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MARCH 2017

**SUSTAINABLE OPERATIONS:**  
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energy audit**  
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# On to New Challenges

John Adie  
Operations Supervisor  
Concord, N.H.

**JOHN ADIE BRINGS A TRACK RECORD OF SUCCESS  
TO A NEW ROLE OPERATING TWO PLANTS**

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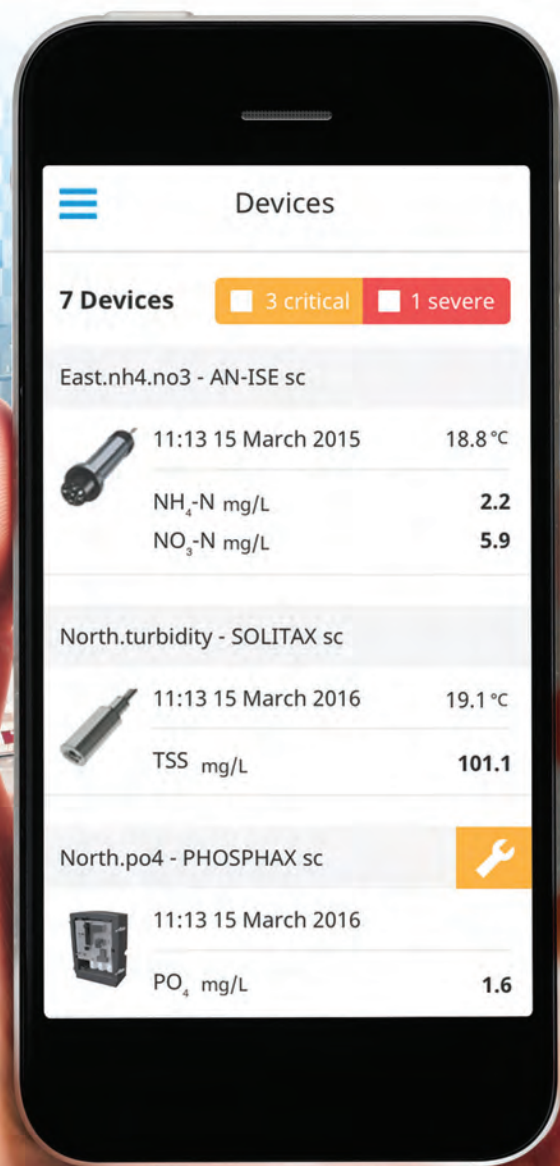
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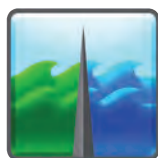
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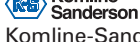
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A detailed close-up photograph of a Hyundai Crown Triton motor. The image shows the blue-painted metal housing of the motor, which has the Hyundai logo embossed on it. Below the housing, the internal components are visible, including the copper windings of the stator and the central shaft with a pulley. The lighting is dramatic, highlighting the textures of the metal and the intricate details of the motor's construction.

# HYUNDAI CROWN TRITON™ MOTORS

## THREE CRITICAL FACTORS THAT MAKE THIS THE BEST MOTOR IN THE MARKET ...

### 1 CONSERVATIVE DESIGN PHILOSOPHY

Hyundai has very **conservative** engineering and **design philosophies**, they do not accept the 'Nominal Approach' of making motors. Every motor, not just the average of a group of motors, must meet or exceed the target requirements such as temperature rise, efficiency, noise and vibration.

**The Nominal Approach:** NEMA or other specifications may require that a motor have a max temperature rise of 80°C at the rated load. The Nominal Approach allows that the average of the entire lot not exceed 80°C, meaning that some motors may exceed the requirement. All that matters is that the average of all motors does not exceed the required value.

**Summary - The Hyundai Approach:** Hyundai requires that every single motor produced does not exceed 80°C so they set their internal target at 7-8% less. This assures that **every motor** produced meets the requirement. Hyundai uses this same philosophy for many other critical attributes such as efficiency, noise level, vibration, full load speed, locked rotor and breakdown torques.

### 2 LOW OPERATING TEMPERATURES COUPLED WITH A PREMIER INSULATION SYSTEM

Heat is the largest factor leading to premature insulation failure - the larger the buffer between the actual motor temperature and the temperature rating of the insulation system is, the longer the insulation life will be.

**Hyundai's approach** for a reliable insulation system is to use **Class N varnish**, which is **rated for 200°C** and limits the temperature rise to ~74°C. This results in a larger buffer between the actual temperature and what the insulation system can handle without breaking down. With a 40°C ambient and a motor running at the nameplate load this buffer for an HHI motor is a whopping 86°C (200-74-40 = 86). Compare this to a typical motor with an 80°C rise and Class F insulation, the buffer is only 35°C (155-80-40=35). Remember the old adage, for every 10°C cooler electrical products run, the life expectancy of the insulation system doubles. An 86°C buffer is a big deal if you want a motor that will last a long time.

**Summary - Hyundai motors run cooler** and provide a larger buffer of protection for the insulation system which results in long life. An additional benefit of this design allows you to apply a stock motor in higher ambient conditions and still provide a good buffer.

### 3 LOW VIBRATION

Vibration leads to premature bearing failure and can damage the coupled equipment.

**Hyundai's approach to a low vibration motor ... Shoot for less than half of the NEMA requirement**, don't cut cost with lighter weight end bells, machine all motors with a precise foot flatness and use only the best bearings.

**NEMA requires a finished motor** to have a vibration level that does not exceed **.15 inch/second peak**. **Hyundai's conservative approach** sets the target at **~.07 inch/second peak**. All motors are precision balanced, feet are machined to a flatness of ~0.005", end bells are heavily ribbed and only premium bearings such as NSK, SKF or FAG are used.

**Summary** - heavy cast iron frames, precision balance rotors and precise foot flatness leads to lower vibration and thus longer bearing life and less damage to other equipment.

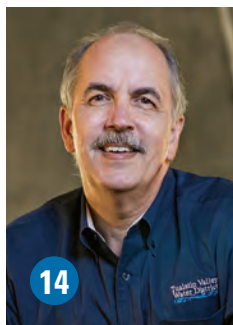
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## on the cover

John Adie, retired from a 25-year career at the wastewater treatment facility in Nashua, New Hampshire, now supervises two other plants with technologies that were new to him. He was a 2015 winner of the William D. Hatfield award from the New England Water Environment Association. (Photography by Oliver Parini)

## top performers:

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### Experience Pays Big

The Florida town of Davie steps up to address restrictions on potable water use with an award-winning MBR-based water reclamation facility.

By Ted J. Rulseh

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### Up With Quality

San Elijo Joint Powers Authority water reclamation facility protects ocean water quality and provides a drought-resistant recycled water supply.

By Trude Witham

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### Roots in Operations

As he rose through the ranks in the water utility industry, Mark Knudson never forgot the essential role of water and wastewater operators.

By Jim Force

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### On to New Challenges

After a successful career at the wastewater treatment plant in Nashua, New Hampshire, John Adie brings his experience to two more clean-water facilities.

By Doug Day

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### Where Can You Save?

Energy audits are nothing new, but they can reveal opportunities for major efficiency improvements and provide a sound business case for implementing them.

By Ted J. Rulseh, Editor

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### Riding a Fad

Pokémon Go became the vehicle for education at a water festival that drew a big crowd for a county utility agency in Georgia.

By Craig Mandli

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### After the Storm

Rain gardens built after Hurricane Sandy help control runoff and provide lessons in green infrastructure for the New Jersey city of Hoboken.

By Jeff Smith

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### Choosing Durability

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By Chris French

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### Rehabilitating Gravity Filters

A dual parallel lateral configuration in a media

filter underdrain offers advantages in effective backwashing and efficient filtration.

By Thomas M. Getting, P.E., BCEE, and John Geibel, P.E.

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### Energy Insights

An energy audit points the way to major savings in aeration and a host of future improvements for the clean-water plant in Stratford, Ontario.

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Operators in small communities often find themselves with many more needs than available funds can meet. Here is a perspective from an operator in that position.

By Ted J. Rulseh

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A two-in-one unit from Schreiber removes grit and grease from wastewater streams in parallel channels, helping to protect downstream processes.

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let's be clear

## **Where Can You Save?**

ENERGY AUDITS ARE NOTHING NEW, BUT THEY CAN REVEAL OPPORTUNITIES FOR MAJOR EFFICIENCY IMPROVEMENTS AND PROVIDE A SOUND BUSINESS CASE FOR IMPLEMENTING THEM

By Ted J. Rulseh, Editor

Energy audits have been around for a long time, most likely since the first oil price shocks during the Jimmy Carter administration, which is when the cost of energy became a significant concern.



The Sustainable Operations feature in this month's TPO reminds us how valuable an energy audit can be. At the clean-water plant in Stratford, Ontario, an energy assessment by the local electric utility and the plant's contract operator pointed to a series of improvements, chiefly a blower retrofit. Savings from that alone were projected at more than \$1 million over 20 years.

Has your water or wastewater treatment plant gone through an energy audit lately? If not, perhaps the time is right.

### **KNOW THE DIFFERENCES**

If you decide to pursue an audit, it's useful to note that there are different types, or levels, and to choose the one that best fits your needs. As in any other endeavor, you get what you pay (or don't pay) for.

Some energy audits are free. Often these are conducted by utility companies or equipment vendors. A free audit may or may not be comprehensive; it may identify only the most obvious savings opportunities. And in some cases, that can be well worthwhile.

On the opposite end of the spectrum are energy audits that involve engineering evaluations; these may come with substantial price tags. The price may prove worth paying if the audit uncovers savings opportunities that a no-cost audit would not. On the other hand, an audit that costs, say, \$20,000 is no bargain if it yields only a similar amount in savings.

### **WHICH TYPE?**

Organizations classify energy audits in different ways, but there are basically four tiers.

The first tier consists of energy benchmarking. If you took this elementary step, you would work with an expert to study your plant's past data on fuel and electricity expenses, and then compare your findings against results from other plants of similar size and with similar processes. You could



then use the data to see where you stand against your peers and decide whether a more detailed audit might be worthwhile.

The second tier involves a review of your utility bills and a walk-through of your plant with someone well versed in water facilities and their energy usage. Many utilities and some consultants offer this type of audit at no charge. It's a good way to find low-hanging fruit — places to save large amounts of energy and money without a big investment, or with a big investment that pays back fast. It can also help you find areas that might warrant a closer look.

The walk-through will give you a reasonably detailed look at how you're using energy and the large energy consumers, like aeration, pumping, filtration and solids handling. At the end, you receive a summary report and recommendations.

### DIGGING DEEPER

The third tier is more and may simply follow up on the walk-through, providing more detail. It might look into areas such as your basic building heating, cooling and lighting systems, roof and wall insulation, the condition of windows and doors, compressed air systems, and other mechanical and electrical systems. It usually includes some level of economic and engineering analysis, and predictions of return on investment for various energy-saving measures.

The fourth and final tier is often called an investment-grade energy audit. It's a comprehensive analysis of the improvements you could make, with a tight focus on return on investment. This type of audit is typically not free and in fact can be expensive, but it can also be well worth the up-front expense.

An investment-grade audit generally includes a close look at utility rate structures and assesses how changes in usage patterns — such as shifting some operations to off-peak times when power is cheaper — might reduce costs. It also may include a complete inventory of all energy-using equipment.

If you decide to pursue an audit, it's useful to note that there are different types, or levels, and to choose the one that best fits your needs. As in any other endeavor, you get what you pay (or don't pay) for.

This kind of audit can be used to support a large and varied package of energy improvements, in which some have fast payback, others have slower payback, and in aggregate the investment has an acceptable payoff.

Project packages are often undertaken as performance contracts in which an energy service company finances the improvements, which are then paid for over a number of years out of resulting savings that are guaranteed by contract. It usually takes an investment-grade audit to support such savings guarantees.

### WHAT'S BEST FOR YOU?

So, those are the basics. There is a lot of good information about energy audits online; your local electric and gas utilities may also be good sources. Energy isn't likely to get cheaper. An energy audit can be a good way to start taking control of that component of your costs. **tpo**

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## Found a calling

Wastewater and water treatment have changed my life. Both professional areas have given me purpose, changed my outlook directionally and offered goals to work toward for the environment, communities and for me personally. The drive and passion that I've always had didn't have direction until now.

The question of where to apply my love for science and the environment was answered for my career path when wastewater and water treatment were introduced to me. The other question — what is my purpose? — was also answered by the water industry, opening new doors I never even considered walking through.

Graduating with college degrees in engineering and communications left me undecided and confused with life and my career. The confusion unfortunately took me down a path that landed me in prison. The ironic part is that this path introduced me to this terrific industry. Amidst all of the tragedy, I had finally found my calling. Finding that answer despite the situation resolved the toughest question that plagued me my entire adult life. Water treatment and wastewater fulfill all of my personal passions and interests.

Water is our most important resource and should be treated as such. It is vital to the survival of the human race and our planet. Treatment plant operators and everyone else should do everything possible to preserve and protect this resource. The quality of health and life for us and future generations should be a priority, and this industry can lead the way by integrating ourselves and new technologies into plant operations.

As you stated in your article in the June 2016 edition, "It's no longer simply about getting water clean. It's about taking in wastewater and extracting the resources it contains: clean water nutrients and energy. At the same time, there are big advances in the processes involved." This statement, along with the big innovations sweeping through the industry, sparked even further excitement in me.

I have been working at a Class 3 activated sludge wastewater facility for 10 months straight in the California Department of Corrections and Rehabilitation prison system. Working seven days a week, nine hours a day along with the chief operator's guidance, I have earned a Grade II wastewater license and will be taking the Water Treatment II and Water Distribution II exams next month. Even though I'm in prison, even though I'm away from my family, I'm doing something I believe in while paying my debt to society and rehabilitating.

In closing, I'm excited about the path I'm on. The water industry will be my permanent career. My goal is to be a fixture in helping communities and helping our struggling environment by treating the water I receive and the water I deliver back.

**Michael Enstad**  
Pilot Rock Correctional Center  
Crestline, California

## Asking for a chance

I'm currently incarcerated, and I've had the privilege to learn about the operation of wastewater and drinking water treatment plants. I've learned that if I don't get licensed before my release from prison, it will be extremely difficult to obtain a job.

Many ex-offenders who have completed these courses are unable to acquire the hands-on training hours needed to receive their licenses and are told by companies that if they do not possess their licenses, they cannot be hired. I feel this policy is wrong and should be changed. This resource of future operators should be utilized. Most of these potential operators already have completed their classes and have taken and passed their state

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exams. All they need is the hands-on training time to activate their licenses.

My proposal is that you use your many resources to inform employers of this resource and try to convey that it would be a benefit to all if this resource were put to use. In a time when many operators are retiring and filling vacancies is difficult, every source of potential operators should be taken advantage of.

My current status is that I may not be able to activate my license before I am released. This situation is stressing and vexing to say the least. If there is anything you can do to aid me and the many ex-offenders who are going to go through this situation, please do what you can. We're striving to right our wrongs and be productive citizens.

**Daniel J. Murillo, Operator Trainee**  
Marion Correctional Institution  
Lowell, Florida





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### A National Health Crisis

Flint has made countless headlines for its lead problem, but the city could be a canary in the coal mine for nationwide contamination. Concerns over elevated lead levels in drinking water have been on the rise, and recent data analysis has identified thousands of communities and water systems with lead contamination issues.

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## TRUMP ADMINISTRATION

### What Will the Future Bring?

The water and wastewater industry is paying close attention to President Donald Trump's new administration. The president has promised to make infrastructure and clean water high priorities, but many are left uncertain, wondering what exactly they can expect in the months and years to come.

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### Is Your Plant Secure?

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# ROOTS IN OPERATIONS

AS HE ROSE THROUGH THE RANKS IN THE WATER UTILITY INDUSTRY, MARK KNUDSON NEVER FORGOT THE ESSENTIAL ROLE OF WATER AND WASTEWATER OPERATORS

STORY: **Jim Force** | PHOTOGRAPHY: **Ethan Locke**

THE TWO YEARS MARK KNUDSON SPENT AS A WASTEWATER OPERATOR at the Cowlitz County (Oregon) Water Pollution Control Plant made all the difference in his career.

As the CEO of the Tualatin Valley Water District, a recipient of the George Warren Fuller Award for distinguished service from the Pacific Northwest Section and the AWWA, and a former member of the AWWA board of directors, he says those early years taught him the importance of operations and maintenance and the roles operators play in successful water management.

"I'd gone to college, gotten a master's degree, and was doing exactly what I wanted to do, designing water and wastewater systems," Knudson remembers. "But I realized that operations was the missing link. I needed to understand the operator's perspective. I was fortunate that the Cowlitz plant manager took a chance and hired me as an operator."

He says those two years gave him tremendous perspective on how plant operators were the key to success: "That experience has stayed with me through my career."

## ENGINEERING BACKGROUND

Knudson was named CEO of the Tualatin Valley district in 2013, where he had served as chief engineer since 2007. The district serves more than 200,000 customers in Beaverton, Hillsboro, Tigard and unincorporated Washington County, Oregon.

Before joining the district, Knudson worked for Carollo Engineers, the Portland Water Bureau and the Clackamas River Water District. A native of Tigard, Oregon, he earned a bachelor's degree in civil engineering and a



Mark Knudson, P.E., CEO of the Tualatin Valley Water District

master's in environmental engineering from Oregon State University.

He received a 2014 Award of Recognition for Service to the Water Profession from the AWWA and a 2005 Powell-Lindsey Citation for Outstanding Service from the Pacific Northwest Section AWWA. He is a registered professional engineer and certified water distribution and treatment operator in Oregon.

## MAKING A DIFFERENCE

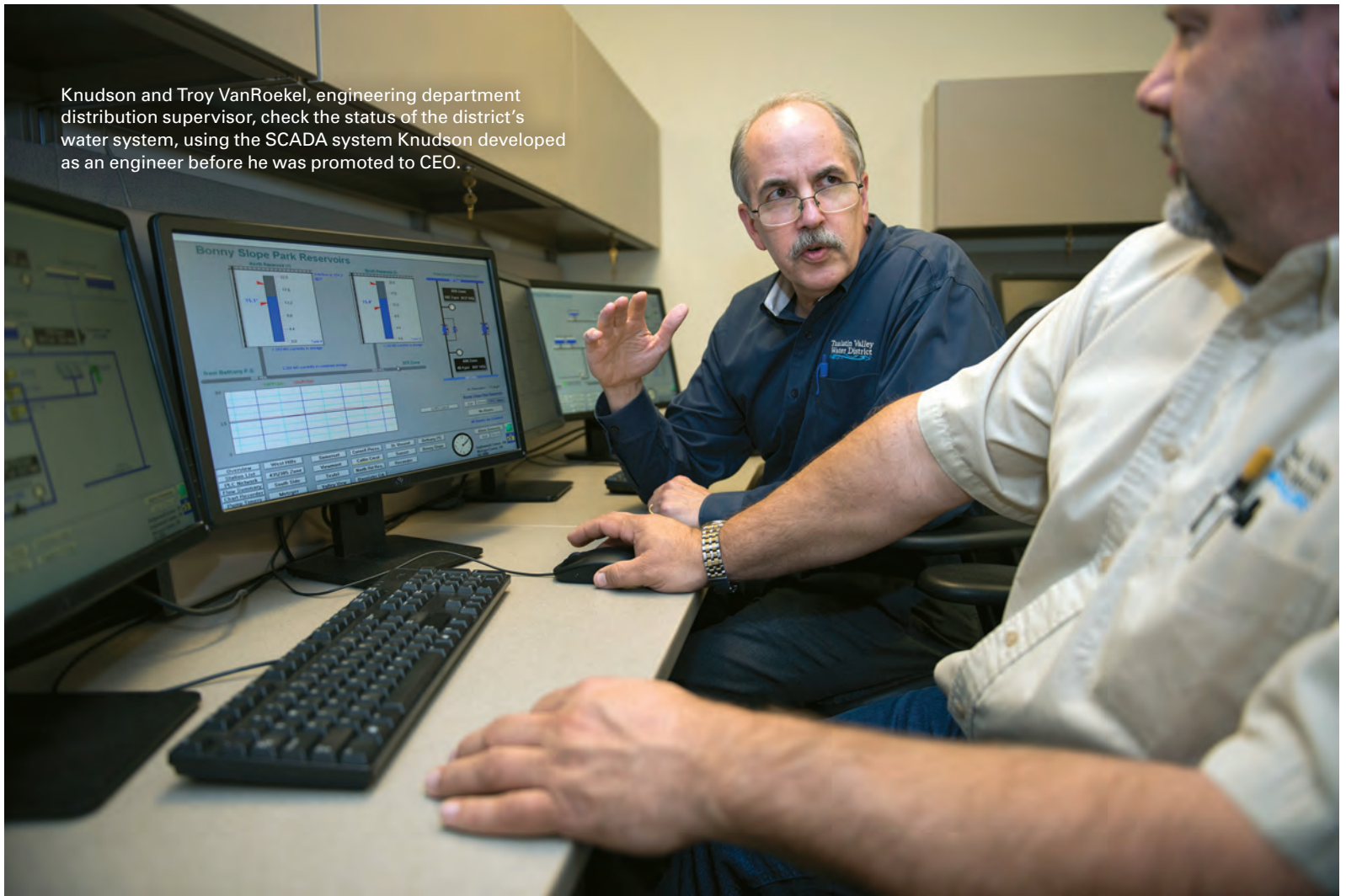
How did he decide on the water profession? "My father was an electrical engineer," Knudson says. "He worked for a Portland-based consultant who designed water and wastewater facilities." That gave him exposure to treatment plants and water management at an early age and led to his education in water engineering.

He has no regrets about his early career decisions. "The initial reward came through the technical side, optimizing treatment processes, increasing efficiency and performance, simplifying operations and improving reliability," he says.

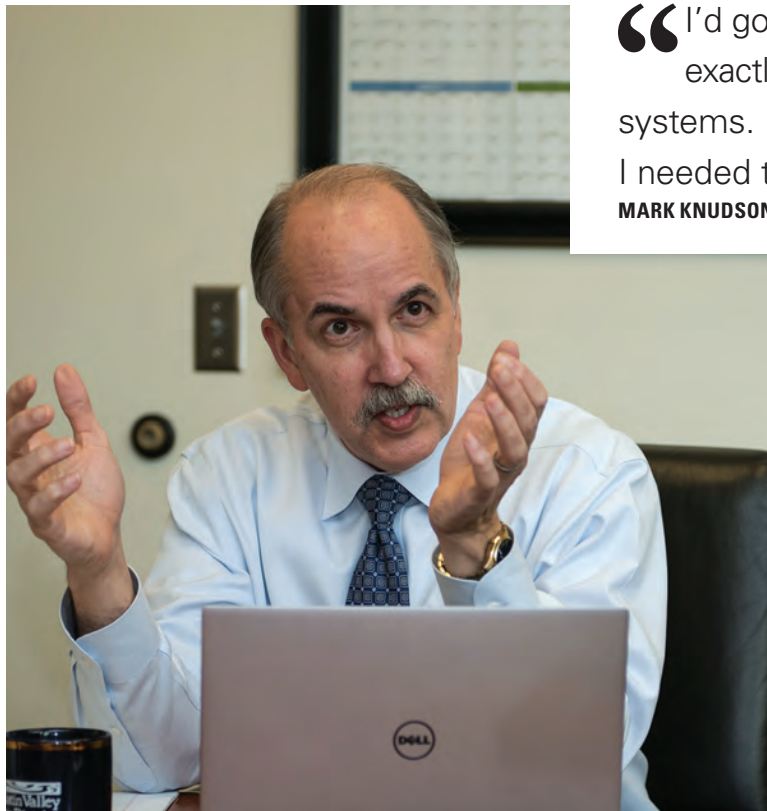
He was also motivated by the idea that wastewater treatment can make a difference in the environment: "Early in my career, I began to appreciate the public service nature of what we do. The experience at Cowlitz County allowed me to better appreciate the public health significance of the role of the treatment operator."

As his career developed, Knudson was challenged by security issues around 9/11, and the need to harden facilities against the risk of major earthquakes in the Northwest. Now as general manager, he's in a position to put all the pieces together: operations, engi-





Knudson and Troy VanRoekel, engineering department distribution supervisor, check the status of the district's water system, using the SCADA system Knudson developed as an engineer before he was promoted to CEO.



“I’d gone to college, gotten a master’s degree, and was doing exactly what I wanted to do, designing water and wastewater systems. But I realized that operations was the missing link. I needed to understand the operator’s perspective.”

MARK KNUDSON

## Mark Knudson, P.E., Tualatin Valley Water District, Oregon

POSITION: | CEO

EXPERIENCE: | 30-plus years in the industry

RESPONSIBILITIES: | Oversee and direct second-largest water utility in Oregon

EDUCATION: | Bachelor’s degree civil engineering, master’s degree environmental engineering, Oregon State University

CERTIFICATIONS: | Certified Operator, Water Distribution Level 4 and Water Distribution Level 3 of Oregon

GOALS: | Provide quality water and quality service and ensure a reliable, sustainable supply

GPS COORDINATES: | Latitude: 45°30’20.62”N; longitude: 122°51’1.21”W



Knudson is a registered professional engineer and certified water distribution and treatment operator in Oregon.





Mark Knudson leads team members during a meeting at the Tualatin Valley Water District offices in Beaverton. From left, Pete Boone, engineer; Paul Matthews, chief financial officer; Knudson; Andrew Carlstrom, customer service manager; and Amy Heinlen, human resources director.

## FACING DOWN CHALLENGES

Mark Knudson sees little difference between his personal and professional challenges: “I’ve done water management my entire life, and now they’re really one and the same.”

At the top of the list he puts partnerships with other water jurisdictions, followed by personnel, and then customer expectations. Historically, water supply has centered around independent systems that sometimes behave in a parochial manner.

Today, Knudson believes systems need to rely on multiple sources and interconnections to achieve the resiliency they need to continue providing quality water. That and the need for rate efficiencies are driving water agencies toward regional solutions.

“Technology is the easy part,” he says. “The real need is for cooperation and coordination among boards and councils of multiple jurisdictions. They need to surrender a little bit of control in order to achieve the greater public good.”

Finding great people is another challenge: “Good isn’t good enough. We need people who are bitten by the public service bug and get personal satisfaction from meeting a critical community need as opposed to receiving a big salary. We need to grow the future leaders and our industry.”

As for meeting customer expectations: “We tend to be a conservative industry and slow to change. At the same time, the expectations of our customers regarding billing, account access, updates and social media are evolving rapidly.”

“He has extraordinary administrative skills. ... He has a good staff. It’s unusual to find someone with his credentials who has also been an operator. We go where he leads us.”

**JIM DOANE**

neering, environment, public service, public health and safety, and organizational management.

“He has extraordinary administrative skills,” says Jim Doane, who serves on the district board and has known Knudson for more than 30 years. “He has so many balls in the air. He has a good staff. It’s unusual to find someone with his credentials who has also been an operator. We go where he leads us.”

## SECURITY AND 9/11

On Sept. 11, 2001, Knudson was director of operations and maintenance for the Portland Water Bureau. The terrorist attack changed his own and the entire water industry’s focus. “I was driving to work when I heard about the planes crashing into the towers,” he recalls. Immediately, his attention switched to security.

“We mobilized security, developed a command system, and implemented a security plan. Suddenly we recognized how precarious the water system could be, at Portland or anywhere.” At the time, Portland had large, open-water reservoirs. Recognizing their vulnerability, the bureau hired security services to monitor them. Over time, Portland formed its own security team to guard key facilities.



Oregon also needs to protect water systems against natural disasters, including earthquakes. Knudson helped lead development of seismic hardening plans for the state. He made presentations on the vulnerability of water systems before the Oregon Seismic Safety Policy Advisory Commission. And when the state legislature authorized preparation of an Oregon Resiliency Plan, Knudson became co-chair of the work team to identify seismic vulnerabilities and resiliency strategies for water and wastewater systems.

“Historically, the Northwest wasn’t considered especially vulnerable to a large earthquake,” Knudson says. “But recent research shows it’s at significant risk. It’s imperative that we plan for a magnitude 9 earthquake in the next 50 years in the Northwest. It would be similar to the 2011 earthquake in Japan, and the impacts on our communities would be catastrophic.

“We aren’t able to upgrade everything, so we focus on developing a resilient backbone of key facilities and pipelines that are designed to withstand such a quake. Pipelines represent some of the biggest challenges. They need special protection, especially at the joints.”

## GOING REGIONAL

Knudson is putting his planning experience into practice as part of a new regional water supply program the Tualatin Valley district is managing. It’s a 100 mgd supply system that includes a treatment plant, transmission pipelines and reservoirs that will draw water from the Willamette River to supply the district and five other partnering agencies.

“Our district gets about half its water from the Portland Water Bureau, which is expensive, and much of that system was built before we understood the seismic risks,” Knudson says. The new system will take advantage of the district’s previous investment in an intake on the Willamette. The new supply system will cost about \$1.2 billion and employ “awesome technology” to meet the region’s needs, Knudson says. The project must be operational by June 2026.

The success of the regional project has required open communication and cooperation. “It has been a six-way conversation,” Knudson says. “The secret to success is to be clear about our objective, and not get lost in the details. We’re providing a resilient source of water for generations to come.”

## REACHING THE PUBLIC

Public outreach is one of the most important factors in the Willamette regional supply system and in successful water management overall, Knudson believes: “We need to be open and honest to maintain the confidence of our customers and the trust of our regional partners.”

He notes that people often don’t understand that basic services like firefighting require a safe, reliable municipal water system: “In the Portland area we average 37 inches of rainfall a year. Water falls from the sky and the public assumes it should be cheap. We need to continue to remind people that their public health and safety depend on clean water.”

Knudson observes that for years, the water industry has been a silent service: “We’ve done great work

for decades, but haven’t talked about it.” He believes it’s time for the industry to speak up and share the good news by making better use of communication tools and strategies that respond to customers’ concerns and needs: “Use a video rather than a bill-stuffer.”

And focus on the value of water: “Water rates could triple and people would still pay less for it than for cable TV. We need to build support for the essential nature of our service. We can’t afford to wait for a disaster, like an earthquake, to begin making investments in reliability.” **tpo**

“The secret to success is to be clear about our objective, and not get lost in the details. We’re providing a resilient source of water for generations to come.”

**MARK KNUDSON**

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# Riding a Fad

“POKÉMON GO” BECAME THE VEHICLE FOR EDUCATION AT A WATER FESTIVAL THAT DREW A BIG CROWD FOR A COUNTY UTILITY AGENCY IN GEORGIA

By Craig Mandli



PHOTOS COURTESY OF THE PUBLIC UTILITIES DEPARTMENT OF THE UNIFIED GOVERNMENT OF ATHENS-CLARKE COUNTY

Exhibits included a water filtration experiment.

Unless you’ve lived off the grid for the past nine months, you’ve probably heard of the hit game, “Pokémon Go.”

Laurie Loftin learned about the game when she saw visitors to parks and other public areas walking while staring at their mobile devices. She made “Pokémon Go” the theme of a water festival that drew big attendance for the Unified Government of Athens-Clarke County (Georgia).

“It was hard not to notice all the people walking around,” says Loftin, water conservation program education specialist for the county. “Once the news coverage hit, you really couldn’t avoid it. I downloaded the app so I could see what everyone was coming for.”

## MAKING IT FUN

Using their smartphones, “Pokémon Go” players navigate a virtual map to capture Pokémon creatures, then train them and battle them against others at gyms. Loftin applied the game to the seventh annual Athens Water Festival at Sandy Creek Park in September.

“Families bring their kids out because it is something really fun,” says Loftin. “From there we’re able to speak to the adults, who aren’t likely to come to a workshop on their own. So we’re able to get water education to both kids and parents.”

“Families bring their kids out because it is something really fun. From there we’re able to speak to the adults, who aren’t likely to come to a workshop on their own. So we’re able to get water education to both kids and parents.”

**LAURIE LOFTIN**

During the festival, kids get sprayed by water trucks, see the inside of a fire hydrant, and touch marine and freshwater creatures. Adults take part in short workshops to learn about homemade green cleaning products, rain barrels and rain gardens. Singers, dancers and a magician also take part.

Loftin ties current events and fads into each festival. After borrowing from *Star Wars* for a virtual light-saber battle at the 2015 festival, she focused on Pokémon last year. As attendees entered the festival grounds, their first stop was the county’s “I Made a Splash” booth, which doubled as the Pokémon gym.





Getting sprayed by water trucks was a highlight for kids at the Athens Water Festival.

There they received a Water Log with directions to locate Pokémon at several of 20 educational booths. Once they completed four activities on the Water Log to capture four Pokémon, they could return to the gym to collect a prize.

The activities encouraged water conservation and the importance of clean water. To capture the Pokémon named Politoed, players had to name three reasons they need and value water. To catch Marill, they learned why it's important to keep trash and leaves out of storm drains. They caught Squirtle for learning about water efficiency tricks, such as turning off the faucet while brushing teeth.





"The lessons weren't complicated, but they were ones that we hope stick with these kids," says Loftin. "It was a lot of fun, and we were very pleased with the results."

### SUCCESSFUL OUTREACH

The 2016 festival drew more than 800 attendees, a record crowd, even though the University of Georgia football team played a home game on the same day. "This is big football country, so any time you compete with the Bulldogs, you don't know what you're going to get," says Loftin.

"The crowd that came out, though, was very diverse. There were a lot of young families with small children, and many older people who just wanted to learn about our water system. It was a very nice group. We've asked young parents about what the best ways to involve them are, and almost all say to find a way to involve their kids."

That model has earned national recognition. The county Public Utilities Department received a 2016 Partner of the Year award from the U.S.

<p>CP 20</p>  <p><b>Water Cannon</b> 20% more efficient!</p> <p>Evolves by turning off water when brushing teeth.</p> <p>You caught Squirtle!</p>	<p>CP 50</p>  <p><b>Headaches</b> when people waste water!</p> <p>Evolves by reminding others to use water wisely.</p> <p>You caught Psyduck!</p>
<p>CP 140</p>  <p><b>COMPLETE THIS ACTIVITY TO CAPTURE POLITOE!</b></p> <p>Enthusiasm for water &amp; has great WaterSense!</p> <p>Completely evolved, understands the Value of Water.</p> <p>You caught Politoed!</p>	<p>CP 30</p>  <p><b>Makes a Big Splash</b> to clean water!</p> <p>Evolves by volunteering for Rivers Alive &amp; other water clean ups.</p> <p>You caught Magikarp!</p>
 <p><b>Traps Trash</b> to keep it out of water!</p> <p>Evolves by using legs &amp; suction cups to put litter in trash can.</p> <p>You caught Octillery!</p>	<p>CP 60</p>  <p><b>Floats in stormwater</b> to remove trash!</p> <p>Evolves by keeping trash &amp; leaves out of storm drains.</p> <p>You caught Marill!</p>

EPA. "I think pretty much everyone takes clean water for granted in this country," says Loftin. "It's our job to let people know how important it really is. The more diverse we can make that message, the wider audience we're going to reach." tpo





# After the Storm

RAIN GARDENS BUILT AFTER HURRICANE SANDY HELP CONTROL RUNOFF AND PROVIDE LESSONS IN GREEN INFRASTRUCTURE FOR THE NEW JERSEY CITY OF HOBOKEN

By Jeff Smith

**L**ots of rain and stormwater runoff in a short time can challenge any combined sewer system.

Just ask the operators of the Adams Street Wastewater Treatment Plant in Hoboken, New Jersey, where flooding in parts of the city is common. None was more challenging than the flood caused by the 14-foot storm surge produced by Hurricane Sandy in 2012, when nearly half the city was flooded.

“We were devastated, and the plant was offline for 24 hours,” says Phil Reeve, project manager for CH2M Hill at the 20.8 mgd (design) plant owned by North Hudson Sewerage Authority. “But through a lot of hard work and cooperation we were back to full treatment in five days.”

## PART OF THE PLAN

Not long afterwards, Reeve and his staff coordinated the design and installation of two rain gardens, the first of them in Hoboken, as part of a site improvement project. As it happened, that effort gave the authority a head start on a regional planning effort called The Hoboken Green Infrastructure Strategic Plan, which evolved over the next two years.

Finalized in late 2013, the plan is part of a 13-county initiative in North Jersey called the Regional Plan for Sustainable Development. Funded by the U.S. Department of Housing and Urban Development, the plan outlines a variety of ways to reduce stormwater runoff, such as by constructing wetlands, building basins or ponds, creating vegetated swales, installing green roofs, minimizing areas of impervious surfaces, and installing rain gardens.

The two rain gardens at the Adams Street Plant are in front of the main administration building. Each captures flow from the parking lot and diverts it away from the combined sewer system.

“The city has plans to build other infrastructure like rain gardens throughout the community, and we’d like to think it’s because ours have been so successful.”

PHIL REEVE

The larger of two rain gardens in front of North Hudson Sewerage Authority administration building in Hoboken, New Jersey.

PHOTO COURTESY OF NORTH HUDSON SEWERAGE AUTHORITY

The smaller garden is 44 by 18 feet; the larger one measures 90 by 10 feet. Both are designed to handle 3 inches of ponding. They drain through 12 inches of permeable soil on top of 6 inches of gravel. The certified sandy soil mixture is amended with up to 7 percent organics and contains less than 5 percent clay and silt.

## HELP WITH MAINTENANCE

The gardens support native grasses, sedges, rushes, ferns, shrubs and deep-rooted plants — some 800 in all. For aesthetics, an 18-inch-wide border of stone adorns each garden.

The plant staff performs only a small amount of maintenance; most of that work falls to students from Hoboken’s Stevens Institute of Technology. The students volunteer their time and do the work as part of a study by their professor, who monitors the capacity and water quality to determine the rain gardens’ efficiency.

Reeve says the rain gardens are the result of the second attempt to build them. In 2011, an anticipated grant from an irrigation equipment manufacturer to fund the project fell through, but the authority was so committed to the project that its leaders decided to pay for the gardens. Work was then interrupted by Hurricane Sandy.

“Our rain gardens have been very successful,” says Reeve. “The city has plans to build other infrastructure like rain gardens throughout the community, and we’d like to think it’s because ours have been so successful.”

## LEARNING TOOLS

Education is a big part of the rain gardens’ success. Besides the study by



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an expert in green infrastructure from the Stevens Institute, students from Columbia University and officials from the New Jersey Department of Environmental Protection have toured the plant. Tours conducted for students and the public also include the story of the rain gardens.

“Our goal in constructing the rain garden was to focus our local communities on green solutions in urban settings.”

**DR. RICHARD J. WOLFF**

“Our goal in constructing the rain garden was to focus our local communities on green solutions in urban settings,” says Dr. Richard J. Wolff, the authority’s executive director. “There is a great deal that can be done with green infrastructure in densely populated areas serviced by CSO collection systems. We wanted to set an example for developers and municipalities alike, and this rain garden has been a great step forward in that regard.” **tpo**



## Share Your Ideas

**TPO welcomes news** about interesting features of your facility’s grounds, signage or buildings for future articles in the PlantScapes column. **Send your ideas to editor @tpomag.com or call 877/953-3301.**

The team at the North Hudson Sewerage Authority includes, from left, Phil Reeve, CH2M Hill project manager; Ludmila Bgongoradazi and Guiherme Wecker, Stevens Institute of Technology exchange students from Brazil; Dr. Richard J. Wolff, authority executive director; and Steven Hudock, CH2M Hill client services manager.





# *Experience* Pays Big

STORY: **Ted J. Rulseh**  
PHOTOGRAPHY: **Robert Herrera**

THE FLORIDA TOWN OF DAVIE STEPS UP TO ADDRESS RESTRICTIONS ON POTABLE WATER USE WITH AN AWARD-WINNING MBR-BASED WATER RECLAMATION FACILITY





Plant mechanics Greg Cavicchia (left) and Tony Tristram inspect the reverse osmosis system at the Town of Davie Water Reclamation Facility. (Pumps by US Motors [Nidec Motor Corporation].)

WHEN THE FLORIDA TOWN OF DAVIE BUILT ITS NEW water reclamation facility with a membrane bioreactor, the operators had no experience with the technology.

They did have substantial experience in the wastewater treatment industry, and that enabled them to bring the plant online smoothly, delivering high-quality effluent from the start. After 3 1/2 years in operation, the plant treats an average of 1.4 mgd, up to 70 percent of it delivered to customers for reuse in landscape irrigation.

“In starting up a brand new facility, besides learning the equipment and developing operating procedures, we were faced with having no support structure on site,” says John McGeary, chief operator. “We had a maintenance shop, but no tools, equipment or supplies, and limited spare parts. It

was the same with the lab. We had specified some equipment but it was not stocked initially.

“Next, we had to do subtle upgrades and modifications, like adding signage, installing lockout/tagout stations, adding hoses and reels, placing lockers for personal protective equipment, building the Material Safety Data Sheet collection, deciding where to install valves and sample ports, setting up an office, and more. Having an experienced staff was extremely helpful.”

The team’s success has been recognized with the 2016 David W. York Water Reuse Facility of the Year Award (1 to 5 mgd category) from the Florida Water Environment Association.

### SECURING THE RESOURCE

The fast-growing town of Davie (population 96,000) lies about 10 miles inland from Fort Lauderdale. Davie is home to several institutions of higher education, including Nova Southeastern University, Broward College, and satellite campuses of Florida Atlantic University and the University of Florida. The Bergeron Rodeo Grounds, next to the town hall, is a stop on the national professional rodeo circuit.

The history of the water reclamation facility goes back to 2007, when the South Florida Water Management District (SFWMD) adopted the Regional Water Availability Rule, requiring utilities to develop alternative water supplies to meet future demands and minimize impact on aquifers. For the town of Davie, that meant 0.6 mgd reduction in the available water supply.

After a thorough needs assessment, town officials determined that a 6 mgd brackish water treatment facility and a 3.5 mgd reclaimed water facility would be needed by 2013. The brackish water reverse osmosis plant reduced withdrawals from the freshwater Biscayne aquifer by instead drawing from the deeper Floridian aquifer.

“Part of the startup stage of the MBR process is to build that biofilm on the front of the membranes. At startup, the effluent is good, but it continues to get better as you build the biomass.”

JOHN McGEARY

## Town of Davie (Florida) Water Reclamation Facility



COMMISSIONED: | 2013

SERVICE AREA: | 35.6 square miles

POPULATION SERVED: | 96,000

FLOWS: | 3.5 mgd design, 1.4 mgd average

TREATMENT LEVEL: | Advanced secondary

TREATMENT PROCESS: | Membrane bioreactor

BIOSOLIDS: | Land-applied

EFFLUENT: | Recycling for irrigation, deep well injection

ANNUAL BUDGET: | \$36 million (all utility operations)

WEBSITE: | [www.davie-fl.gov](http://www.davie-fl.gov)

GPS COORDINATES: | Latitude: 26°4'5.28"N; longitude: 80°14'5.27"W





From left, plant operators Walter Fletcher, Todd Tysinger and Scott Hull inspect connectors on the TrojanUVFit disinfection unit.

Both new treatment facilities were built in the same complex, which also includes town Utilities Department administrative offices. The town also operates an older water treatment plant and a 5.5 mgd secondary wastewater treatment plant with three contact stabilization packaged units, sending effluent to the nearby city of Hollywood for reuse and ocean discharge.

### EFFICIENT PROCESS

The water reclamation facility was designed and built by AECOM; Ovivo supplied the MBR. Influent from two pump stations first enters the headworks, passing through two 23 mm rotating drum screens (Huber Technology) and then a cyclonic grit removal system (Fluidyne Corp.).

A biofilter (Evoqua Water Technologies) controls odors from the headworks. “It doesn’t use harsh chemicals,” says McGeary. “We fill it with plant food. The media develops a biomass that consumes the hydrogen sulfide. That is followed by an activated carbon absorber (Evoqua). We just don’t have odors.”

From the headworks, the flow moves to two covered anoxic basins for denitrification. It is then pumped to an aeration zone where nitrification occurs. The blowers are controlled on a feedback loop based on a programmed dissolved oxygen setting.

In the MBR channels, aeration continues. A thin microbiological film on the membranes aids BOD and TSS removal. “Part of the startup stage of the MBR process is to build that bio-film on the front of the membranes,” says McGeary. “At startup, the effluent is good, but it continues to get better as you build the biomass.

“We regulate the flow through the membranes with pumps controlled by variable-frequency drives. If the level goes up in the anoxic tanks, then the system pumps more. If the level goes down, it pumps less. Our pumps are on the discharge side of the membranes; we pull the flow through the system. Our favorite feature is that we don’t have clarifiers. We’re not dependent upon settleability. We don’t have to worry about filaments. We don’t have to worry about cleaning weirs.”





Walter Fletcher, plant operator 1, checks plant readings using a Model 55 dissolved oxygen meter (YSI, a Xylem brand).

“There was excitement in being at a place that had never been in service before. Most everybody starts a career a place that’s well established. We were not. It was up to us to set the parameters and build the new standard operating procedures.”

**JOHN McGEARY**

## ON TO REUSE

The mixed liquor suspended solids not processed after the MBR flows by gravity back to the anoxic basin. The permeate goes through a TrojanUVFit disinfection system. The finished water is then sent to reuse storage and then on to customers; excess over customer demand is injected down deep wells.

Solids are wasted to a 400,000-gallon two-stage aerobic digester. A membrane bioreactor in Stage 1 continuously removes water, thickening the material from 1 percent to 3 percent solids. Aeration continues in Stage 2. The material is then delivered to a rotary press (Fournier Industries) to dewater. “The press is self-contained,” says McGeary. “The solids and the polymer enter a mixing chamber and then go into the press.”

An automatic system loads truck trailers with finished Class B biosolids for transport to farms for land application. Contractor H&H Liquid Sludge Disposal handles hauling, site permitting and application for biosolids from both the town’s treatment plants. “We also have permits to send material to lined landfills or to residuals management facilities,” McGeary says.



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Disinfected effluent is sent to two storage tanks designated “reclaim” and “reuse.” The difference between the two is that if the process becomes upset, the connection between the tanks is severed and effluent is delivered only to the reclaim tank, from which it is pumped down the deep wells.

“If turbidity and disinfection are good, then the two tanks are interconnected and we pump reuse to customers on pressure demand,” says McGeary. “We maintain pressure at 70 psi, and customers use what they need. If the level goes up and the tanks are full, then the deep well pumps come on. Our usage can vary greatly. If it rains five days in a row and nobody uses any water, that’s when the deep wells come into play.”

Major reuse customers are the University of Florida Agricultural Testing Center, which abuts the plant property; Nova Southeastern University across the street; and a golf course down the road from the plant. The distribution system has been extended to a town park and a town golf course,





#### Town of Davie Water Reclamation Facility PERMIT AND PERFORMANCE

	INFLUENT	EFFLUENT	PERMIT
<b>BOD</b>	~150 mg/L	< 4 mg/L	20 mg/L
<b>TSS</b>	~200 mg/L	Not detected	5 mg/L
<b>Turbidity</b>	—	0.1 NTU	0.2 NTU 95 percent of the time 0.5 NTU absolute limit
<b>Coliform</b>	—	Not detected	Not detected 95 percent of the time 25 cfu/100 mL absolute limit

but neither receives reuse water because capacity is insufficient. In the near future, an additional wastewater pump station will be rerouted to the reclamation plant, raising its average flow to about 2 mgd.

### MEETING THE CHALLENGE

MBR technology challenged the operations team, which McGeary joined shortly before startup. He holds a Class A Wastewater Operator license and previously spent 33 years with the city of Fort Lauderdale, ending as chief operator of the city's 55 mgd regional treatment plant. He was also captain of a seven-time state champion Operations Challenge team. His staff members are:

- Scott Hull, plant operator II, Class B, 35 years in the industry, Operations Challenge team member
- Charles Arline, plant operator II, Class B, 35 years, former superintendent at another utility
- Todd Tysinger, plant operator 1, Class B/C, 20 years
- Jewel Foster, plant operator 1, Class C
- Walter Fletcher, plant operator trainee
- Gregory Cavicchia and Anthony Tristram, utilities maintenance mechanics
- Cynthia Doyon, compliance and efficiency manager

"Other than a small pilot plant here and there, I believe we were the first

The team at the Town of Davie Water Reclamation Facility includes, from left, Scott Hull, Greg Cavicchia, John McGeary, Todd Tysinger, Anthony Tristram and Walter Fletcher.

MBR in our county," says McGeary. Ovivo provided classroom training during the late stage of construction, and technical representatives from the company were on site during startup. AECOM, as the facility designer, also provided training.

"There was excitement in being at a place that had never been in service before," McGeary says. "Most everybody starts a career in a place that's well established. We were not. It was up to us to set the parameters and build the new standard operating procedures.

"We started in a half-mode with just one aerator and one anoxic tank because we only had one pump station feeding the plant in the beginning. That gave us a chance to learn at lower flows. The process worked quite well. I would say most of our startup headaches were just minor bugs, like electrical and plumbing problems.

"Between Ovivo, AECOM and our own maintenance staff, we got everything fixed and got the plant running smoothly. We were extremely pleased with the quality of the effluent, even right away. We started by only discharging to the deep wells until we had a good track record. We ran that way for six months to make sure we had a good quality consistency before we began to push reuse water out to customers."

### KEEPING IT RUNNING

Along the way, the team built the SOPs based on a U.S. EPA model that includes seven phases for each procedure. An in-house lab allows operators to perform tests for process control. Samples for compliance testing are sent

(continued)





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Greg Cavicchia performs maintenance on a Verderflex Dura 25 peristaltic pump chemical feed system (Verder).

to a certified laboratory.

The team has developed an extensive safety program. All members are trained in first aid and in the use of the plant's automatic electric defibrillators. Team members and compliance officer Doyon do full walkthroughs of the plant every two months to identify issues that need attention. All SOPs include a safety component. The fire alarm and suppression system is thoroughly tested annually. Training courses for continuing education credit are offered periodically to staff by vendors, the city of Fort Lauderdale safety training bureau, and the local operators association.

For McGeary and his team, starting and running the plant has been a good ride and a source of satisfaction. "Once we moved the influent pipe here from the other plant, it was the point of no return," he says. "We had to learn quickly how to get things right. The plant works very well. It's very consistent. If you have the machines running right, they will produce results for you." **tpo**

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## KEEPING IT GREEN

The Town of Davie Water Reclamation Facility and the adjoining brackish water treatment plant and offices operate in keeping with the town's larger focus on sustainability, embodied by the slogan: Make Davie Clean Through Green.

"When this facility was designed, it had a lot of green features built in," says John McGeary, chief operator. The buildings have multizone heat pumps for air conditioning. The lights are on motion sensors so that they turn off when spaces are unoccupied.

"We capture all the rainwater here on site," says McGeary. "We have retention areas, and they are interconnected. An underdrain takes all the rainwater and percolates it back into the aquifer. We even capture the rain from the roofs and parking lots. This facility is not an aquifer drawer but an aquifer adder."

In general, the town acts affirmatively to promote water conservation. Residents can pick up low-flow showerheads and sink faucet aerators. A town park hosts Broward County's annual Water Matters Day, where water utilities and product vendors set up exhibits — as many as 90,000 people attend.

Town utility officials also meet with homeowner associations to advocate wise use of water and discuss topics such as best practices for irrigation. "Water conservation is a big deal," says McGeary. "It is becoming more important in South Florida, as consumptive-use permits from the Biscayne Aquifer are being restricted."

“Water conservation is a big deal [and] becoming more important in South Florida.”

JOHN McGEARY



Todd Tysinger checks settings for the rotary press (Fournier Industries) used to dewater solids before transport to farms for land application.



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# Choosing Durability

STAINLESS STEEL BLADES ON MIXER IMPELLERS HELP ELIMINATE MAINTENANCE ISSUES AND ENHANCE PROCESS PERFORMANCE AT RESEARCH TRIANGLE PARK'S TREATMENT PLANT

By Chris French

Are fiberglass or stainless steel impeller blades better for a wastewater treatment plant's mixers? At one of the world's largest research parks, there is no shortage of expertise for weighing whether one material is better than another.

With more than 200 companies and some 50,000 people skilled in fields such as microelectronics, telecommunications, biotechnology, chemicals, pharmaceuticals and environmental services, Research Triangle Park in Durham County, North Carolina, is a place to find answers to all sorts of technical questions.

At the nearby Triangle Wastewater Treatment Plant, operators' experience made a case for mixers with stainless steel impellers. As a result, the plant team has been gradually replacing its fiberglass-bladed mixers with stainless steel.



The Durham County team chose mixers with stainless steel impeller blades for extended service life.

During his near 10 years at the plant, Pearce and his team have labored long and hard to keep the original mixer blades going. "We've been doing everything we can, but the clogging, especially during storm events, became more and more frequent.

"We had to pull up mixers from which heavy hair mixed with plastics and cotton swabs were hanging, taking them out of service. It became normal for this to be once per month, per mixer in some of the treatment facility mixing zones. Eventually, the blades' gel-coat front edge wears off, making them split, and at up to almost \$10,000 per blade to replace, this was something we had to address."

## VARIABLE FLOWS

Industrial wastewater accounts for 70 percent of the plant's intake, but it also handles large flows from the weekday workforce at the research park, and from 6,000 local residents on weekends, when flows are appreciably slower.

Joseph R. Pearce, deputy director of the Durham County Engineering and Environmental Services Department, says, "Although our percentage intake of industrial wastewater is significantly higher than the national average, we still have to deal with all the hair and rags that despite pre-screening can cause clogging problems for any treatment plant."



Landia submersible mixers and air-jet units mix and aerate the biosolids sludge tanks at Durham County.

## PROCESSING SOLIDS

Built in the early 1960s and expanded in the 1970s, the Triangle plant was upgraded in 2005 when the 6 mgd tertiary treatment facility was replaced with a 12 mgd five-stage enhanced biological nutrient removal system that removes nitrogen and phosphorus with carbon source addition and chemical phosphorus treatment using sodium aluminate. The mixers installed at that time had fiberglass impellers.

In 2013, a new biosolids handling facility was constructed. This time around, with Pearce at the helm, the decision was made to use mixers from Landia that have solid stainless steel impellers.

The biosolids facility consists of two aerated holding tanks with 1 million gallons capacity, three centrifuges, and an automated truck loading station. Excess biomass flows to sludge holding tanks. The waste sludge thickens by gravity, and the supernatant is decanted into a sidestream equalization tank.



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Landia mixers and jet aerators then go to work on the thickened material (1 percent solids) to ensure a uniform solids concentration and minimize anaerobic conditions. Polymer is added to the thickened material before it is moved to the centrifuges, which deliver a cake at 20 percent solids. This material is pumped to trailers for transport to a commercial Class A composting facility for stabilization and distribution to the landscape market.

“In our biosolids facility, we have no issues whatsoever with the mixers,” says Pearce. “They were very reliable, so we then retrofitted a Landia mixer into one of our problem basins to try it. After a seven-month run we had no

much to the mixers,” says Pearce. “We’re extremely happy with our investment because improving Durham County’s facilities and improving safety is very much our mission.”

Setting standards at the Triangle plant is nothing new. The facility’s administration building was the first to be LEED-certified. Low-energy, recycled, and regionally manufactured materials were used in its construction. The building’s wastewater is treated and rerouted to the HVAC system and low-flow toilets. Using reclaimed water has reduced potable water use by 32 percent.

In addition, the Triangle plant’s recycled water facility consists of four turbine pumps, a hydropneumatic tank, a 500,000-gallon storage tank, instrumentation and metering, a dual disinfection system and a distribution system.

### RECYCLING VALUE

Recycled water has become a community asset for landscape irrigation, cooling towers and construction activities. In Research Triangle Park, having a redundant water supply is important for water-critical facilities such as computer database services, pharmaceutical plants, LED manufacturing, and agricultural research and development in greenhouses.

Triangle’s proactive recycling didn’t escape Pearce’s eye when he recently snapped up some 12-year-old Landia mixers from another treatment plant in North Carolina: “Even though these mixers are over a decade old, the blades are in excellent condition. I’ll gladly have these longer-lasting stainless steel units on board as backup.” **tpo**

“Although our percentage intake of industrial wastewater is significantly higher than the national average, we still have to deal with all the hair and rags that despite pre-screening can cause clogging problems for any treatment plant.”

**JOSEPH R. PEARCE**

clogging whatsoever, so one by one as the existing mixers split, we replace them with the stainless steel impeller mixers. We expect fewer clogging problems and blade wear not to be an issue.”

### MAINTENANCE SAVINGS

The Triangle plant now has 15 of the stainless mixers, and that is expected to almost double as the steel units are phased in. The mixers will be installed in the anoxic and anaerobic zones and in 18-foot-deep oxidation ditches requiring propellers about five feet in diameter, operating at 47 rpm.

“Not surprisingly, we’ve made a big saving on our maintenance program, and I’m also pleased for our team that there is now much less use of winches and crane hoists and exposure to rags because we don’t really have to do

### Share Your Ideas

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

Send your ideas to editor@  
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The San Elijo facility nestles in a small canyon between Interstate 5 and the Pacific Ocean. FACING PAGE: Chopper pumps circulate biosolids through heat exchangers and back to digesters, continuously grinding and chopping to ensure uniform consistency and temperature.

# Up With *Quality*

SAN ELIJO JOINT POWERS AUTHORITY WATER RECLAMATION FACILITY PROTECTS OCEAN WATER QUALITY AND PROVIDES A DROUGHT-RESISTANT RECYCLED WATER SUPPLY

STORY: **Trude Witham** | PHOTOGRAPHY: **Collin Chappelle**

AS A SMALL WASTEWATER/RECYCLED WATER AGENCY WITH JUST 21 EMPLOYEES, the San Elijo Joint Powers Authority (SEJPA) has accomplished big things.

In 2016, it was named Recycled Water Agency of the Year by WateReuse California in the medium-size category, recognizing the agency for its leadership, creativity and persistence in developing recycled water as a valuable local water supply.

That would not have happened without exceptional teamwork. “Our operations staff, led by operations director Chris Trees, P.E., shows incredible initiative, flexibility and intellectual dexterity to innovate and improve treatment and delivery of high-quality recycled water,” says Mike Thornton, P.E., SEJPA general manager. “Also, we have a visionary board of directors who take a broad view not only of the functional work we do, but of the greater positive impact we can have on our community.”

The SEJPA owns and operates the San Elijo Water Reclamation Facility. The wastewater system includes

the treatment facility, eight lift stations and the San Elijo Ocean Outfall, co-owned with the city of Escondido.


The water reclamation system consists of tertiary treatment facilities, 19 miles of recycled water distribution pipelines, and three recycled water reservoirs holding 750,000 to 1 million gallons.

The authority wholesales recycled water to the San Dieguito Water District, Santa Fe Irrigation District, Olivenhain Municipal Water District and the city of Del Mar to irrigate fairgrounds, golf courses, parks, school properties and highway rights-of-way. Says Thornton, “The success of our recycled water program is built on collaboration with our water district partners. Together, we’ve created an award-winning program.”

## CONTINUOUS IMPROVEMENT

The water reclamation facility, in Cardiff by the Sea, was built in 1965 and operated by San Diego County. As flows increased and the Clean Water Act took effect, the plant converted to advanced primary treatment in 1981,





“The outcome of the process improvements is better-quality secondary effluent as measured by TSS and turbidity, which improves operational efficiencies in the recycled water process.”

CHRIS TREES, P.E.





“Our team is highly motivated and well trained. That results in exceptional job performance, strong budget controls, good permit compliance, and an impressive safety record.”

MIKE THORNTON, P.E.

## San Elijo Water Reclamation Facility, Cardiff by the Sea, California



BUILT: | 1965

POPULATION SERVED: | 40,000

EMPLOYEES: | 21

FLOWS: | 5.25 mgd design, 3 mgd average

TREATMENT LEVEL: | Tertiary

TREATMENT PROCESS: | **Water reclamation facility: activated sludge, sand filtration. Advanced treatment facility: microfiltration, reverse osmosis**

RECEIVING WATER: | Pacific Ocean

BIOSOLIDS: | Dewatered and land-applied

ANNUAL BUDGET: | \$6 million (operations and maintenance)

WEBSITE: | [www.sejpa.org](http://www.sejpa.org)

GPS COORDINATES: | Latitude: 33°0'49.35"N; longitude: 117°16'25.33"W

The team at the San Elijo Water Reclamation Facility includes, front row, from left: Dale Kreinbring, Mike Thornton, Mike Piper, Carrie Cook, Ravy Chea, Scott Best and Chris Trees. Back row: Mike Konicke, Paul Kinkel, Jim Barnett, Aaron Simonson, Jose Garcia and Mike Henke.

increasing capacity from 2 mgd to 2.87 mgd. The facility's management and operations was transferred from the county to SEJPA in 1986.

In 1992, secondary treatment facilities and other upgrades increased capacity to 5.25 mgd. In 2000, tertiary treatment was constructed, along with 17 miles of distribution pipelines, two reservoirs and one booster pump station. The tertiary system included 2.5 mgd of continuously backwashing sand filters (Parkson Dynasand) followed by sodium hypochlorite disinfection.

Recently, the system was upgraded to include an additional steel reservoir and more distribution pipelines. An advanced water treatment facility,

built in 2013, includes a 1.4 mgd microfiltration system (Pall Corporation) and 0.5 mgd reverse osmosis system (Water Equipment Technologies - a Xylem Brand) that can be expanded to 1 mgd. The facility operates in parallel with the sand filters to produce 3 mgd of recycled water, about the same as the average daily wastewater flow.

Wastewater entering the reclamation plant is treated with bar screens and an aerated grit chamber before it flows to the primary sedimentation basins. From there, it is sent to equalization basins to attenuate daily peak flows. It is then sent to conventional activated sludge basins equipped with anaerobic selectors before final clarification in rectangular secondary clarifiers.

Primary sludge is sent directly to anaerobic digesters; waste activated sludge is first sent to dissolved air flotation thickeners and then to the digesters. The digested material is dewatered with belt presses that regularly achieve 20 percent solids. The dewatered biosolids are trucked to farms in Arizona for land application. Digester gas is used to heat the digesters.

Today, SEJPA serves about 40,000 people over 19 square miles, including the cities of Solana Beach, Encinitas, Del Mar and parts of Rancho Santa Fe. The authority produces some 450 million gallons of recycled water per year. The water reclamation facility is permitted to discharge up to 3.02 mgd of tertiary-treated water to recycled water users, and up to 5.25 mgd of secondary effluent to the Pacific Ocean.

The arid San Diego area relies heavily on water imported from the Colorado River and Northern California; recycled water helps the community conserve potable water.

(continued)





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Ravy Chea, SEJPA senior lab analyst, tests the plant's daily reclaimed water sample.



## ADVANCED WATER TREATMENT

The advance water treatment system has greatly improved recycled water quality. “Historically, we struggled with high TDS in the recycled water, partially from local water supplies and partially from water softeners within the service area,” says Trees. “Often, TDS ranged from 1,100 to 1,300 mg/L. Now, our TDS levels are in the 700 to 900 mg/L range.”

System construction went smoothly. “Operators reviewed the design

during meetings with the design team and with representatives of the equipment manufacturers, who also provided on-site training,” Trees says. “From these meetings, the staff developed standard operating procedures for operation and system cleaning.”

The SEJPA team worked closely with Kennedy/Jenks Consultants and Trussell Technologies on operations improvements to fine-tune the biological process. Those included adding an anaerobic selector, enhanced dissolved

## HIGHLY DECORATED

The San Elijo Joint Powers Authority (SEJPA) has collected some 40 awards since 2003. Besides the Recycled Water Agency of the Year Award from WaterReuse California in 2016, the authority won three 2015 awards from the California Water Environment Association:

- Operator of the Year – Mike Dietrich, lead operator
- Laboratory Person of the Year – Susie Arredondo, laboratory analyst
- Electrical/Instrumentation Person of the Year – Casey Larsen, SCADA manager

Says Chris Trees, operations director, “During 2015, Mike Dietrich led the operations team into an increasingly complex and demanding operations environment. He showed exemplary leadership during one of the most dynamic years in our plant’s history.”

For example, he performed troubleshooting on the primary influent and digester ferric addition systems to find the cause of unusually high intermittent chemical usage. After reviewing treatment process parameters, laboratory data and the chemical addition system, he found that occasional high storage tank levels were causing the chemical to be pushed past the peristaltic pump heads and hoses.

Arredondo goes above and beyond to help make facilities safer and better. As a safety committee member, she shared ideas and developed training sessions. Says Trees, “She is readily available to help the operators with extra lab tests, equipment calibrations and whatever else is needed to help make their jobs a little easier.” She also volunteers time on weekends to staff the authority’s booth at community events, teaching the public about water reclamation and conservation.

Larsen has made big contributions in upgrading facilities, and planning and designing capital projects. For example, he developed a program to automate the aeration system for the activated sludge process to optimize energy use based on dissolved oxygen set-points. “This work was paramount to the overall project, which is saving 900,000 kWh each year,” says Trees. Larsen also implemented an energy-savings program for recycled water distribution. The program controls pump runtimes to minimize operations during periods of on-peak energy prices.

Says Mike Thornton, general manager, “We have a very passionate and dedicated staff. They choose to be engaged in the industry and seek high levels of certification. They take great pride in the results we produce.”

(continued)



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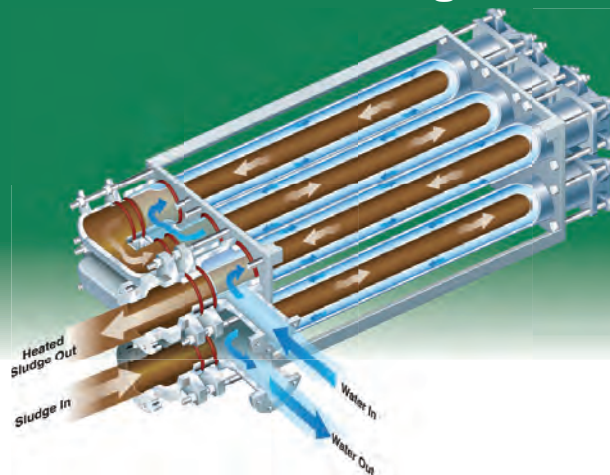
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SEJPA Wastewater Treatment Plant PERMIT AND PERFORMANCE (monthly averages)		
Secondary treatment	PERMIT	EFFLUENT
<b>CBOD</b>	40 mg/L	5.2 mg/L
<b>TSS</b>	45 mg/L	6.5 mg/L
<b>Oil and grease</b>	40 mg/L	Non detectable
<b>Settleable solids</b>	1.5 ml/L	Non detectable
<b>Turbidity</b>	100 NTU	3.2 NTU
Tertiary treatment	PERMIT	EFFLUENT
<b>TDS</b>	1,200 mg/L	865 mg/L
<b>Chloride</b>	450 mg/L	242 mg/L
<b>Sulfate</b>	450 mg/L	196 mg/L
<b>Manganese</b>	0.15 mg/L	0.07 mg/L
<b>Iron</b>	0.3 mg/L	0.14 mg/L
<b>Boron</b>	0.75 mg/L	0.36 mg/L



The water reclamation plant uses a combination of reverse osmosis (Water Equipment Technologies - a Xylem Brand), and microfiltration (Pall Corporation) in processing water from the upscale beach cities of Del Mar, Solana Beach and Encinitas.



Mike Thornton, SEJPA  
general manager

“As the regulations evolve, there may be opportunities to pursue in potable reuse.”  
**MIKE THORNTON, P.E.**

oxygen control and monitoring, temperature monitoring of the mixed liquor, and remote monitoring of the waste activated sludge TSS to help optimized wasting rates.

“The outcome of the process improvements is better-quality secondary effluent as measured by TSS and turbidity, which improves operational efficiencies in the recycled water process,” Trees says.

The staff enjoys being part of system upgrades and optimization. After the process control improvements, they began developing process control algorithms to automate and optimize the biological process.

“From this, they developed mathematical equations that correlated influent temperature with the optimal solids retention time for maintaining non-nitrified treatment, which is the lowest-cost treatment, since SEWRF has ocean-discharge options,” says Thornton. From the temperature-SRT correlation and TSS monitoring of the waste activated sludge, Casey Larsen (SCADA manager) and Trees developed programming logic for automatic wasting and for process control based on influent temperature.

Although the new systems have increased the operators’ workload, the water quality improvements have been worth it: “The wastewater treatment



has been exceptional, and recycled water salinity levels have been significantly reduced, which is a major benefit for our customers who use the water for irrigation,” says Thornton. “Also, the better water quality has allowed us to expand the customer base into industrial applications. We now serve two cooling towers that previously would not use the recycled water because of its high mineral content.”

## WELL TRAINED

A team of seven operators keeps the water reclamation facility running smoothly. The plant is staffed 10 hours a day, and an operator is on call outside those hours. “Every operator is certified and trained to operate all the equipment,” says Trees. “They are assigned to focus on certain areas with monthly rotations.”

SEJPA encourages cross-training, as operators often assist in the laboratory, on facility maintenance projects, and in operating and maintaining wastewater lift stations. Most operators have at least one certificate in a secondary field, such as mechanical technologist or laboratory analyst.

Reporting to Thornton are Trees and Paul Kinkel, director of finance and administration, who supervises Jennie Basco, administrative assistant, and Carrie Cook, accounting technician. Reporting to Trees in addition to Larsen are:

- Dale Kreinbring, chief plant operator
- Mike Dietrich and Todd Hutchinson, lead operators
- Aaron Simonson and John Boyle, operator II
- Eric O’Riley, operator I
- Scott Best, operator in training
- Mike Konicke, associate engineer
- Mike Henke, mechanical supervisor and wastewater operator
- Jose Garcia and Jim Barnett, mechanical technicians
- Ravy Chea, senior laboratory analyst
- Susie Arredondo, laboratory analyst

The greatest challenge is balancing pursuit of opportunities, like expanding the recycled water system and improving treatment, with facility maintenance and succession planning. “We encourage individual and team goal-setting to develop our employees and increase job performance,” says Thornton. “Our team is highly motivated and well trained. That results in exceptional job performance, strong budget controls, good permit compliance, and an impressive safety record.”

## FUTURE GOALS

The authority plans to continue expanding its recycled water network and customer base by improving recycled water to suit diverse applications. “As the regulations evolve, there may be opportunities to pursue in potable reuse,” Thornton observes.

The authority has also experimented with capturing urban runoff to protect beaches and lagoons, and redirecting that water to the sewer system for treatment and reuse. “The collection of runoff and first-flush stormwater has to be handled carefully,” says Thornton. “Otherwise it could hydraulically overload the conveyance system or treatment plant, or affect process biology.” The SEJPA operates three low-flow runoff stations that collect dry-season runoff and some limited first-flush flow for treatment.

The authority has started planning to increase

recycled water storage and expand microfiltration capacity. Other capital projects in progress include headworks upgrades, anaerobic digester and dewatering system improvements, and replacement of multistage centrifugal blowers with turbo blowers for process air.

Whatever the future brings, Trees is confident the staff will excel: “Our strength lies in the unity of the group. We work as a team to solve problems and achieve our goals. Our motto is: We win as a team.” **tpo**

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# Rehabilitating Gravity Filters

A DUAL PARALLEL LATERAL CONFIGURATION IN A MEDIA FILTER UNDERDRAIN OFFERS ADVANTAGES IN EFFECTIVE BACKWASHING AND EFFICIENT FILTRATION

By Thomas M. Getting, P.E., BCEE, and John Geibel, P.E.

**G**ranular filter media (effective sizes from 0.5 to 1.5 mm) generally remove particles larger than 7 to 10 percent of the smallest grains. Most water treatment applications try to remove color and all solids greater than 10 to 20 microns. Smaller particles are removed with the help of coagulating chemicals.

In gravity filters, the conditioned raw water is introduced at the top of a basin, flows down through the media bed, and is collected by the underdrain system (Figure 1). The driving force is the distance from the water level over the filter to the first air break, which is usually into a clearwell or control weir.

As solids accumulate in the media, the headloss increases until either the flow cannot be maintained or solids are driven through the filter. At that point, backwashing water or a combination of air and water scours the media and restores the driving force. Backwash effectiveness is measured by the resulting media cleanliness and costs of power and water used for backwashing.

Several studies have shown that an air/water backwash system provides a cleaner media and uses less backwash water than alternative methods.

## THE DUAL PARALLEL LATERAL

The dual parallel underdrain was developed to solve flow distribution problems by providing a primary lateral and two parallel secondary compensating laterals (Figure 2). Control orifices open from the primary lateral directly into the secondary laterals.

Backwash water flows through the primary lateral, rises and discharges through the control orifices into the secondary compensating laterals.

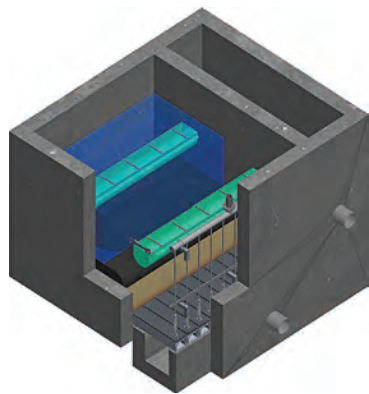


FIGURE 1. In gravity filters, the conditioned raw water is introduced into the top of a basin, flows down through the media bed, and is collected by the underdrain system.

Any unbalanced flow from the primary lateral creates a directly compensating velocity pressure gradient, which puts the secondary lateral into a uniform hydraulic pressure condition throughout its length. This uniform pressure services the top-deck dispersion orifices that discharge from the compensating lateral into the filter box.

In a lateral with equal-sized and equal-shaped orifices along its length, the orifice farthest from the point of admittance delivers the most water. Discharge variances exist in the primary lateral of the dual parallel lateral underdrain; the secondary laterals provide balance.

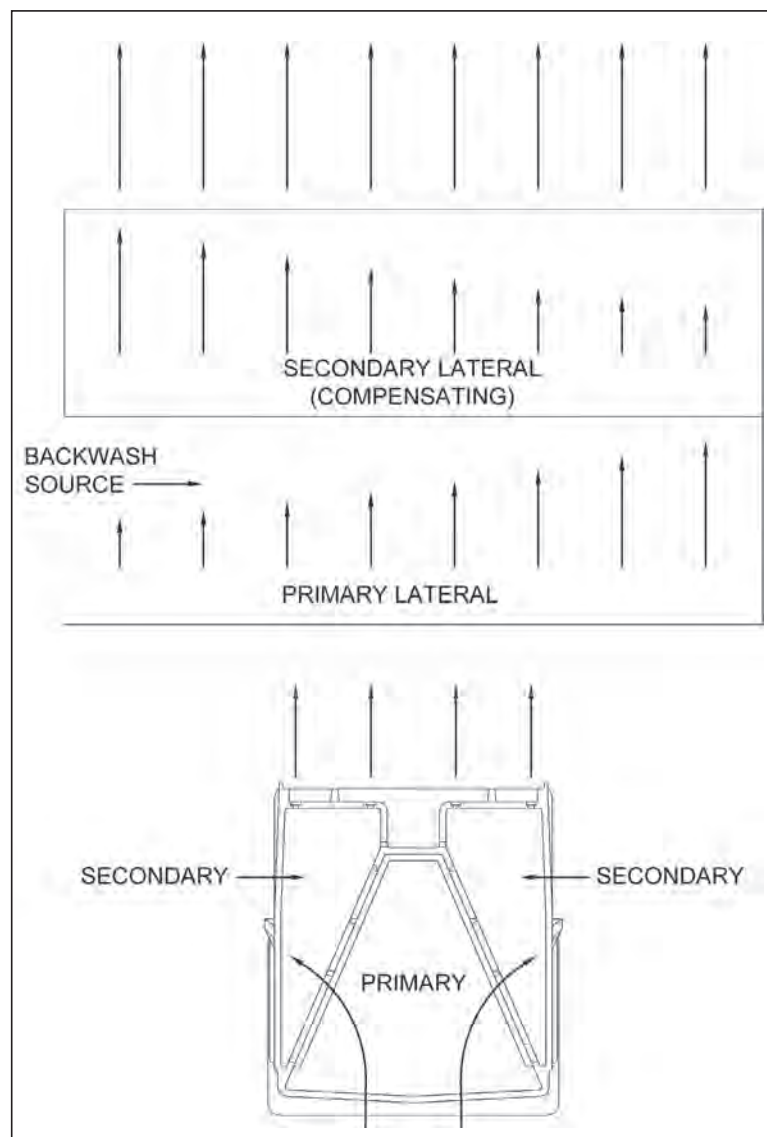


FIGURE 2. The top diagram shows how the secondary, compensating lateral interacts with the primary lateral to provide uniform distribution of the backwash water and air. The bottom diagram cutaway view shows the orifices that distribute backwash water and air between the primary and secondary laterals that provide the flow to the top deck orifices.



The dual parallel lateral has been successfully used in thousands of new and rehabilitated water filter plant installations.

This system provides uniform discharge along the entire length of the lateral. Dual parallel laterals can be sized up to 50 feet long with a backwash maldistribution of less than  $\pm 2$  percent. An additional benefit of the dual parallel lateral is its ability to meter and uniformly distribute air to facilitate backwash.

A baffle in the bell end of the secondary laterals ensures that the air and water metered into each 4-foot section are discharged from that section. Without the baffle, the backwash water tends to push the air up and down the lateral, causing pulsations.

When rehabilitating existing filter systems, many factors must be considered. These include an adequate backwash flow based on the existing backwash system, configuration of the backwash flume, depth and shape of the filter box, and characteristics of the proposed media. In the case of dual media using anthracite and sand, the usual design backwash flow rate is 20 gpm per square foot at 70 degrees F.

## FLUME ARRANGEMENTS

Flume arrangement has a significant impact on rehabilitation cost. The configuration of the backwash flume is one of the major contributors of maldistribution in a filter, along with the underdrain lateral type and the media.

### FRONT FLUME

Figure 1 shows a typical installation of the dual parallel lateral in a filter with a front flume. The backwash water enters the flume, travels into the filter with a front flume. The backwash water is dispersed up into the media, and finally is collected by washwater troughs. The air header piping in the flume uses J-risers to distribute the air to each dual parallel lateral. The air riser's J shape is used to flush any water that accumulates in the bottom of the air header piping as the air fills the header.

### FLAT-BOTTOM FLUME

The flat-bottom flume (Figure 3) is ideal for replacing existing plenum underdrains with an end feed inlet configuration. This design improves maldistribution characteristics while allowing for deeper, more efficient media beds.

Other flume designs are available for rehabilitation, depending on the existing infrastructure design. Figure 4 shows the arrangement used to rehabilitate a false-floor underdrain system. The old floor is removed and the dual parallel lateral underdrain is placed directly on the floor. The water enters the new underdrain layout at the end of the lateral and air is being added using drop pipes mounted on the filter wall.

The configuration of the filter box in a filter rehabilitation influences decisions such as lateral length, flume and underdrain configuration, media depth and selection, and backwash air delivery methods. The designer must fit the backwash flume, the underdrain, the media support, the media, and sufficient freeboard to the backwash outlet to prevent media loss.

Another method of adding media depth or increasing freeboard into an existing filter box is the use of a gravelless support plate instead of graded gravel. Media, such as sand, anthracite or granular activated carbon, can be placed directly onto the surface of the plate. This has the added benefit of eliminating gravel disruption and simplifies media change-out, such as for granular activated carbon reactivation.

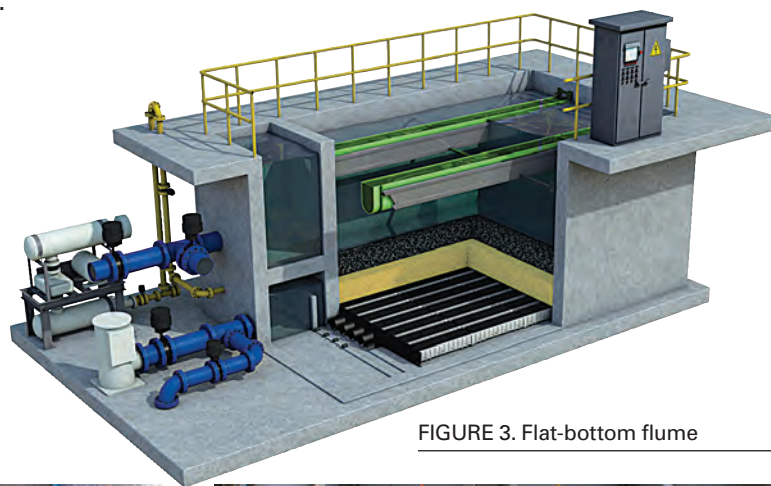


FIGURE 3. Flat-bottom flume



FIGURE 4. Left, demolition of a false-floor underdrain. Right, installation of a dual parallel lateral underdrain.

## CONCLUSION

The dual parallel lateral has been successfully used in thousands of new and rehabilitated water filter plant installations. The compensating secondary lateral has demonstrated excellent backwash characteristics versus other types of single-pass underdrain systems. The closely spaced orifices of the dual parallel lateral improve distribution of backwash air and water, providing better filter media cleaning.

The dual parallel lateral can be easily used to rehabilitate existing filter boxes. A low-profile block coupled with gravelless support plates enables designers to provide more filter depth and improve operating performance, while meeting ever more stringent regulatory requirements.

### ABOUT THE AUTHORS

Thomas M. Getting, P.E., BCEE, is principal engineer - filtration; and John Geibel, P.E., is senior product engineer - filtration; both with Xylem. tpo

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John Adie loves being able to get outside and operate the plant in addition to handling the desk-bound side of things.

### John Adie, Concord, New Hampshire

POSITION: | **Plant operations supervisor**

EXPERIENCE: | **27 years in the industry**

CERTIFICATION: | **Grade IV Wastewater Operator**

EDUCATION: | **Associate degree, earth science, Northern Essex Community College**

MEMBERSHIPS: | **New Hampshire Water Pollution Control Association, NEWEA, WEF**

GOALS: | **Retire to a lake house and enjoy what the profession has done to preserve water quality**





# ON TO NEW CHALLENGES

AFTER A SUCCESSFUL CAREER AT THE WASTEWATER TREATMENT PLANT IN NASHUA, NEW HAMPSHIRE, JOHN ADIE BRINGS HIS EXPERIENCE TO TWO MORE CLEAN-WATER FACILITIES

STORY: **Doug Day** | PHOTOGRAPHY: **Oliver Parini**

AFTER WINNING A PRESTIGIOUS AWARD FOR HIS CONTRIBUTIONS to the industry, John Adie retired from a 25-year career at the wastewater treatment facility in Nashua, New Hampshire.

But instead of transitioning to a life of fishing or golf, Adie chose to spend his retirement supervising two other plants with technologies that are new to him.

Adie received the 2015 William D. Hatfield Award from the New England Water Environment Association. At the time, he was operations supervisor at the Nashua plant. He is past president of the New Hampshire Water Environment Association.

"I've been involved with NHWEA for more than 10 years in different committees, and then 25 years at Nashua working from operator in training up to a supervisory position and being involved in multiple upgrades at the plant," Adie says. He is now plant operations supervisor for the two clean-water facilities in nearby Concord, New Hampshire.

## INTEREST IN ENVIRONMENT

As a youngster, Adie and a good friend were interested in careers as forest rangers. "I always did a lot of hiking, biking and camping and was interested in preserving the environment," Adie says. His friend became a genetics engineer.

Adie earned an associate degree in earth science from Northern Essex Community College and was working on a chemistry degree at Salem State University. A job opened up at a printed circuit board company that included dealing with wastewater. His background fit the job, so he took it, leaving school.



John Adie, operations supervisor

Less than three years later, though, things weren't looking so bright. "A lot of the plating industries were going overseas, and there was a rumor that we would be closing shop," Adie says. "My next-door neighbor worked in human resources at Nashua. She told me there would be an opening at the wastewater treatment facility. I toured the plant, did an interview and got the job. A couple of years later, the circuit board company closed its doors."

## GAINING RESPONSIBILITY

The Nashua Wastewater Treatment Facility is fed by a combined sewer system and has a design flow of 16 mgd, an average flow of 11 mgd, and a peak wet-weather flow of 110 mgd. After starting as an operator in training in 1989, he moved steadily up the ranks.

He became a Grade IV operator 11 years ago. "We don't do the ABC [Association of Boards of Certification] test," he says. "It's a test developed by engineers at the state Department of Environmental Services, so it's more an engineering test than a knowledge test."

He has also taken certifications over the years in management and supervisory skills, and in building and repairing computers. He kept upgrading his license and knowledge because he always wanted to be in management, and he continues studying today. He left Nashua in 2000 to go back to Boston University for Computing Technology

Industry Association A+ certification and to earn a certificate in computer network administration: "I was dabbling in it but really started to like it."

He remembers telling Rick Seymour, plant superintendent and his boss, that he was changing careers: "He sits me down and says, 'Johnny, does your



John Adie likes the challenge of operating facilities with technologies new to him.



wife know about this?’ He wrote me a nice letter of recommendation and wished me luck. I thought I was going to get a job in the field, but then 9/11 happened, and the whole bottom fell out of the industry.”

## BACK TO NASHUA

So, about 12 months after he left Nashua, he was looking for a new job. “With my networking skills, Nashua called and asked if I wanted to come

back and do SCADA work for them,” Adie says. “They were really going to start ramping up the SCADA system and needed someone with networking knowledge. So things worked out for me. I’m a pretty lucky guy.”

As far as Seymour’s reaction upon Adie’s return: “He didn’t say much. ‘Welcome back’ was probably all he said, but with a big grin on his face.” Adie was lead operator when the plant became the only one in the state to install an egg-shaped anaerobic digester. That \$23 million project took two years, and the biogas generated provides about a third of the plant’s electricity. “It also reduced our biosolids by more than 50 percent, so we had a cost savings, and it helped with odors around the plant because everything is self-contained,” Adie says.

That was the most challenging project he has faced in his career. “Learning that process was totally different,” he says. “It took us a long time to figure out how to run the digester. It was a big learning curve, but we had good guidance from the engineers at CB&I, who built the facility.” As lead operator, he worked with the engineers, made sure all the operators understood the equipment, and integrated it with the SCADA system.

## TREATING HIGH FLOWS

Adie was operations supervisor in 2009 when the plant added a \$37 million, 60 mgd wet-weather treatment facility to help reduce combined sewer overflows (CSOs). “The main challenges were keeping track of the contractors, attending the engineering meetings, making sure the construction didn’t inhibit the plant processes, and seeing that everyone was working together getting over any hurdles,” he says. “At the time, the project had the most concrete ever poured in the Northeast. We had concrete trucks coming in for weeks.”

The two-year project increased the plant’s peak capacity from 50 mgd to 110 mgd. “When the inflow level gets high enough, there is a weir that splits the flow to the wet-weather facility,” Adie says. “It has an ACTIFLO system

(Veolia Water Solutions & Technologies North America) that adds microsand and polymer to the water and drops out the solids. With the ballasted floc, we have a clear effluent going into the chlorine contact chamber.”

“It took us a long time to figure out how to run the digester. It was a big learning curve, but we had good guidance from the engineers at CB&I, who built the facility.”

**JOHN ADIE**

The city has spent nearly \$70 million to minimize CSOs, including a \$12 million automated underground combined sewage screening and disinfection facility built in December 2014. That gravity-fed system includes a 1-million-gallon holding tank that stores the overflow for later treatment and provides partial treatment to amounts over 1 million gallons to reduce the impact of

CSOs. Eliminating overflows with such engineered solutions will cost more than \$100 million, while separating all combined sewers would cost about \$250 million.

Just before Adie left Nashua, the plant spent \$4.16 million to replace three 25-year-old blowers with energy-efficient 200 hp Turblex blowers (Evoqua Water Technologies) and upgrade the secondary clarifiers.

## ANOTHER NEW PATH

Shortly after receiving the Hatfield Award in 2015, Adie qualified for his full retirement pension at Nashua and decided to move on. He took the job in Concord in February 2016 and oversees the 10.1 mgd Hall Street and the 1.25 mgd Penacook wastewater treatment plants.

The Hall Street facility is a conventional activated sludge plant with a bioreactor that includes a trickling filter to handle BOD. It also treats 5 million gallons of landfill leachate and 2 million gallons of septage per year. Penacook is a sequencing batch reactor plant, converted from conventional



“That’s probably the best thing about working in this field. The principles pretty much stay the same. You apply them differently to get the same result.”

**JOHN ADIE**

activated sludge when a local tannery closed in 1987. The former primary clarifier and aeration tank are now used for storage during wet-weather flows.

Adie welcomes the chance to work with processes new to him. “That’s probably the best thing about working in this field,” he says. “The principles pretty much stay the same. You apply them differently to get the same result.”

The management skills he learned at Nashua have helped him embrace new tasks, such as issuing requests for proposals. “Project management is important now because plants around the country are going through facelifts,” he says. “Our next one in Concord is a solids dewatering project and we’re looking at adding digestion in the near future.” Both plants are planning major SCADA upgrades, too.

Adie considers himself fortunate because his previous and current jobs allowed him work in the plant even though he had a desk job. That keeps things fresh and lets him to stay involved in operating plant equipment.

In Concord, he is on call one week in every five. That includes doing rounds on weekends, when the plant is unmanned. “So I still get to be an



The Hall Street Wastewater Treatment Plant team in Concord includes, from left, Kristin Noel, Dan Driscoll, Joe Mulleavey, Bob Sleis, Dan Broudeur, John Adie and Rick Tibbits.

operator, and not a lot of people get that,” he says. If they put me behind a desk totally, I’d have to really think about doing it. I still like getting out and involved in the process, flipping switches, trying new things. I’m happy with that. I wouldn’t give it up for anything.” **tpo**

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## MORE THAN JUST GAMES

John Adie has been building his own computers since he was a kid. He does it now to feed his addiction to computer gaming, mainly first-person shooting adventures and a few strategy games: “Just because it’s fun.”

His gaming dates to 1995, when his family got its first desktop computer and he discovered “Doom,” the game that introduced the first-person shooter genre and helped lead development of 3-D graphics, multiplayer gaming and customized software and hardware packages.

Adie spends a couple of hours a night gaming. “While my wife [Anjanette] is watching her reality shows, I’ll be on the computer. Fifty-two years old and I haven’t grown up yet,” he says. His interest in computers and electronics predates his gaming; it was a hobby he shared with his dad, Les.

“We were building stereos and computers way back when you could buy the kits at Radio Shack,” he says. “Then we got the Commodore 64 and I thought that was the best thing I’d ever seen

in my life, because you could actually buy programs for it instead of typing them in, and you could play games with it.”

Guinness World Records lists the Commodore as the highest-selling computer model of all time. Some 20 million were sold, many still in use with a resurgence in retro computer games. It was the most powerful computer of its time in 1982, and cheaper than its competitors. It introduced online gaming in 1988 with the game “Habitat,” which stored graphics on a floppy disk to overcome the limitations of the modems of the day.

As interest in home computers grew, high schools added computing to their curricula. Adie learned the current programming languages: BASIC, COBOL (the first English-like computer language), and FORTRAN (scientific and math language). That set him up well to continue learning through the years. Little did he know that his interest would become an important part of his work resume as computers became integral to the wastewater treatment industry.



# Energy Insights

AN ENERGY AUDIT POINTS THE WAY TO MAJOR SAVINGS IN AERATION AND A HOST OF FUTURE IMPROVEMENTS FOR THE CLEAN-WATER PLANT IN STRATFORD, ONTARIO

By Doug Day

**E**nergy conservation is part of the planning process for the city of Stratford, Ontario. With the wastewater treatment plant consuming more than 20 percent of the city's total energy, it made sense to target that facility.

A free energy assessment conducted by Festival Hydro and the plant operator, Ontario Clean Water Agency (OCWA), showed that more than 60 percent of the 5.7 mgd plant's energy went to aeration through 1,600 fine-bubble diffusers.

## PRECISE AERATION

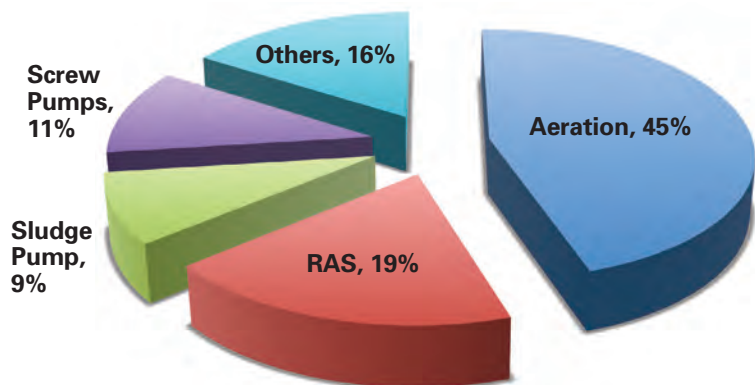
The operations team started there. "We replaced two fixed-speed 200 hp centrifugal blowers with a single 350 hp high-efficiency turbo air blower from APG-Neuros with a built-in variable-frequency drive," says Indra Maharjan, program manager for energy conservation and climate change with OCWA.

"The old blowers always operated at full output and often over-aerated. This caused dissolved oxygen to be 5 to 10 mg/L, when it should have been 2 to 3 mg/L. We were using more air and energy than required, and the over-aeration also caused problems with shearing of the floc, which made the secondary clarifiers less efficient."

Incentives of \$75,200 from Ontario's Save on Energy conservation program helped fund the \$350,000 project. The city expects a return on invest-

“We were using more air and energy than required, and the over-aeration also caused problems with shearing of the floc, which made the secondary clarifiers less efficient.”

INDRA MAHARJAN



More than 60 percent of the Stratford treatment plant's electrical demand was for aeration before the system was upgraded to reduce energy use by 30 percent. The chart above shows the current allocation of energy demand.



A single 350 hp high-efficiency turbo blower (APG-Neuros) now does the job of two fixed-speed 200 hp blowers and saves about \$56,400 a year.

ment of nearly 700 percent over the 20-year life of the aeration system — some \$1.2 million in savings.

Since the equipment went into service in March 2014, the plant has seen better secondary clarifier performance and uses 30 percent less energy for aeration, saving \$56,400 per year on electricity. The savings can help fund future improvements.

## MUCH MORE TO COME

The energy audit was valuable in identifying energy saving opportunities and in helping set priorities. Aeration was the largest, easiest and most obvious target. "Now we have other operational changes and process optimization we need to do in coming years," says Maharjan. "Stratford is a medium-sized municipality so there's always a lack of resources. The projects will be spread out over multiple years."

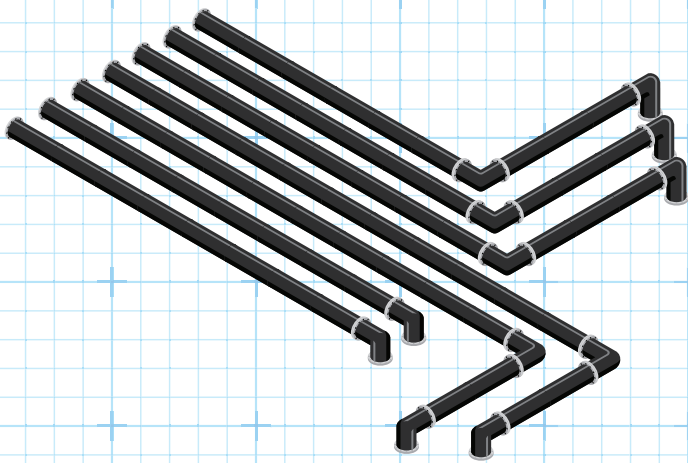
The audit suggested several other upgrades that could improve energy efficiency, all eligible for Save on Energy incentives. Projects include right-sizing pumps, upgrading to high-efficiency motors, and installing VFD controls on other systems, including pump stations, influent pumps, deep well lift pumps, screw pumps, sludge pumps and return activated sludge pumps.

"The city's engineering group is pleased to continue to be part of the Save on Energy program, recognizing the opportunities to upgrade equipment, use less energy and provide more long-term, efficient operations to the city and its residents," says Mike Mortimer, manager of Environmental Services.

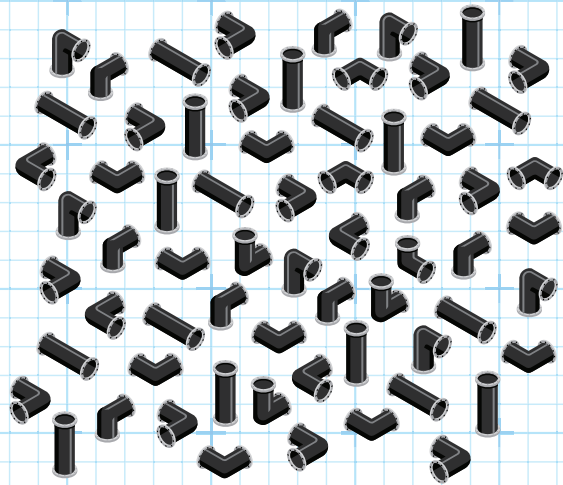
The future projects are expected to have payback periods from two to seven years and provide an additional \$60,000 in annual energy savings. **tpo**



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# When Funds Are Scarce

OPERATORS IN SMALL COMMUNITIES OFTEN FIND THEMSELVES WITH MANY MORE NEEDS THAN AVAILABLE FUNDS CAN MEET. HERE IS A PERSPECTIVE FROM AN OPERATOR IN THAT POSITION.

By Ted J. Rulseh

It's a common tale. A small community's clean-water plant is aging. The operators know it's time to modernize or upgrade. They know what needs to be done, and community decision-makers do, too, but it's hard to find the money to do the work.

James (Jay) Irwin, chief operator of the village of Sherman (New York) Wastewater Treatment Plant, finds himself in that position. The community of 730 residents, about an hour west of Buffalo, needs to replace or significantly improve its 140,000 gpd (design) plant, commissioned in 1978 and never upgraded. Unfortunately, the estimated cost of \$4.2 million is more than the plant's roughly 300 customers could support through higher rates.

Irwin, with the full support of the mayor and four village trustees, is casting about for state or federal funding assistance, so far without success. Meanwhile, despite badly deteriorating plant infrastructure, he and Josh Courtney, assistant operator, consistently meet BOD limits (30 mg/L winter — 10 mg/L summer), and TSS limits (30 mg/L winter — 5 mg/L summer). They achieve more than 99 percent BOD and TSS removal.

Ironically, that excellent performance makes it more difficult for the plant to receive funding from the state's Environmental Funding Corporation. Irwin described the village's predicament and his approach to excellence in operation in an interview with *Treatment Plant Operator*.

**tpo: What is your background in the clean-water profession?**

**Irwin:** My family moved to Sherman when I was 13. I grew up and graduated from high school here. I went to community college for two years, got a criminal justice degree, and worked as a police officer for about four

“Eventually it's going to affect our effluent quality. We can only do so much with what we have. If our tanks fall apart, we won't be able to run our process properly.”

JAMES IRWIN

years. Then the chief operator here, Paul Fisher, was looking for his replacement. He hired me, and I've been here since. New York offers a two-week basic operations course, a one-week activated sludge course and a one-week laboratory course. I took them, passed the state's 1A and 2A exams, and got my 2A operator license.

**tpo: Can you describe the plant's basic treatment process?**

**Irwin:** The collections system flows by gravity to a wet well. A pump station then lifts the wastewater to the head of the plant. After a comminutor it enters the process tanks. We have two tanks but only run one of them.



James (Jay) Irwin, chief operator of the village of Sherman (New York) Wastewater Treatment Plant

They're circular tanks with an aeration zone, a contact stabilization zone, a digester, and a stilling well in the middle.

The plant originally had microscreen tertiary treatment, but that was used for only about two years. About five years ago I converted those tanks to provide additional settling before the flow goes to the chlorine contact tanks. From there the effluent goes into a post-aeration tank, where we have fine-bubble diffusers. We discharge to French Creek.

**tpo: What issues are you having with the plant infrastructure?**

**Irwin:** The plant is pushing 40 years old. On our second process tank, the steel is badly deteriorated. All the concrete is falling apart. We've repaired what we can, but you can't really ever fix that without redoing the whole thing. Our thickener fell apart with the harsh winters we have in this area; now we just use it for holding supernatant. The concrete around the chlorine contact and post-aeration tanks has been repaired numerous times.

**tpo: What about the condition of the process equipment?**

**Irwin:** We have a bar screen, but it's not effective. We clean it manually about once a week. The comminutor doesn't do a very good job. We have



major grease and solids problems. We're always pulling something out of the tanks and getting plugged air lines. Our influent pumps are getting older. They don't handle the solids very well, and they plug up quite often. The pumps are in a small steel room about 20 feet underground that is rusting pretty heavily. We're down there once if not twice a month putting one out of service to clean and declog it.

**tpo: What makes it difficult to accomplish the upgrades you know are necessary?**

**Irwin:** Our budget doesn't allow for any kind of heavy funding. In recent years we've had to borrow money out of the general fund for the things we need — the normal lab work and our regular bills. We raised our rates in the last budget year by 50 cents per 1,000 cubic feet, so we're getting on top of things, but we definitely don't have a reserve.

**tpo: What sources of funding are you exploring?**

**Irwin:** There is funding from the U.S. Department of Agriculture Rural Development program, and I'm working on applying for that. We could potentially get all the money we need, but it depends on how much money is available. There are loans, or grants if we can qualify, but the amount available is limited.

**tpo: Have you explored any other avenues for funding?**

**Irwin:** We could have received a loan through the New York State Environmental Facilities Corporation (EFC), but the interest rate was 2 percent, and we can't afford to borrow the full amount at that rate. We would need to have grant money as part of the package, and we didn't qualify for a grant.

**tpo: Why didn't your facility qualify for a grant?**

**Irwin:** They have a point system, and we came in below the line. That was because of the high quality of our effluent. They said that because of our effluent and the quality of work we do, it doesn't matter what our infrastructure looks like. They said they understand that's a flaw in the system, but there's nothing they can do about it. Essentially, we would have to fail our permit to qualify for higher grant funding.

**tpo: What will happen if your infrastructure and equipment continue to deteriorate?**

**Irwin:** Eventually it's going to affect our effluent quality. We can only do so much with what we have. If our tanks fall apart, we won't be able to run our process properly. Right now we can't even put our second process tank in service while we repair the first tank. It's been suggested that we put in a holding tank, but we don't have enough property to do that. We're landlocked by the creek and by a farm right next to us.

**tpo: How do you produce such good effluent with so little in terms of resources?**

**Irwin:** It's experience. I'll have 10 years in June. I've been chief operator for six years. I had a great mentor in Paul Fisher, my predecessor. He was a really good operator.

**tpo: What are you doing day to day to keep the plant on an even keel?**

**Irwin:** We keep very close track of our mixed liquor suspended solids and our sludge volume index. We watch them daily, and we have the process fine-tuned so that we know what we need to do and when to clean the tanks. We have an extended aeration process, and we have the ability to introduce influent to our tank at different positions, depending on our flow.

**tpo: How do you respond to changes in flow?**

**Irwin:** We don't have combined sewers, but we get a lot of I&I, so we see high flows from heavy rains or from snowmelt in spring. We're able to short-circuit the system to move those heavy flows through without affecting our process. We move our influent port into the contact stabilization zone, so

the flow gets treated quickly. Because it's highly diluted, we don't need as much detention time to process it properly. Then we use the two former tertiary tanks to allow more time for solids to settle out. You could almost call them polishing tanks.

**tpo: What does the future look like in terms of your permit? Will permit changes make an upgrade even more necessary?**

**Irwin:** We may soon have to get down to a lower chlorine residual. That will be hard to do without dechlorination or going to UV. Our ammonia limit is going to change. We will have to meet a limit year-round instead of just in summer the way we do now. We'll have trouble meeting the limit in winter because of the way the process works. We might have to consider chemical addition or adding another tank.

“We do the same job every wastewater department is doing, only with less money. I think that should be taken into consideration under these funding point systems.”

JAMES IRWIN

**tpo: Are your community leaders on board with the need to invest in the facility?**

**Irwin:** They are definitely in favor, but we've got to find the money to do it. I've had a couple of village board members in for a visit. I showed them what's going on, and they fully understand the situation we're in.

**tpo: In your opinion, what should be done to help small plants like yours?**

**Irwin:** I favor merging systems where possible. We have a couple of cases in our county where towns have gone together to form sewer districts. Our neighboring town has a lake with more than 600 properties and no sewer system. I proposed upgrading this plant and having their sewage pumped and treated here. Then we could share the costs and make it cheaper for everybody in the long run. I had an engineering report done to compare what it would cost for them to build their own system versus coming to us. They decided to go on their own.

**tpo: What can be done to help small facilities where combining systems isn't possible?**

**Irwin:** The EFC lists who is receiving money and who has received the 0 percent hardship loans and grants. A lot of those places are big plants treating millions of gallons a day, while little plants like ours that are more in need aren't getting anything. We go above and beyond to make sure we meet our permit. We do the same job every wastewater department is doing, only with less money. I think that should be taken into consideration under these funding point systems. We manage, but with what we have and where we're heading, we're not going to be able to manage forever. **tpo**

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 <b>Blue-White Industries</b> 5300 Business Dr., Huntington Beach, CA 92649 714-893-8529 Fax: 714-894-9492 sales@blue-white.com www.blue-white.com See ad page 2			YES				YES		
 <b>Börrger, LLC</b> 2860 Water Tower Pl., Chanhassen, MN 55317 612-435-7300 Fax: 612-435-7301 america@boerger.com www.boerger.com			YES	YES		YES			YES
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 <b>Dragon Products</b> 1655 Louisiana St., Beaumont, TX 77701 800-231-8198 frac.sales@modernusa.com www.dragonproductsltd.com		YES							
 <b>EBARA Fluid Handling</b> 1651 Cedar Line Dr., Rock Hill, SC 29730 803-327-5005 Fax: 803-327-5097 sales@pumpsebara.com www.pumpsebara.com		YES		YES		YES		YES	YES
 <b>EPIC INTERNATIONAL, Inc.</b> 10993 Richardson Rd., Ashland, VA 23005 804-798-3939 Fax 804-798-9175 try@epicintl.com www.epicintl.com	YES								
 <b>Force Flow</b> 2430 Stanwell Dr., Concord, CA 94520 800-893-6723 925-686-6700 Fax: 925-686-6713 info@forceflow.com www.forceflow.com			YES						
 <b>Gardner Denver</b> 1800 Gardner Expressway, Quincy, IL 62305 217-222-5400 Fax: 217-228-8243 pd.blowers@gardnerdenver.com www.gardnerdenverproducts.com See ad page 37		YES				YES			
 <b>Gorman-Rupp Company</b> 600 S Airport Rd., Mansfield, OH 44903 419-755-1011 Fax: 419-755-1251 grsales@gormanrupp.com www.GRpumps.com See ad page 13		YES				YES		YES	
 <b>Hawkins Water Treatment Group</b> 2381 Rosegate, Roseville, MN 55113 800-328-5460 612-331-6910 john.andren@hawkinsinc.com www.hawkinsinc.com		YES	YES				YES		
 <b>Holland Pump</b> 7312 Wesport Pl., West Palm Beach, FL 33413 800-451-0769 561-697-3333 Fax: 561-683-7247 sales@hollandpump.com www.hollandpump.com See ad page 8		YES		YES		YES			
 <b>IWAKI America</b> 5 Boynton Rd., Holliston, MA 01746 508-429-1440 info@iwakiamerica.com www.iwakiamerica.com		YES	YES				YES		
 <b>JDV Equipment Corporation</b> 1 Princeton Ave., Dover, NJ 07801 973-366-6556 Fax: 973-366-3193 sales@jdvequipment.com www.jdvequipment.com See ad page 29	YES			YES					



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		YES	YES		YES				YES					
		YES	YES											
										YES	YES	YES		
							YES	YES	YES					Vacuum
							YES	YES	YES		YES	YES		
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			YES	YES			YES	YES	YES					
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		YES					YES				YES			
											YES	YES		

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# 2017 **Pumps** TREATMENT PLANT OPERATOR **COMPANY DIRECTORY**

Archimedes/  
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Centrifugal

Chemical Feed

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Deep Well

Dewatering/  
Bypass

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Effluent

Grinder/Sump



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800-225-5457 908-234-1000 Fax: 908-234-9487  
info@komline.com www.komline.com

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www.lakeside-equipment.com

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lmi@precisionflowsystemsleads.com www.lmipumps.com

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YES



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YES

YES

YES



**Milton Roy**  
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miltonroy@precisionflowsystemsleads.com  
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YES



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**NOV**  
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industrial@nov.com www.nov.com/industrial

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YES



See ad page 39

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**ProMinent Fluid Controls, Inc.**  
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YES



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	YES			YES			YES	YES	YES		YES			
	YES						YES		YES			YES	YES	
		YES					YES	YES						
	YES	YES	YES		YES		YES	YES	YES					
							YES	YES				YES	YES	Dry Pit
	YES	YES		YES	YES		YES	YES						
		YES			YES			YES	YES		YES			
				YES							YES			
						YES	YES	YES	YES					
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	YES	YES	YES	YES										
	YES	YES	YES				YES	YES	YES					

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	YES				YES					YES	YES		YES	
										YES	YES		YES	
					YES									
	YES	YES			YES		YES	YES	YES		YES		YES	Chemical Metering Systems
														Remote Monitoring Systems
							YES	YES	YES		YES		YES	Grit
	YES						YES	YES	YES		YES	YES	YES	
	YES										YES	YES		
											YES	YES	YES	
		YES	YES							YES	YES			
											YES	YES	YES	Stormwater
				YES	YES	YES	YES	YES	YES	YES	YES		YES	
		YES	YES								YES			
											YES	YES	YES	Self-Priming



1. The Grit & Grease system has an aerated grit settling channel and a parallel channel where grease floats and is skimmed off.
2. The mechanical drive systems have direct-drive gearboxes to help reduce the time and resources needed for maintenance.



# Double Duty

A TWO-IN-ONE UNIT FROM SCHREIBER REMOVES GRIT AND GREASE FROM WASTEWATER STREAMS IN PARALLEL CHANNELS, HELPING TO PROTECT DOWNSTREAM PROCESSES

By Ted J. Rulseh

**G**rit in wastewater is a well-known nuisance that if not efficiently removed can damage downstream process equipment and cause maintenance headaches.

But grease can cause its own set of issues, such as by forming grease balls in aeration basins and clarifiers that have to be removed manually. A technology from Schreiber is designed to remove both grit and grease in adjoining channels.

The Grit & Grease system has an aerated channel where grit settles to the bottom and is pumped out, along with a parallel channel where grease floats to the surface and is skimmed off. Improvements to the system have enhanced reliability, reduced maintenance, and simplified programming of operations to adapt to specific treatment plant flows and grit characteristics.

Larry Willingham, director of sales processes, talked about the technology in an interview with *Treatment Plant Operator*.

**tpo: What market need drove development of this technology?**

**Willingham:** Grit is a nuisance component of wastewater that can cause abrasive wear on mechanical equipment. A combination of grit and grease becomes even more abrasive. Getting those components out early in the process benefits the operation and maintenance of a facility throughout its service life. A combined removal system is very beneficial. You get both materials out, as opposed to neglecting the grease.

**tpo: How does this system remove the grit efficiently?**

**Willingham:** The primary component is an aerated grit chamber with

“Organics are often bound up with the grit. The turbulence, the roll that we create with aeration, helps slough off the organic material from the grit and keep it in suspension.”

LARRY WILLINGHAM

a traveling bridge carrying a pump for removing grit that accumulates in the bottom trough. Our system differs from a conventional aerated grit chamber using a length-width ratio of 8-to-1 to 10-to-1, versus conventional units with a ratio of about 5-to-1. It has the typical design parameter of a three- to five-minute detention time, but the greater length means more opportunity to accumulate the grit on the floor of the basin.

**tpo: Is the footprint about the same as for a conventional aerated grit basin?**

**Willingham:** It's narrower than a conventional chamber but also longer, and so the overall area is about the same.

**tpo: What is the advantage of a grit channel that is aerated?**

**Willingham:** Coarse-bubble diffusers run the length of the channel. We aerate very heavily at the influent end where the heaviest grit settles out. Organics are often bound up with the grit. The turbulence, the roll that we



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create with aeration, helps slough off the organic material from the grit and keep it in suspension. As the flow travels down the channel, we reduce the agitation so that the finer grit particles can settle out. The system is adaptable to a wide range of flows without deterioration of grit removal because it controls the aeration and agitation independent of the hydraulic flow.

### **tpo:** How is the grit that settles removed from the system?

**Willingham:** A grit pump mounted to a traveling bridge lifts the collected grit to an elevated trough to transfer the grit slurry to a classifier for further washing and dewatering.

### **tpo:** How does the system remove grease along with the grit?

**Willingham:** There are two separate linear channels. One is a deep channel where we settle the grit. Next to that a divider baffle wall protrudes just below the water surface and separates the two channels. The baffle wall keeps the turbulence in the aerated grit channel from transferring to the grease channel. The grease needs a quiescent area where it can float on the surface. The air rolls that agitates the grit and separates the organics also assists in floating the grease to the surface and to the other channel. The grease slips underneath the baffle wall and onto the surface of the grease channel, where we remove it with an air/water skimming mechanism.

### **tpo:** How does the skimming mechanism function?

**Willingham:** The skimming system directs air or water onto the surface and transports the floating grease and scum to the far end of the chan-

nel. There it enters a screw conveyor that runs continuously and rotates very slowly, removing and dewatering the grease. Since the screw conveyor sits at an angle of about 20 degrees, the water drains back down into the structure, and we end up with relatively dry grease balls about an inch to an inch-and-a-half in diameter. The material is very easy to dispose of at a landfill because most of the water has been removed. The volume is reduced tremendously.

### **tpo:** What are some of the latest upgrades to this technology?

**Willingham:** The mechanical drive systems have improved with direct-drive gearboxes. This and other modifications have reduced the time and resources needed to maintain and service the equipment. And a new bridge arrangement makes it much easier to access and retrieve the grit pump for servicing.

“The skimming system directs air or water onto the surface and transports the floating grease and scum to the far end of the channel. There it enters a screw conveyor that runs continuously and rotates very slowly, removing and dewatering the grease.”

LARRY WILLINGHAM

### **tpo:** How much operator attention does this system require?

**Willingham:** The system is highly automated. Mainly, it just needs a periodic visual inspection. Operators have flexibility to use a touch screen to adjust the sequence time for grit pump operation based on the characteristics of the grit. **tpo**



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# Pumps

By Craig Mandli

## Archimedes/Screw Pumps

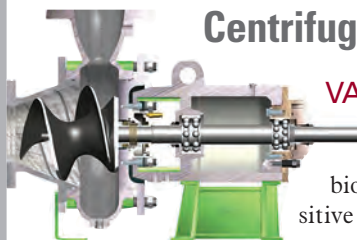
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The tube-mounted screw pump from Schreiber incorporates the Archimedean screw pump concept in a self-contained unit for ease of installation and construction. It transports liquid inside a stationary tube, simplifying design and eliminating grouting. Units are factory assembled and can be set at a fixed angle, or the lower end can be supported by a hoist to vary the pump angle and for maintenance access. The pump provides variable capacity at constant speed. It uses a single-row spherical roller and self-aligning combination radial/thrust lower support bearing. A flanged bearing provides radial support at the upper shaft. 205/655-7466; [www.schreiberwater.com](http://www.schreiberwater.com)



Tube-mounted screw pump from Schreiber

## Centrifugal Pumps



Triton screw centrifugal pumps from Vaughan Company

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Triton screw centrifugal pumps from Vaughan Company handle thick biosolids, large or stringy solids, shear-sensitive fluids, and delicate or highly abrasive materials. They have non-overloading power characteristics, heavy-duty power frames and a flushless mechanical seal.

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Fluid handling products from Hayward Flow Control

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BLUEline Rotary Lobe Pump from Boerger

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The Concertor smart, interconnected wastewater pumping system from Flygt - a Xylem Brand senses the operating conditions of its environment, adapts its performance in real time and provides feedback to pumping station operators. It offers an energy savings of up to 70 percent compared to a conventional pumping system, a reduced inventory by up to 80 percent due to flexible performance, and clog-free pumping operation and clean wet wells saving up to 80 percent in vacuum cleaning costs. Its compact design allows for a reduction in cabinet size by up to 50 percent. It offers a wide performance field from which to choose the right operating point, making the selection simple and facilitating performance fine-tuning. 855/995-4261; [www.xylem.com](http://www.xylem.com)



Concertor pumping system from Flygt - a Xylem Brand

### GRUNDFOS PUMPS SL AND SE



SL and SE pumps from Grundfos Pumps

Grundfos Pumps is extending its SL and SE range of wastewater pumps to include medium, high and super-high hydraulic offerings from 12 to 42 hp. Designed to handle raw, unscreened sewage, effluent and large volumes of surface and process water, the extended selection ensures high pump efficiencies over a wide range of demand and a large free passage of solids at low vibrations. The extended range enables free passage of solids up to 5 inches, which is ideal for large flows of raw sewage. Intelligent and self-adaptive controls allow the pump to adjust to changing operating conditions, while high-efficiency motors meet or exceed global standards. 800/921-7867; [www.us.grundfos.com](http://www.us.grundfos.com)

### POLYLOK PL-CPE4A

The Polylok PL-CPE4A is a submersible 4/10 hp 115-volt single-phase effluent pump with a 2-inch NPT vertical discharge. It has a maximum head of 38 feet and a maximum flow of 56 gpm. The pump is designed with a 3,450 rpm oil-filled permanent split-capacitor motor and has an amp rating of 6.6 for 115 volts, a rugged cast iron housing and volute equipped with a cast iron vortex impeller capable of passing a 3/4-inch-diameter solid. The stainless steel shaft is supported by two single-row oil-lubricated ball bearings. The shaft seal is an inboard seal design with a secondary Exclusion V seal. It has a 20-foot UL/CSA listed power cable suitable for submersible service and fitted with a three-prong plug. The unit is supplied with an integrated clip for the included piggyback mechanical float switch for automatic operation. Other sizes and horsepower are available. 877/765-9565; [www.polylok.com](http://www.polylok.com)



PL-CPE4A pump from Polylok



## Metering Pumps

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Series MP7000 metering pump from Neptune Chemical Pump Company



S Series peristaltic pump from Stenner Pump Company

## Peristaltic Pumps

### STENNER PUMP COMPANY S SERIES

Built to NEMA 4X for demanding applications, the S Series peristaltic pump from Stenner Pump Company interfaces with process control systems through multiple programmable inputs and outputs. Operational modes

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## Progressive Cavity Pumps

### NOV EZSTRIP

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EZstrip progressing cavity pump from NOV

## Solids/Sludge Pumps

### GORMAN-RUPP COMPANY ERADICATOR SOLIDS MANAGEMENT SYSTEM

The Eradicator Solids Management System upgrade kit for Super T Series self-priming centrifugal pumps from Gorman-Rupp Company can handle new sewage, poultry waste, plastic bags, hair and other stringy, clog-prone materials that may wreak havoc on pumps. The system consists of a lightweight inspection cover, a back cover plate incorporating an obstruction-free flow path, and an aggressive self-cleaning wear plate including laser-cut notches and grooves, along with a tooth designed to clear material from the eye of the impeller. It can be easily installed into existing Super T Series pumps in the field. 419/755-1011; [www.grpumps.com](http://www.grpumps.com)



Eradicator Solids Management System from Gorman-Rupp Company



S4THL trash pump from Hydra-Tech Pumps

### HYDRA-TECH PUMPS S4THL

The S4THL 4-inch hydraulic-drive vortex-impeller trash pump from Hydra-Tech Pumps offers 3-inch solids handling and head capabilities up to 210 feet. It can be bolted directly into a pipeline or fitted with a suction hose for underwater dredging. Combined with HT50 to HT75 power units, it is capable of flows up to 1,000 gpm. This safe and variable-speed hydraulic-drive submersible pump can be used where electric power is hazardous or impractical. 570/645-3779; [www.hydra-tech.com](http://www.hydra-tech.com)

### SCHWING BIOSET SMARTEC

The Smartec line of piston pumps from Schwing Bioset easily convey high-viscosity effluent with high solids content. Ideally suited for effluent and organic waste, they are designed for plant managers seeking to lower expenses and increase overall efficiencies. They provide a low lifecycle cost, with standardized control packages that allow for streamlined installation and operation. They can help reduce maintenance, shorten service times and provide a quick return to pumping duty. They include single- or twin-screw feed systems, side or top material feed configurations, a control module allowing for remote or local monitoring and control, and factory skid mounting for quick installation and operation. 715/247-3433; [www.schwingbioset.com](http://www.schwingbioset.com)



Smartec line of piston pumps from Schwing Bioset

## Submersible Pumps

### BJM PUMPS SV SERIES

SV Series solids-handling submersible pumps from BJM Pumps have a nonclog design with vortex impellers. Their vortex action allows for near port-sized passage of solids up to 90 percent of pump outlet diameter. They are designed for the han-



SV Series from BJM Pump

dling of raw effluent and wastewater containing solids, even with high grit content. Industrial applications include pumping high-viscosity liquids, trash sumps, wood chips and other difficult services. They have a 304 stainless steel motor housing for corrosion and abrasion resistance, and are available in sizes from 2 to 4 inches, in 1/3 to 10 hp, with flows to 726 gpm and heads to 48 feet. **877/256-7867; [www.bjmpumps.com](http://www.bjmpumps.com)**

### CRANE PUMPS & SYSTEMS BARNES SOLIDS HANDLING SERIES

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



**Barnes Solids Handling Series from Crane Pumps & Systems**

## Vertical/Lift Station Pumps



**Patz Shaft Drive Pumps, distributed by Screenshot Systems**

### SCREENCO SYSTEMS PATZ SHAFT DRIVE PUMPS

Patz Shaft Drive Pumps, distributed by Screenshot Systems, are vertical pit pumps that can be used in above-ground or underground storage tanks, and include choices of single- or three-phase electric motors. They have high solids and grit capacities with large centrifugal pumps and hardened steel impellers. High capacities include the 3333 Series up to 500 gpm, and the 4444 Series up to 1,580 gpm. They can be deployed in depths from 3 feet to 12 feet 8 inches. The 6000 and 8000 Series have a three-point hitch with PTO drive and can offer up to 3,500 gpm at depths from 6 to 12 feet. They can be used

with an agitator nozzle to mix and pump fast. The 616 vertical prop agitator is capable of mixing at 9,000 gpm, keeping grit and solids mixed at pit depths of 6 to 16 feet. **208/790-8770; [www.screenshotsystems.com](http://www.screenshotsystems.com)**

## Pump Controls

### DSI DYNAMATIC EC-2000

The EC-2000 digital universal controller from DSI Dynamatic is suitable for any brand of eddy current drive. It has the option of being equipped for Ethernet IP communication, simplifying the installation and setup of the controller, and permitting all control communication to be transmitted over a single pair of wires. Compatible devices and protocols include those by Allen Bradley, Omron, Beckoff



**EC-2000 digital universal controller from DSI Dynamatic**

and Modbus/TCP. With this added connectivity, they can be controlled remotely via an internet connection, displaying a replica of the digital keypad on a PC, tablet or smartphone. Alarm signals can be sent via email or text. It also communicates via relay commands and analog 4-20mA signals. It includes serial communication capability via various standards. **800/548-2169; [www.dynamatic.com](http://www.dynamatic.com)**

### GREYLINE INSTRUMENTS PSL 5.0

The PSL 5.0 pump station level controller from Greyline Instruments has redundant level sensing. It includes a non-contacting ultrasonic sensor and can be connected to a loop-powered pressure sensor for redundant sensing in applications with foam or grease. It will continuously recalibrate the pressure sensor and automatically switch back and forth from ultrasonic to the pressure sensor as required. It is designed for lift stations, wet wells and storage tanks. Calibration and relay setpoints are easy to enter through the user-friendly keypad and menu system. An automatic pump runtime logging and reporting system helps operators to plan pump maintenance and identify lazy pumps before they fail. It includes an isolated 4-20mA output and six programmable control relays for pump control, pump alternation and level alarms. An intrinsically safe sensor and a built-in data logger are optional. **315/788-9500; [www.greyline.com](http://www.greyline.com)**



**PSL 5.0 pump station level controller from Greyline Instruments**

### PRIMEX PSLT



**PSLT submersible level transmitter from PRIMEX**

The PRIMEX PSLT provides a reliable and low-maintenance solution for level control applications. The instrument measures the hydrostatic pressure of the water above the sensor and outputs a 4-20mA signal proportional to the level. The transmitter-wetted components are designed to provide an electrical isolation barrier while the protective diaphragm isolates the pressure sensor from process material. It has an industry-standard 4-20mA, is two-wire-loop powered, with an 18/2 shielded cable with vent tube, removable lock-in-place stabilizing weight, and has multiple ranges and cable lengths available. **844/477-4639; [www.primexcontrols.com](http://www.primexcontrols.com)**

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**WS Series pump control panels from See Water**

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bus registers and 12 different digital or analog status conditions including pump status, tank level, flow rate, pressure, temperature, humidity, water leaks and power failure. The system sends alerts via phone, email or text. Users can view data values in real time via sensaphone.net or an iPhone/Android app. All sensor readings are saved in the cloud, which protects against data loss and provides unlimited information storage. The standard system is Ethernet based, but it is also available with a cellular option. **877/373-2700; [www.sensaphone.com tpo](http://www.sensaphone.com tpo)**



**Sentinel PRO cloud-based system from Sensaphone**

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☐ Flygt - a Xylem Brand, Concertor pumping system  
☐ Grundfos Pumps SL and SE pumps  
☐ Polylok PL-CPE4A effluent pump

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By Craig Mandli

## Chemical metering pumps help eliminate vapor lock and loss of prime

### Problem

A military base in California's San Diego County has a water supply and wastewater treatment plant to serve a population of 70,000. Diaphragm metering pumps had been used to inject sodium hypochlorite into the wastewater treatment system. The cycle consists of a suction and discharge phase. During the suction phase, gaseous chemicals were causing vapor lock and causing the pump to lose prime.

### Solution

The pumps were replaced with two **ProSeries-M MD-3 double-diaphragm metering pumps (Blue-White Industries)** for beta testing. In dual diaphragm configuration, when the first diaphragm is in the suction phase, the second is in the discharge phase. This helps create a near-continuous sodium hypochlorite flow, preventing gas buildup and loss of prime.



### RESULT

The pumps delivered the chemical in the high-pressure application and eliminated vapor lock. The pumps injected 12.5 to 18 percent sodium hypochlorite at 5 to 10 gph at 90 to 120 psi. Smooth dosing eliminated the need for a pulsation dampener. The installation was simplified by the pumps' drop-in-place design and built-in controls. 714/893-8529; [www.blue-white.com](http://www.blue-white.com)

## Screw pumps solve high-lift pumping problem

### Problem

The Willmar (Minnesota) Wastewater Treatment Plant needed a single-stage screw pump for 43.2 feet of lift.

### Solution

The plant installed three **Landustrie open screw pumps (EPIC International)**. They pump 8,333 gpm. The pumps, 84 inches in diameter and 74 feet 6 inches long, have solid one-piece ductile cast iron (not welded) upper and lower shafts and flanges, and reinforced flight starts. They use self-aligning bearings.



### RESULT

The screw pumps solved the lift problem, and have run without incident since they were installed. 804/798-3939; [www.epicintl.com](http://www.epicintl.com)

## Chemical feed pumps provide reliable service for ozone pretreatment

### Problem

The 37 mgd William B. Cater Water Treatment Plant in Santa Barbara, California, needed an upgrade to add ozone pretreatment facilities, including a new metering pump system.

### Solution

The plant team chose **Encore 700 metering pumps (UGSI Chemical Feed)** for a durable hydraulic diaphragm and the economy, simplicity and serviceability of mechanical diaphragm liquid ends. It is driven by a rotating crankshaft where eccentricity can be smoothly adjusted during operation. The pump valves operate efficiently and with minimal vibration. Pumps are available in six diaphragm sizes and double simplex capability for capacities to 660 gph and back pressure to 175 psi.



### RESULT

With minor maintenance, the pumps have metered 12.5 percent sodium hypochlorite accurately and reliably. The pumps also deliver the plant's primary coagulant, a viscous blend of aluminum chlorohydrate and polymer that weighs over 11 pounds per gallon and is corrosive to metals. 855/669-3845; [www.ugsichemicalfeed.com](http://www.ugsichemicalfeed.com) tpo

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### 2. GRUNDFOS REMOTE MANAGEMENT SYSTEM

The Grundfos Remote Management (GRM) system provides facility managers and engineers remote access and control to data and alarms from pumps, controllers and auxiliary equipment such as sensors and meters. The secure internet-based system saves time and cost by reducing the need for onsite inspection, and is designed for pump installations in various water infrastructure and commercial applications. A user-friendly interface provides a complete overview of system operation, including energy consumption and performance. Scheduling capabilities help streamline necessary maintenance work and plan who will respond to alarms. **800/921-7867; [www.us.grundfos.com](http://www.us.grundfos.com)**

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## water: product spotlight

### A polymer pump solution

By Craig Mandli

The **FLEXFLO A-100N** polymer pump from Blue-White Industries is capable of handling high-viscosity polymers used in water and wastewater treatment. According to Blue-White President Rob Gledhill, the pump's built-in tube failure detection (TFD) system can help eliminate many of the problems that are often found in polymer feeding equipment.



FLEXFLO A-100N from Blue-White Industries

"Common problems exist with current polymer metering pump technologies used in the industry, including sticking or failing ball check valves, loss of prime, expensive maintenance and rebuild kits, high pulsations, and costly polymer spills due to pump failures," says Gledhill. "By selecting the FLEXFLO A-100N, these problems can be eliminated. A-100NP provides the perfect pump technology to precisely and gently meter polymers."

If the TFD system senses tube failure, the pump will automatically shut off and energize a relay, permitting communication with external equipment, such as a backup pump or alarm. This technology virtually eliminates costly polymer spills and cleanup. In addition, no false triggering is caused by condensation and washdown procedures.

"TFD detects virtually any chemical solution, preventing costly spills," says Gledhill. "The A-100NP is equipped with the ideal wetted materials for use with all liquid polymer feed applications, eliminating potential compatibility problems."

Gledhill points out that the TFD's polymer sensor technology makes a major improvement over Blue-White's older polymer feed pumps.

"The TFD system incorporated in older-model polymer pumps were not able to detect oil-based polymers," he says. "These reengineered pumps incorporate new, sophisticated technology in a revised sensor assembly (TFD+) which enables it to detect virtually any chemical solution."

A-100NP pump models are self-priming. Their tube assemblies are stamped with clearly visible part numbers for simple reorder. They provide precise chemical feed to 124 gph, with a max working pressure of 100 psi. A version is offered with a variable-speed motor, dial knob control and on/off switch, while an alternate version is equipped with a variable-speed motor and a digital control with remote and local control.

Blue-White sales engineer Bill McDowell says the research and development phase of this particular model was extensive, as were testing procedures.

"Blue-White engineers have been working on the development of the new TFD+ sensor assembly for more than a year," says McDowell. "Our customers, representatives, distributors and field service technicians have been asking for this product for a few years now. Early testing and high interest from end users and distributors indicate this product will provide a much-needed solution to a challenge in the field." 714/893-8529; [www.blue-white.com](http://www.blue-white.com)

## wastewater: product spotlight

### Thermal mass flowmeter a fit for biogas systems

By Craig Mandli

**Fluid Components International (FCI)** has expanded and improved its compact thermal mass flowmeter line with a new, advanced electronics design that features the addition of certified HART, Version 7, digital bus communication. The new model **ST51A thermal mass flowmeter** from FCI provides users with an economical yet rugged solution for measuring air or gas flows in demanding industrial applications, including biogas. HART communication offers the benefits of a regular interface, plus the ability to make field configuration

changes if needed, using a standard HART 475 communicator.

"Biogas production is typically a low-pressure and low-flow process," says Steve Cox, FCI's western regional sales manager. "A flowmeter that is used in that process needs to operate over a wide flow range and include low-flow sensitivity."

The ST51A has a wide 100-1 turndown ratio, and has no moving parts. It carries global agency approvals for Div.1/Zone 1 Ex installations, IP67 dust/water ingress protection and rugged, all-metal enclosures.

"Biogas can be very nasty on flowmeters, so it's important that the meter you use be durable," says Cox. "The ST51A works well in damp, dirty environments, so it's a good fit for biogas flow measurement and other moist gas applications."

The transmitter and electronics can be integrally mounted with the flow element or remote mounted up to 100 feet away. Users have a choice of 24-volts DC or 85 to 265 Vac power. The transmitter enclosure is available in either epoxy-coated aluminum or stainless steel, and can be ordered with either NPT or metric threaded cable ports. According to Cox, the ST51A is an updated version of the company's stalwart ST50 flowmeter, which was introduced in 2006.

"The biggest difference in the new model is the HART interface," says Cox. "But the ST51A also operates at higher temperatures."

The ST51A is calibrated to the user's actual process conditions in one of FCI's 19 flow stands using NIST and ISO/IEC 17025 traceable equipment, and is fully temperature compensated. For applications with limited straight-run, it can be supplied with and calibrated specifically for use with Vortab flow conditioners to maintain optimal accuracy. The ST51A also carries a SIL rating, being independently evaluated by Exida and found to meet SIL 1 compliance.

"This is a unit that is configurable, but is designed to be plug-and-play," says Cox. "And, in many applications, you can install it and forget about it." 800/854-1993; [www.fluidcomponents.com](http://www.fluidcomponents.com)



ST51A from Fluid Components International (FCI)

## people/awards

**Adel Banoub**, acting superintendent of the Woonsocket (Rhode Island) Wastewater Treatment Facility won the 2016 Rhode Island Alfred E. Pelouquin Award from the New England Water Environment Association for excellent performance in wastewater operations and significant contributions to the field. Banoub began at Woonsocket as a chemist in 1977.

**Walter Hilbert**, chief of wastewater management for Suffolk County, New York, died of cancer at age 51. He was credited with helping spearhead efforts to reduce nitrogen discharges and protect the area's water resources.

For the 10th straight year, the **Gig Harbor Wastewater Treatment Plant** received an Outstanding Performance Award from the Washington State Department of Ecology for meeting permit standards.

The **Long Beach, Fort Columbia State Park** and **Willapa Regional wastewater treatment plants** were honored by the Washington Department of Ecology for perfect performance in 2015. Long Beach had perfect compliance for the first time in 2008, and since then it has made the list every year except 2012. Fort Columbia achieved perfect compliance in 2009 and 2010. Willapa achieved perfect compliance for the first time in 2014.

**Spartanburg Water**, South Carolina, was named a Utility of the Future Today for performance and innovation at its wastewater facilities under a program developed by the WEF.

**Gary Hanson** won the Wisconsin Wastewater Operators Association 2016 George F. Bernauer Award, the association's highest honor. Hanson has operated many treatment facilities since 1978, and continues to provide education and guidance to operators throughout Wisconsin and the Upper Midwest. He is a project manager and wastewater technician for Short Elliott Hendrickson, which has its corporate office in St. Paul, Minnesota.

New Jersey American Water promoted **Kevin Kirwan** to vice president of operations and **Kevin Keane** to senior director of coastal operations.

**Anchorage (Alaska) Water & Wastewater Utility** received the Engineering News-Record Northwest Region's Water/Environment Best Projects Award and Safety Award.

The Washington Department of Ecology Northwest Regional Office recognized **Bainbridge Island** with the Wastewater Treatment Plant Award for permit compliance and monitoring and reporting.

The **Clayton County Water Authority** won five 2016 awards from the Georgia Association of Water Professionals:

- Wastewater Lab Award (larger than 20 mgd)
- Water Environment Federation Analyst Excellence Award
- Municipal Wastewater WEF Burke Award for Safety (Shoal Creek Water Reclamation Facility)
- Top Maintenance Technician Award
- Top Collection System Platinum Award
- Distribution System Gold Award

The city of **Fremont Wastewater Treatment Plant** received the Scott Wilber Outstanding Facility Award from the Nebraska Water Environment Association for the 12th consecutive year.

## events

### March 1-2

International Conference on Water Management Modeling, Courtyard by Marriott Toronto Brampton Hotel, Ontario, Canada. Visit [www.icwmm.org](http://www.icwmm.org).

### March 6-7

Virginia Water Environment Association Industrial Waste and Pretreatment Conference, Omni Hotel, Charlottesville. Call 757/460-7048 or visit [www.vwea.org](http://www.vwea.org).

### March 7-9

Flint Water Infrastructure Summit, Riverfront Banquet Center, Flint, Michigan. Visit [www.michigan.gov](http://www.michigan.gov).

### March 12-15

AWWA South Carolina Section Annual Conference, Sheraton Myrtle Beach Convention Center. Visit [www.scwaters.org](http://www.scwaters.org).

### March 14-15

AWWA Best Practices Water Audits and Loss Control Programs Seminar, Holiday Inn Express Nashville (Tennessee) Downtown Hotel. Visit [www.awwa.org](http://www.awwa.org).

### March 19-22

AWWA 2017 Sustainable Water Management, Hotel Monteleone, New Orleans. Visit [www.awwa.org](http://www.awwa.org).

### March 20-23

Illinois Section AWWA WATERCON 2017, Crown Plaza, Springfield. Visit [www.isawwa.org](http://www.isawwa.org).

### March 21-22

AWWA 2017 International Symposium on Inorganics, Detroit Marriott at the Renaissance Center. Visit [www.awwa.org](http://www.awwa.org).

### March 21-23

Quebec Section AWWA Annual Conference, Palais Des Congres, Montreal, Canada. Visit [www.reseau-environnement.com](http://www.reseau-environnement.com).

### March 21-24

New Jersey Section AWWA Annual Conference, The Borgata Hotel Casino and Spa, Atlantic City. Visit [www.njawwa.org](http://www.njawwa.org).

### March 26-29

Missouri Section AWWA Annual Conference, Osage Beach. Visit [www.awwa-mo.org](http://www.awwa-mo.org).

### March 29-31

Design-Build for Water/Wastewater Conference, presented by the Design-Build Institute of America, AWWA, WEF and the Water Design-Build Council, Hilton Minneapolis. Call 202/454-7528 or visit [www.wef.org](http://www.wef.org).

*TPO invites your national, state or local association to post notices and news items in this column. Send contributions to [editor@tpomag.com](mailto:editor@tpomag.com).*

The **Isle of Palms Water and Sewer Commission** was recognized as Water System of the Year from the South Carolina Rural Water Association. The commission also received a South Carolina Department of Health and Environmental Control Facility Excellence award and an Award of Merit from *Engineering News-Record Southeast Water/Environment* for the project to replace the Forest Trails Wastewater Treatment Plant.

The National Association of Clean Water Agencies presented **New Orleans; Milwaukee; and Gresham, Oregon**, with Peak Performance Awards for 100 percent permit compliance.



## Mainland Machinery names Edwards senior mechanical engineer

Mainland Machinery has hired Kevin Edwards as senior mechanical engineer. Edwards brings an extensive background in material handling and mining, specializing in mechanical, piping, industrial ventilation and dust control design. For over 34 years, he has provided multinational firms and government-owned companies his expertise in a variety of fields, most notably in mining, metals, oil sands, petrochemical, power generation and industrial fields. Primarily partnering with the company's material handling department, his skills will be utilized in the areas of concept development, engineered solutions, technical designs and project management.



Kevin Edwards

## Singer Valve boosts engineering department with two new hires

Singer Valve announced the hire of Justin Arseneault as instrumentation and automation engineer and Marc Li as applications engineer. Arseneault designs and programs Singer's UL-approved industrial panels, provides customer support for electronic products, is involved in training and research and development, and does much of the technical manual writing. Li is focused on designing and implementing the optimal valve solution for specific customer requirements. He goes into the field to understand the full scope of the project from which he designs the engineering solution and works with the production team to provide the best solution. **tpo**



Justin Arseneault



Marc Li

The **Grand Island Wastewater Division** was recognized at the American Public Works Association, Nebraska Water Environment Association and American Water Works Association conference with the Scott Wilbur Outstanding Facility Award, Silver Safety Award, Scott Wilbur Large Facility Best in Class Award, and the Scott Wilbur Innovative Award.

The **Lancaster Area Sewer Authority** received the Collection System Safety Award and the Plant Operation and Maintenance Excellence Award from the Eastern Pennsylvania Water Pollution Control Operators Association.

**Sid Fredrickson**, wastewater superintendent in Coeur d'Alene, Idaho, retired after 30 years with the city. He began his tenure with the wastewater department in 1991.

**Tom Callaway**, environmental services manager, retired after 34 years with the city of Spearfish, South Dakota.

**Melinda Ward**, superintendent for the city of Eden Wastewater Treatment Plant, received the 2016 William D. Hatfield Award from the North Carolina Water Environment Association.

The **Naval Air Station Whiting Field** water management team earned the Florida Department of Environmental Protection Plant Operations Excellence Award for the fifth consecutive year.

*TPO welcomes your contributions to this listing. To recognize members of your team, please send notices of new hires, promotions, service milestones, certifications or achievements to [editor@tpomag.com](mailto:editor@tpomag.com). **tpo***

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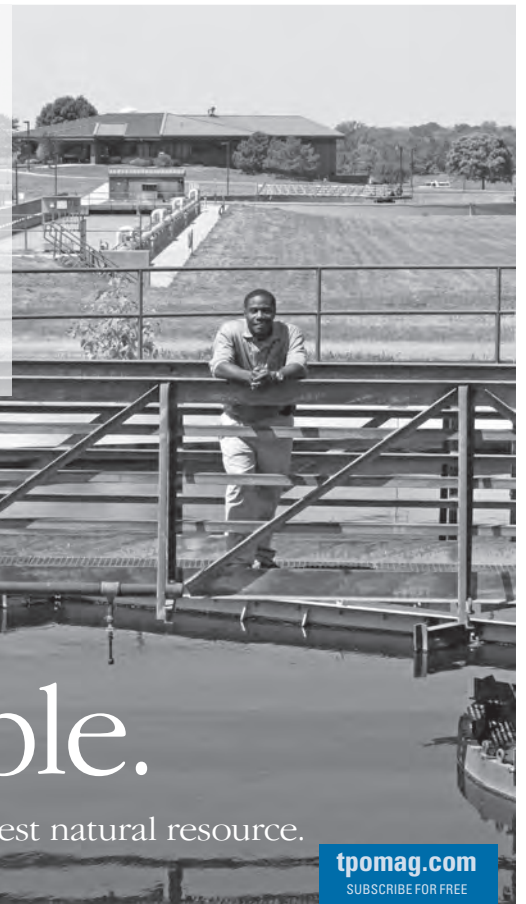


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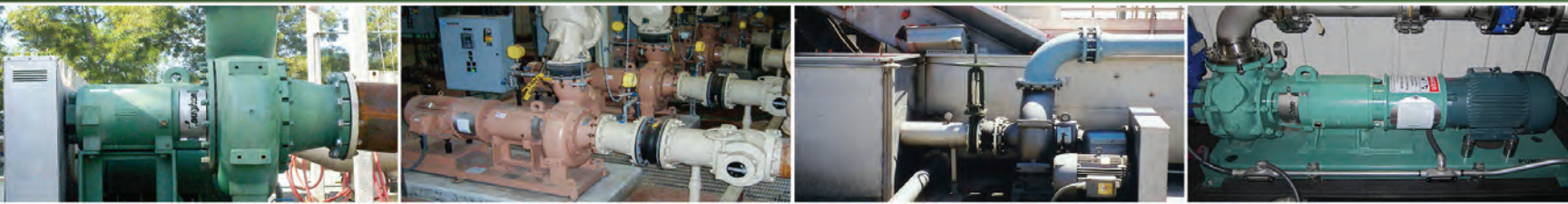
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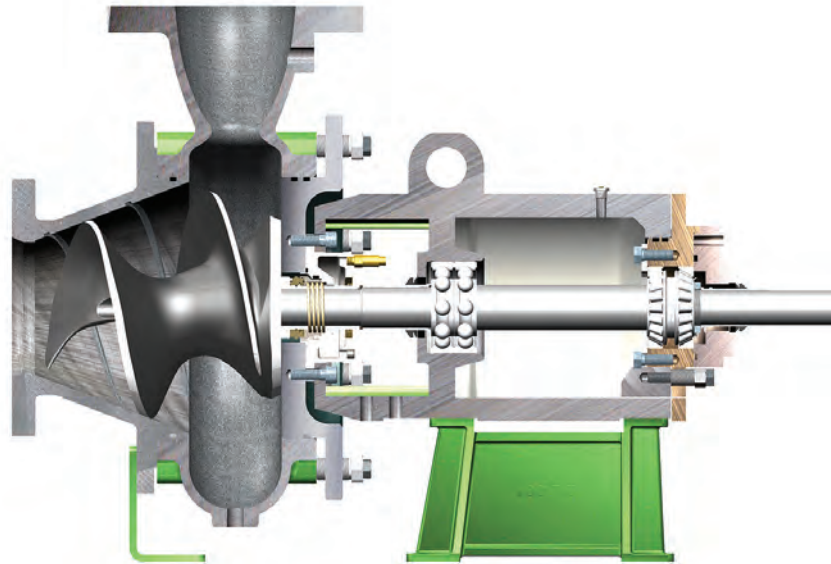
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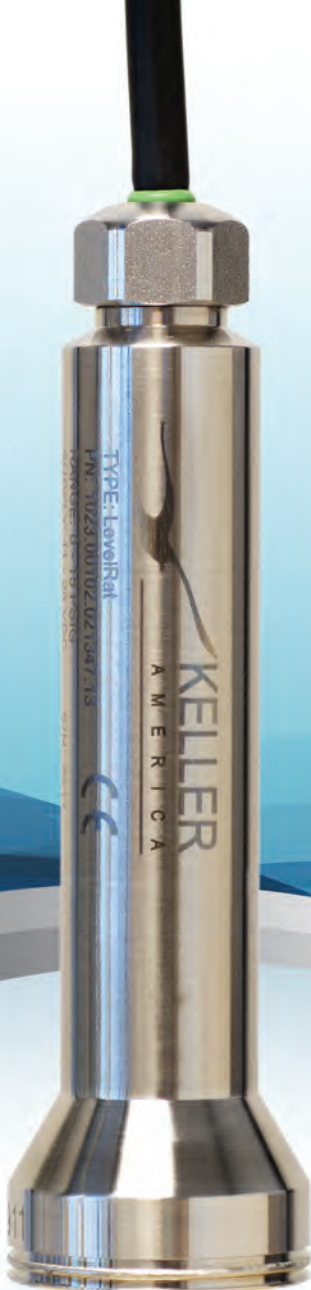


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