detect leaks and make sure their equipment and underground pipes are maintained properly.

Many older private systems don’t have a master meter, so water lost after it enters the system but before it reaches an individual customer meter is not billed to anyone. “We’re trying to find any water that might not be billed,” Zygarlicke says. “In our experience, those private systems are not maintaining a lot of their distribution system, and they are not really looking at their valves and hydrants or looking for leaks.”

TECHY TOOLS

Besides the leak detection equipment, De Pere uses technical tools both to monitor meters and bolster communication with customers. Smart meters and an advanced metering infrastructure system (Sensus - a Xylem brand) alert the utility if an unusual amount of water is passing through a meter.

“We are able to track usage and be alerted to obvious leaks after the meter,” Zygarlicke says. “We get a weekly report on any meters that might be experiencing abnormal usage or other things that might be going on in the system.”

“That helps our customer base mitigate any kind of surprise bills. We bill quarterly here, not monthly. If you have a large leak going on for 90 days, that can be a substantial cost for the customer, so we monitor all the meters.”

De Pere also uses a web-based portal (AquaHawk) that allows the utility to analyze and monitor all meters for abnormal usage. The program is accessible to their customers and empowers them to monitor their own usage.

“Keeping costs down has been a major focus for us. It is imperative that we do our due diligence in finding these unbilled leaks in the system.”

ERIC ZYGARLICHE

water system information in,” he says. “It does a little internal analysis and tries to point you in a direction where you might want to concentrate.”

He also takes part in a water efficiency group with his state AWWA section. The group meets regularly to discuss new and emerging technology and share best loss control practices.

MAIN REPLACEMENT

In recent years, De Pere has reduced the number of breaks in the city’s 126 miles of water mains. One reason is the installation of variable-flow

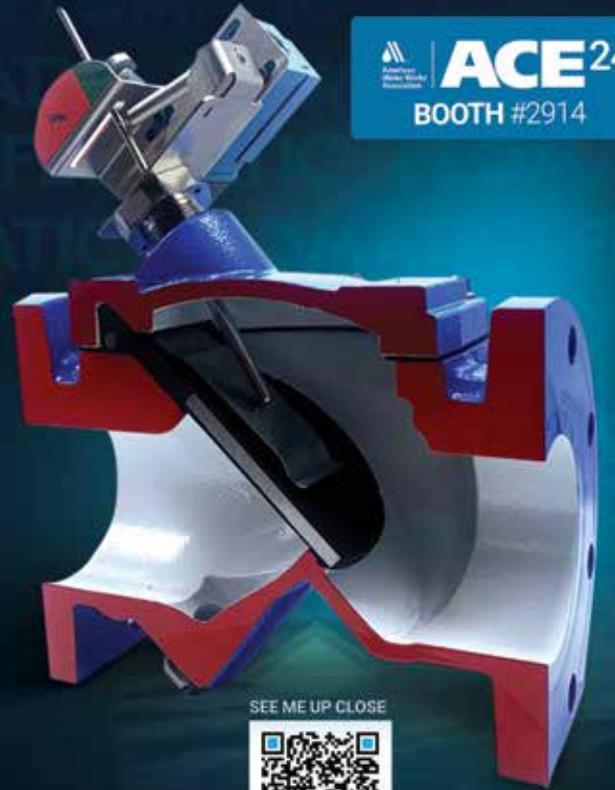
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SCAN FOR AR VIEW



Water operator Jason Cummings installs a iPERL smart water meter (Sensus - a Xylem brand) in a customer's home. De Pere won the Wisconsin Section AWWA award for water efficiency in 2023.

drives on all pumps. "We have slow, soft starts now on all of our motors, including our wells, so we're not creating any kind of water hammer that might cause leaks or main breaks," Zygarlicke says.

Another factor is an aggressive program of replacing old water mains: "We're getting rid of a lot of the cast iron mains and replacing them with PVC mains. It used to be nothing to have 25, 30 or 35 main breaks a year in the city. Now, we're probably down to about a dozen to 15."

Zygarlicke says it's difficult to say whether customer-focused programs such as AquaHawk or the utility's programs are more effective at stopping water loss. "They go kind of hand in hand," he says. "AquaHawk deals with water loss on the customer side. It's being billed, but they are paying for water that they are not actively using.

"Leak detection, on the other hand, deals with water that is not getting to the meter. It helps customers and the utility. If we're not locating those leaks, all of the costs of that water get passed on to the ratepayer. Keeping costs down has been a major focus for us. It is imperative that we do our due diligence in finding these unbilled leaks in the system." **tpo**



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Testing for PFAS

'FOREVER CHEMICALS' IN WASTEWATER INCREASINGLY CHALLENGE WATER UTILITIES. HERE ARE SOME VALIDATED METHODS FOR DETECTING AND QUANTIFYING PFAS CONCENTRATIONS

By Paul Jackson



Accuracy is essential in testing wastewater for PFAS. Significant progress has been made in standardizing and validating PFAS test methods.



Water utilities looking to have wastewater analyzed for PFAS are advised to work with a laboratory that understands the test methods available and can help choose the option that best fits the organization's specific needs.

Standardized and validated methods for analyzing PFAS in nonpotable liquids give wastewater dischargers and regulatory entities reliable data for informed decision-making.

As concerns continue to grow about PFAS compounds in wastewater streams, treatment plant operators have become responsible for detecting and monitoring those compounds.

Crucial to those duties is selection of an appropriate test method for PFAS, which are synthetic chemicals characterized by their resistance to heat, water and oil. Being highly stable and difficult to destroy, they can build up in the environment and in the bloodstreams and tissues of animals, humans and plants. Studies show a likely link between some PFAS, particularly PFOA and PFOS, and numerous health issues.

PFAS can enter wastewater streams through various pathways including industrial discharges, landfill leachate ultimately processed at wastewater treatment plants and municipal storm drainage systems in combined sewer systems.

PFAS-containing runoff is a particular problem on sites where aqueous film-forming foam has been used to fight and train for chemical fires. Therefore, airports and military and industrial sites are often strong contributors of PFAS to municipal sewer systems. Common household and industrial cleaners can also contain PFAS, so even the graywater from homes and commercial buildings can contribute the compounds to wastewater.

REGULATORY MONITORING

The National Pollutant Discharge Elimination System and the Effluent Limitations Guidelines program were established as part of the Clean Water Act in 1972. Although awareness of the dangers of PFAS in wastewater has been building over several decades, these programs have only recently addressed PFAS in a significant way.

States can petition the EPA to administer their own NPDES programs, and most have received partial or full approval to do so. In December 2022, the EPA published a memo containing recommendations for dealing with PFAS in wastewater discharges and biosolids to states authorized to administer NPDES permitting. States have been somewhat slow to adapt to the recommendations, but that will change as more water quality restrictions are enacted.

ELGs are national regulatory standards for municipal wastewater treatment plants and for wastewater discharged to surface waters. The EPA updates its ELG Plan every two years. Plan 15, released in January 2023, calls for ELGs to be set for discharge from landfills. Once promulgated, these will be the first federal PFAS-related ELGs for wastewater discharge.

Plan 15 also calls for more research on PFAS in wastewater from textile mills and industrial wastewaters sent to municipal treatment plants. Investigation of the need for ELGs in other industries is ongoing.

Of course, compliance with existing legislation is not the only justification for wastewater analysis. Many industrial entities and municipal wastewater treatment plants are expanding their testing to assess potential liabilities and help prepare for future regulatory requirements.

PFAS TEST METHODS

Wastewater is challenging to analyze for PFAS due to varying solids content and the inherent complexity of the sample matrix. Accurate analysis



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requires special equipment and techniques. Still, significant progress has been made on standardizing and validating PFAS test methods. Here are some common methods used to analyze wastewater samples.

EPA Method 1633

The biopersistence of PFAS makes it important to have standard procedures for measuring their presence in a wide range of matrices. Method 1633 offers a standardized approach to measure 40 PFAS compounds in matrices including wastewater, surface water, groundwater, soil, biosolids/sludge, sediment, landfill leachate and biological tissues.

Finalized in January 2024, Method 1633 includes standard procedures for analyzing PFAS in all target matrices. It will also play a vital role in EPA efforts to study, monitor and regulate PFAS in nearly all matrices and regulatory programs, except drinking water.

EPA Method 1621

Also finalized in January of 2024, this screening method is designed to detect adsorbable organic fluorine in aqueous matrices by combustion ion chromatography. It measures adsorbable organic fluorine in nonpotable water; high levels indicate that targeted testing may be warranted. Method 1621 also can detect organic fluorine concentrations in nonpotable water from the many PFAS not detectable by targeted methods such as EPA 1633.

ASTM D8421 and D8535/EPA 8327

This method was developed by the American Society for Testing and Material to provide a fast, robust way to analyze PFAS in aqueous and solid matrices. It uses liquid chromatography/tandem mass spectrometry, with optional isotope dilution to minimize the impacts of sample matrix interference on quantification and thus improve data quality.

This method has several advantages. Turnaround time is faster, and it is often less expensive than other methods that are more procedurally chal-

lenging. In addition, the aqueous method requires only a 15 mL sample, saving significant field collection time and shipping costs. These benefits make the method attractive for wastewater programs.

Total Oxidizable Precursors (TOP Assay)

PFAS precursors are compounds that can degrade to terminal PFAS under the right conditions, including traditional wastewater treatment processes. TOP Assay oxidizes PFAS precursors, most of which are not currently measured by targeted techniques, converting them to their terminal PFAS compounds that then can be measured.

The increase in PFAS measured after the TOP Assay oxidation is a gross estimate of the total concentration of PFAS precursors present in a sample. TOP Assay is particularly useful in forensic studies designed to identify the source of elevated PFAS in treated wastewater.

VALUE OF OPTIONS

Standardized and validated methods for analyzing PFAS in nonpotable liquids give wastewater dischargers and regulatory entities reliable data for informed decision-making.

However, wastewater covers a wide range of nonpotable liquids with varying levels of suspended solids, and not all decisions require the same data. Multiple options enable utilities to choose a method that best meets their requirements in terms of compliance, targeted analytes, data quality, speed and cost.

Those seeking to have wastewater analyzed should work with a laboratory that is familiar with the methods available and can help them choose wisely.

ABOUT THE AUTHOR

Paul Jackson (Paul.Jackson@pacelabs.com) is national program manager for Compliance Monitoring and Emerging Contaminants with Pace. tpo

Super station chooses biotrickling filter odor-control technology

Problem

The Woodberry Super Station in Hillsborough County, Florida, pumps up to 17 mgd to the Falkenburg Advanced Wastewater Treatment Facility. The odor-control system was to be replaced with a biotrickling filter followed by a carbon polishing filter and ductwork to allow either unit to operate independently.

Solution

The **EcoFilter biotrickling filter odor control technology (BioAir)** was selected for its ability to treat very high hydrogen sulfide loads and the ability of the EcoBase media to remove relatively high concentrations of methyl mercaptan. The system is environmentally friendly and inexpensive to operate, and it requires minimal operator attention and maintenance.



RESULT:

The average inlet hydrogen sulfide concentration was 456 ppm with a peak of 734 ppm; the average outlet concentration was 0.0245 ppm, greater than 99.9% reduction. Methyl mercaptan inlet concentrations were 5 ppm and outlet concentrations were below the detection limit. The average hydrogen sulfide concentration at the outlet of the carbon polishing stage was 0.001 ppm. 856-258-6969; www.bioairsolutions.com

Anaerobic product used to seed portable wastewater unit

Problem

The Canadian Department of National Defence Excellence and Security held a pop-up City Contest intended to inspire innovative solutions for fuel, water, and wastewater logistics to support 150 people in relocatable temporary camps used by the Canadian Armed Forces.

Solution

The Circular City consortium (Innocorps Research Corp., Eco-Growth Environmental, Pop Up City, Saskatchewan Research Council, and Harmony Desalination Corp.) won the \$2 million contest by implementing **BCP35M** from **Bionetix International** in a portable water reuse system. The team engineered the **water-recycling technology** by designing a mobile direct potable water reuse system with up to 90-95% water recovery. The unit includes an advanced wastewater treatment system with a one-third scale blackwater system that uses BCP35M to rapidly seed wastewater startup in less than two weeks. Microorganisms that treat the wastewater produce natural surfactants to separate wastes into smaller droplets, increasing their bioavailability. BCP35M was chosen because of its diverse microbiology to target a wide range of contaminants from organic wastes to petroleum wastes.

RESULT:

The wastewater recycling system is seen as an important step toward greening temporary army camps by improving their environmental footprint and will also be useful for private campsites. 514-457-2914; www.bionetix-international.com

Hypochlorite system leads to significant savings

Problem

The Big Cottonwood Water Treatment Plant at the mouth of the Big Cottonwood Canyon is one of three water treatment facilities serving Salt Lake City via 1,300 miles of transmission and distribution pipe. The plant implemented a bulk hypochlorite system in 2003. After seven years on that system, utility leaders chose to switch to on-site hypochlorite generation for safety and cost savings.

Solution

The plant staff selected two 600-pound-per-day (1,200 pounds of chlorine equivalent) **Microclor on-site hypochlorite systems** from **Cleanwater1**. Modular multi-cell systems in a vertical configuration vent byproduct hydrogen passively with no chance of pressurization.



RESULT:

The systems generate disinfectant at a concentration of 0.8%, 20% below the hazardous material threshold. The plant meets its sodium hypochlorite demand for slightly over one-third the cost of trucked-in bleach while being safer for operators and residents. No special hazardous materials training or equipment is required to operate the system. 858-218-3745; www.cleanwater1.com

Technology defeats odor problems at school and park

Problem

A pump station near an elementary school and park in the Agua Special Utility District in Palmview, Texas, had significant odor complaints. The pump station had hydrogen sulfide levels above 200 ppm, creating odors to the point where the school would not allow the children to play in the school yard or park.

Solution

The municipality sought bids odor-control systems for four pump stations experiencing high hydrogen sulfide levels. The engineering firm considered biological and chemical injection systems and ionization technology. The **Terminodour ionization system (Kusters Water)** won the bid and was installed in 2018.



RESULT:

The system reduced hydrogen sulfide levels to less than 2 ppm at the wet well and stopped the odor complaints. School children now can play in the park. The system also keeps corrosive gases from attacking and deteriorating the concrete inside the wet well. 864-576-0660; www.zimacorp.com

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System injects concentrated oxygen to treat iron and manganese

Problem

The Clapper Road Water Treatment Plant in Bethlehem, New York, included chlorine injection into the raw water to oxidize dissolved iron and manganese. While the plant was designed to treat 6 mgd, the chlorination process was limited to 3 mgd. In 2013, after the U.S. EPA began requiring stricter monitoring of trihalomethanes, the plant was in violation and community leaders quickly commissioned a plant improvement.

Solution

A new pretreatment facility was installed to inject concentrated oxygen to oxidize the dissolved iron and help oxidize dissolved manganese. The process uses an in-line **gas contacting system (Mazzei Injector Company)** consisting of three oxygen injection skids and a single pipeline flash reactor a two-on-duty, one-on-standby configuration to provide flexibility to handle turndown and redundancy requirements. This system is simple to operate and requires a small footprint.



RESULT:

The system and other upgrades implemented enabled the plant to reduce THM levels by 40-50%, improve the efficiency of the dissolved air flotation system, and expand treatment capacity to 8 mgd, all without adding to plant operators' workload. **661-363-6500; www.mazzei.net**

Nanobubbles combat odors, improve process efficiency and energy recovery

Problem

The Stavnsholt Wastewater Treatment Plant in Denmark faced persistent odor complaints. Despite attempts at treatment with ferric chloride, the odor persisted, leading to a search for a solution for the plant, designed to handle 5,000 kg (11,000 pounds) COD per day.

Solution

Partnering with TECHRAS Nano, the plant implemented **nanobubble technology (Moleaer)** in November 2022. The nanobubble generator emits bubbles 10,000 times smaller than conventional fine bubbles, inhibiting anaerobic conditions that breed malodorous compounds.



RESULT:

Summer odor complaints significantly decreased, ceasing entirely in other seasons. Ferric chloride usage was reduced by 84%. Primary clarifier efficiency improved as shown by lower chemical use and a 10% increase in sludge solids content. Energy consumption dropped by 5.3% despite higher mixed liquor suspended solids. Biogas production and methane concentration increased significantly. Based on these successes the plant team opted for a permanent installation starting in spring 2024. **424-558-3567; www.moleaer.com** tpo



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The Lovibond TB 350 WL portable turbidimeter offers simplistic operation combined with intelligent instrument engineering to provide an unparalleled level of accuracy in turbidity measurement. Ideal for field and environmental testing, this instrument delivers the most reliable measurements for low range to high range samples without sacrificing accuracy. Featuring the patent-pending Multipath 90-degree BLAC sensor technology, the optical system is engineered with dual detectors to deliver a ratio reading that mitigates common measurement stability issues. The intuitive touchscreen interface makes it easy to perform procedures and interpret results. This user interface helps eliminate common frustrations and prevents errors. The data logging capabilities allow you to record the testing location, operator's identification, time and date along with the measurement. Stored data can be transferred to a computer via USB. It is EPA compliant for reporting purposes, and all units are supplied ready-to-use with sample cells, silicone oil and calibration standards in the carrying case.

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Metering pump features compact footprint, easy operation

By Craig Mandli

Potable water and wastewater treatment demands chemical injection processes that are dependable and accurate. Where space is limited and reliability and convenience are required, the **PulsaPro 7440 hydraulically actuated diaphragm metering pump** from **Pulsafeeder** has the compact size and features to make operation and maintenance easier and faster.

"The PulsaPro 7440 is ideal for pH control (i.e. sulfuric acid and sodium bisulfite), disinfection (sodium hypochlorite) and odor control," says Jeff Martin, product manager for Pulsafeeder. "It is the next addition to the PulsaPro product line, launched in 2015, the next generation of Pulsafeeder HAD products. This version had more than 10,000 hours of laboratory testing, with over 3,000 hours of testing at customer BETA sites for the petrochemical industry."

The pumps offers flat PTFE diaphragm head configurations for low viscosity water-like applications. Its elastomeric tube diaphragm arrangements are suitable for thicker fluids, slurries or some solids. Each configuration is available in either metal or plastic wet end construction. Its hydraulic diagnostics provide immediate visual intelligence about pump and system performance. In addition to its usage in water and wastewater treatment, chemical processing and power generation industries, it is designed to the API 675 standard for use in oil and gas, petrochemical facilities.

A large, easy-to-view hydraulic diagnostic window provides observation of oil condition and proper



PulsaPro 7440 from Pulsafeeder

pump operation saving time troubleshooting. An externally adjustable bypass valve protects the pump from system over-pressurization and quickly adapts to changing process conditions. A push-to-purge button allows for on-demand removal of air from pump hydraulics to avoid wasting energy from inefficient pump operation. The compact size and customizable rotation of stroke control and motor saves valuable facility space and makes the pump an easy retrofit.

"The 7440 was just recently launched, but the interest from our distribution network has been high," says Martin. "Smaller equipment means smaller skids and more economical uses of building infrastructure, along with less power consumption. Our beta test customer bought several and is designing their future systems around this product."

When precise and accurate chemical delivery matters, the PulsaPro 7440 provides dosing accuracy of +/- 0.5% across its operating range, whether the stroke length is set at full capacity or 10% of maximum. It is available with flows up to 1,098 gph and pressures up to 3,200 psig.

585-292-8000; www.pulsafeeder.com

weight of only 83 pounds for the boom, mast and winch combined, a single crane is commonly moved to multiple base locations throughout a treatment plant. A ratchet screw jack allows the user to adjust the boom from horizontal to 45 degrees while under load, and 360-degree rotation of the crane allows a full range of motion. Smart Latch technology at the boom/mast means no tools are required for assembly. A zinc-plated finish on all noncomposite parts provides added corrosion protection. AC and DC electric winches are optional or the manual winch comes standard with a drill

drive adapter. The cranes are made in the U.S. and each one is individually tested and certified at 125%.

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water and wastewater applications, provides cost-effective bidirectional flow measurements with a wide diameter range and full approvals for drinking water. The electronic device also features extra isolation and housing, making this product especially suitable for applications in areas with extreme humidity and flood risks. The OPTIFLUX 2050's full bore design has no moving parts, and does not suffer from wear or pressure loss. It also comes with a PP or hard rubber liner, providing excellent chemical resistance.

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The S80-T80 dissolved oxygen analyzer from Electro-Chemical Devices easily, accurately and economically measures dissolved oxygen levels to protect municipal water supply storage systems and sensitive ecosystems. The analyzer comes pre-calibrated from the factory, requiring no special tools or installation training. The standard S80 sensors have 316 stainless steel housings although various materials of construction are available to maximize sensor performance while minimizing cost of ownership. The sensors are available in either a choice of insertion- or valve-retractable configurations for quick disconnect and replacement of sensor cartridges. The universal T80 transmitters are available as either single-channel or dual-channel instruments, and come in a 24-volt DC or a 100/240-volt AC power configuration. All versions are available with the optional HART output.

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Emerson's new PACSystems IPC 2010 Compact Industrial PC is a rugged industrial computer designed to handle a wide range of machine and discrete part manufacturing automation applications. Running an industrial version of Linux, and including serial and ethernet connectivity, the IPC 2010 can be used as a communications gateway in a variety of topologies and simultaneously or separately as an edge com-

puting device. Users can implement the IPC 2010 as a flexible protocol converter in many IIoT, edge, OT/IT convergence, HMI visualization, SCADA connectivity and digital transformation roles. The compact form factor IPC 2010 features a wide operating temperature range of any passively cooled IPC, with a low power consumption of just 4 watts and tough packaging so it can be installed virtually anywhere.

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U.S. Patent 11,598,696 & 11,768,132

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product news

product spotlight wastewater

Biosolids system uses nonchemical means to produce Class A product

By Craig Mandli

Biosolids management is one of the most challenging aspects of municipal wastewater treatment. But the **Varcor system**, a process developed by **Sedron Technologies**, is designed as a complete, holistic solids handling system that delivers a dried Class A product with multiple potential end uses.

The system is based on mechanical vapor recompression where solid and liquid fractions are separated through thermal evaporation and the resulting vapor is mechanically compressed. The compressed vapor is then used as the heat source for the evaporation process; in transferring its heat, the vapor condenses and forms a water output. The remaining vapor is concentrated and condensed into a solution of low boiling point constituents. Due to thermal processing, all three outputs — the water, the solids and the low boiling point constituents — are pathogen free.

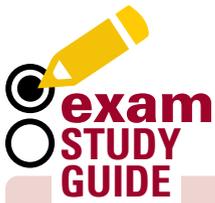
“The Varcor has multiple applications in the municipal wastewater treatment industry including the treatment of Class B biosolids into Class A EQ or Class AA biosolid, reduction of nutrient loading by removing nitrogen and phosphorus from sidestream discharges to public waterways and processing of septage waste,” says Tim Evenson, vice president of sales for Sedron Technologies. “The best fit would be at a high-volume treatment plant that has to meet discharge limits, or would like to produce high quality Class EQ biosolids at an attractive cost with no public funding.”



Varcor from Sedron Technologies

The system uses a mechanical and thermal process that delivers both environmental and commercial benefits by eliminating the use of chemicals, the need for cross-state hauling of liquid waste, and land application of biosolids. It also involves using less energy than traditional treatment processes, furthering the environmental benefits of the system. Finally, the new facility produces both pathogen-free solid fertilizers and aqueous nitrogen fertilizers that can be used as key inputs in agriculture. It transforms traditional wastewater processes that can have a negative impact on the environment into upcycling processes that deliver environmentally beneficial outputs.

“We currently have one operating Varcor system processing human waste in a suburb just south of Seattle, Washington,” says Evenson. “The feedback from customers, including septic haulers and plants who are providing biosolids to the site for processing has been overwhelmingly positive. We are saving them a significant sum of money, reducing trucking miles and time, and providing a solution that is better for the environment.” 360-399-6193; www.sedron.com tpo



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

WASTEWATER

By Rick Lallish

By allowing a settleometer sample to set for several hours after the 30-minute settling test, what can be determined?

- A. Denitrification in the system
- B. Filamentous identification
- C. Septicity and toxicity of sample
- D. MLSS concentration

ANSWER: A. If you allow a sample to sit for several hours after the 30-minute settling analysis, the sample will eventually rise or flip over and float to the top of the settleometer. This is an indication of denitrification. It is a common occurrence and is expected. The amount of time it takes gives operators an idea of possible problems in the clarifier. If the sludge rises too fast (90 minutes or less), you should check the sludge blanket and make possible adjustments (increase) to the return activated sludge levels. More information may be found in the WEF textbook *Wastewater Treatment Fundamentals I: Liquid Treatment*, Chapter 8.

DRINKING WATER

By Drew Hoelscher

What temperature should be maintained in a room storing liquid chlorine containers?

- A. Less than 50 degrees F so the cylinders or containers do not build up pressure.
- B. At least 65 degrees F, but not to exceed 100 degrees F.
- C. Greater than 100 degrees F or the liquid will not convert to a gas.
- D. Temperature is not important because the containers are sealed carbon steel vessels.

ANSWER: B. Buildings storing chlorine containers should be isolated from the rest of the treatment plant and be equipped with a climate control system. Ideally, the temperature should be kept around 70 degrees F. If the temperature is too low, the chlorine gas being withdrawn can condense and return to its liquid form. If the temperature is too great, the container will become over pressurized and may cause a fusible plug to melt.

ABOUT THE AUTHORS

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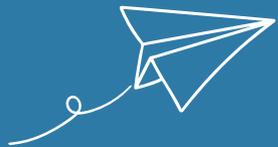
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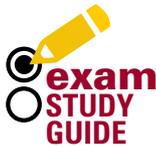


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people/awards

Thomas Kvasnicka retired after 41 years with central Virginia in water and wastewater treatment agencies. He served as chief operator for Hanover, Dinwiddie and Henrico counties, and the city of Richmond and retired from Virginia American Water, serving the city of Hopewell and its industrial base. He achieved top licenses in both water and wastewater.

Columbus (Wisconsin) Utilities won the gold medal at the National Rural Water Association's 25th annual Great American Water Taste Test.

Robert Wells, superintendent of the Middlebury (Vermont) Municipal Wastewater Treatment Facility, was named 2023 Regional Wastewater Treatment Plant Operator of the Year from the U.S. EPA.

San Luis Obispo, California, received a Platinum award from the Alliance for Water Efficiency for its compliance with the organization's Water Conservation and Efficiency Program Operation and Management Standard.

The San Elijo Joint Powers Authority received a Workers' Compensation Excellence Award from the California Sanitation Risk Management Authority and a Safety Plant of the Year award from the San Diego Chapter, California Water Environment Association.

The City of **Lloydminster** received a Saskatchewan Municipal Award for its new wastewater treatment facility.

The **Asheville (North Carolina) Water Resources Department** marked 20 years of achieving the International Organization for Standardization (ISO) 14001 environmental management certification.

Jeff Case, former director of public works and engineering for the Highlands Ranch Metro District and the Centennial Water and Sanitation District in Colorado, retired after more than four decades in public service.

Rick Duncan retired from his position as executive director of the Delaware Rural Water Association after 34 years of service.

Ed Moore, longtime director of public utilities in Toledo, Ohio, retired after more than three decades of service to the city.

John Barlow, top administrator at the Muncie (Indiana) Sanitary District, retired after 41 years with the district.

Jeff Walker, executive administrator with the Texas Water Development Board based in Austin, retired after nearly eight years as head of the agency and more than 34 years with the board.

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AFTER

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events

June 5-6

2024 Michigan Environmental Compliance Conference, Lansing Center. Visit www.michigan.gov.

June 10-13

AWWA ACE24: Transforming Our Water Future, Anaheim Convention Center, California. Visit www.awwa.org.

June 16-19

PennTec 2024, Penn State Conference Center, State College, Pennsylvania. Visit www.pwea.org.

June 18-21

2024 WEF Residuals and Biosolids Conference, Oklahoma City Convention Center. Visit www.wef.org.



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Zoeller names Bill Zoeller as chief executive officer

Zoeller Co. announced that Bill Zoeller became CEO May 1. Zoeller's board of directors, with the support of executive search firm Kensington International, selected Zoeller, previously chief operating officer, to lead the company as CEO upon the retirement of John Zoeller, who has served for 22 years.

"As the chief operating officer at Zoeller Company, Bill Zoeller has shepherded the company through several acquisitions, significant growth and the COVID-19 pandemic, cementing the company's position as a leader in the water solutions industry," says Christopher Carmicle, chair of the Board of Zoeller Co. Prior to this role, Bill Zoeller served as the president of Louisville Operations and director of risk management of Zoeller Co. before joining Zoeller Company in 2011, Zoeller spent more than a decade at LG&E and KU Energy and KPMG.



Bill Zoeller

Flomatic appoints Scott Shimer as VP of sales

Flomatic has appointed Scott Shimer to vice president of sales. With over 30 years' experience, Shimer will lead the sales team, foster strategic partnerships and spearhead initiatives to expand Flomatic's market presence.



Scott Shimer

WQA marks 50-year anniversary as trade association

The Water Quality Association is marking its 50th anniversary as a trade association and the voice of the residential, commercial and industrial water treatment industry. A new timeline on the WQA website highlights key milestones of the industry's advancement over the past five decades. WQA was established in 1974 with the merger of the Water Conditioning Association International and the Water Conditioning Foundation, creating a single industry voice to address rapidly growing industry challenges and opportunities. Included in that merger was the Water Quality Research Council, established in 1952 and now known as the Water Quality Research Foundation. Today, WQA has more than 2,500 member companies across the globe.

Carollo Engineers appoints associate vice president to lead Financial Management Group

Carollo Engineers has expanded its Financial Management Group with the appointment of a new associate vice president, Michael Van Antwerp. Bringing over 25 years' experience, Van Antwerp will lead the firm's grants and funding team. In his role, Van Antwerp will collaborate with Carollo's clients, participating in both pre-award and post-award activities to address and fulfill funding requirements. This includes identifying potential funding sources for capital projects, writing and submitting applications for grants and low-interest loans from federal, state and local governments, coordinating with funding agencies on behalf of clients and preparing and submitting funding disbursement requests and reports.



Michael Van Antwerp

Radhika Fox appointed senior adviser at Xylem

Xylem has appointed Radhika Fox as senior adviser. Fox will provide strategic counsel to Xylem on evolving issues and opportunities in the water sector and provide advice on a range of matters to support the delivery of Xylem's strategy. Fox most recently served as the Senate-confirmed assistant administrator for the EPA's Office of Water, acting as chief adviser to the EPA administrator and White House on water resources and water infrastructure in the United States.



Radhika Fox

Thompson Pump names new Colorado-based dealer

Thompson Pump has partnered with Aurora, Colorado-based Wagner Rents, The Cat Rental Store, making Wagner the exclusive, authorized distributor of Thompson Pump's dewatering and bypass pumps, equipment and services for all of Colorado, New Mexico and El Paso, Texas. Wagner sells and rents quality Cat machines used in heavy construction, building construction, mining, waste handling, paving, municipal and governmental applications, forestry, agriculture and more.

AqueoUS Vets expands senior leadership team

AqueoUS Vets announced several additions to its leadership team. T.J. Westerhaus joined the company as vice president of sales operations. In this role, he will assume the responsibility of driving lead generation, bolstering AV's marketing strategy and overseeing the Channel Partner program in collaboration with the marketing and sales team. Richard (Bo) Botteicher, vice president of execution, is an experienced business leader with more than two decades' experience in the water and wastewater markets of North America. He started his career as a civil design consultant, and most recently led new market development for a small, specialty buried infrastructure consultancy. New Contracts Manager Daniel Funk will leverage his experience in federal procurement, litigation and mediation to oversee the process of contract review and engage in negotiations with customers. Prior to AqueoUS Vets, Funk worked on the contingency response to the U.S. Navy Red Hill Aquifer Contamination, U.S. Navy PFAS remediation efforts in Japan and certification of the on-site U.S. Navy water lab in Cuba. Conrad Hopp, the new strategic initiatives manager, will support the AqueoUS Vets CEO in four main capacities: planning and alignment, strategic partnerships and corporate development, strategic projects and direct support.



T.J. Westerhaus



Richard (Bo) Botteicher



Conrad Hopp

Alfa Laval releases new Pump Handbook

Alfa Laval released a new 375-page *Pump Handbook*, offering insights into basic pump functionality and detailed guidelines for selecting optimal pump types, all available for free download online. Originally published 25 years ago, the handbook has served as a valuable reference for technicians in fluid handling processes. A 2023 update ensures the handbook stays current with the latest pump technologies, emphasizing energy savings through proper pump selection and maintenance.

Asahi/America welcomes Cuestas to service team

Asahi/America announced the addition of Damon Cuestas to the technical field service team. He will assist customers with training and installing Asahi/America's single and double wall industrial and high purity piping systems through thermofusion processes, primarily in Texas.



Damon Cuestas

Lystek awarded Palo Alto contract

Lystek was recently awarded a new contract by the city of Palo Alto, California. The general services contract is for the advanced treatment of biosolids and organic residuals from the city's Regional Water Quality Control Plant. The city had historically used incineration for its biosolids disposal, but this practice was discontinued in 2019. Lystek received one of the first contracts for offsite resource recovery of the city's biosolids in 2019 through a competitive bid process. **tpo**

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