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July 2016

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A woman with short blonde hair, wearing a blue zip-up jacket and light-colored pants, is smiling and standing in front of a sign. The sign is for the City of Napa Water Division and features a red top section with a silver leaf logo and the text 'CITY OF NAPA' in gold, and a green bottom section with 'WATER DIVISION' in gold. The background shows a white railing and a building.

SHAKEN, NOT DETERRED

Rapid response and cooperation
with neighboring utilities helped
Napa quickly restore water service
after a major earthquake

PAGE 24

Joy Eldredge, P.E.
Water Division General Manager
Napa Public Works Department
Napa, California

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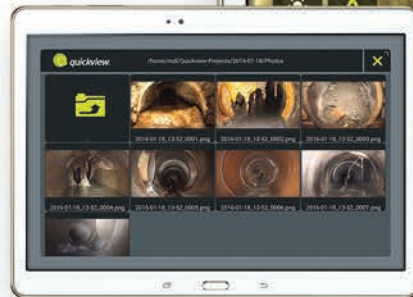
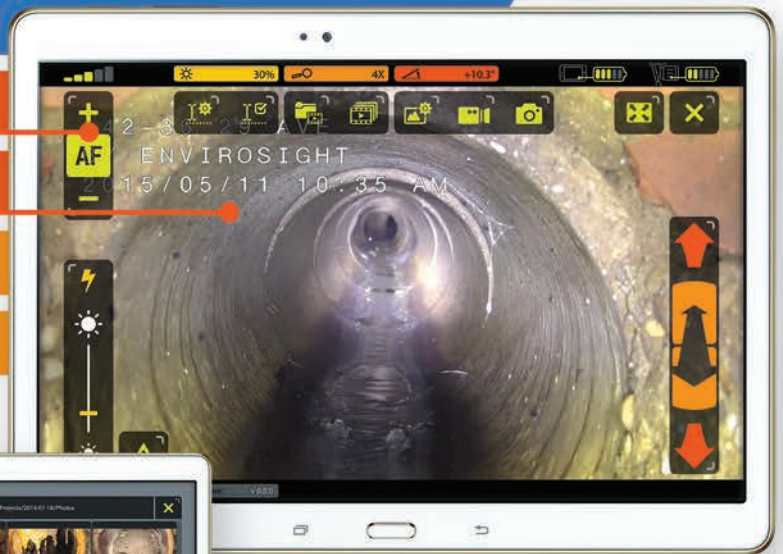
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INSIDE:

CHEMICAL AND MECHANICAL ROOT CONTROL



ON THE COVER:

Napa Public Works Department Water Division General Manager Joy Eldredge, in front of the division's offices, which suffered only minor damage in the 2014 earthquake. (Photography by Lezlie Sterling)



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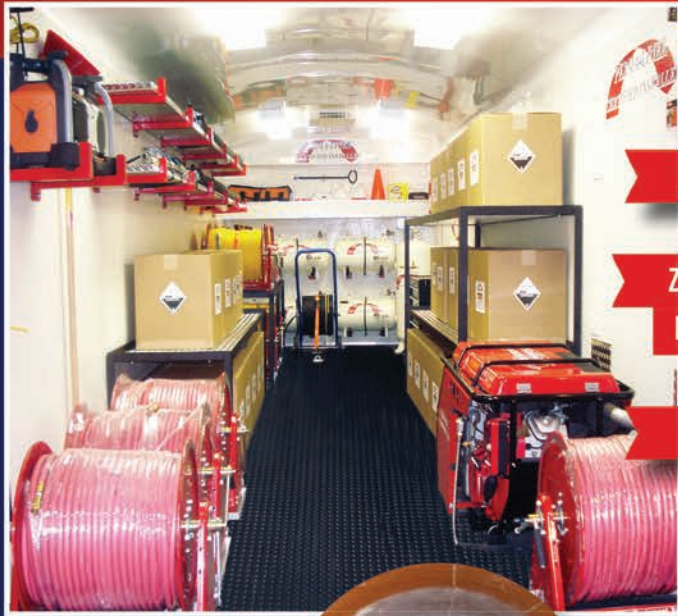
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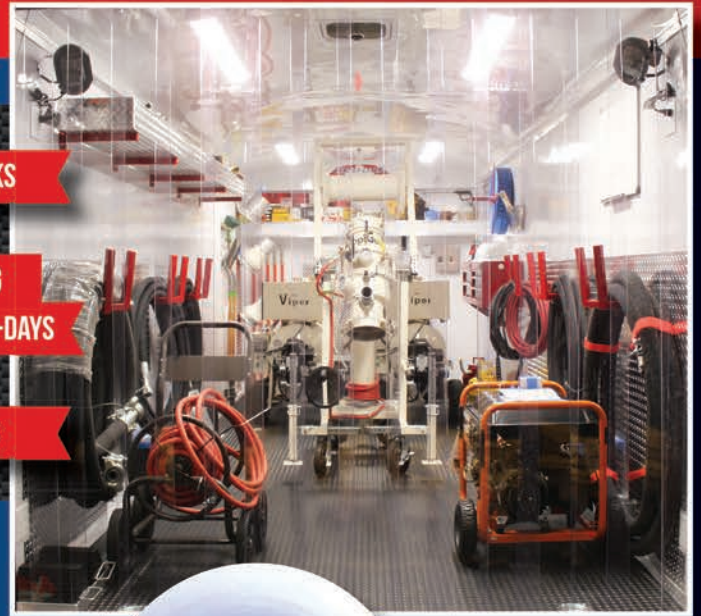
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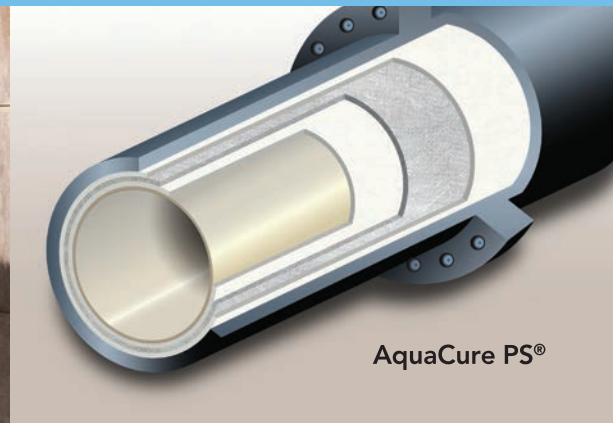


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System operators take on the role of front-line defenders of community health and safety



FROM THE EDITOR

Luke Laggis

When we profiled the Regional Municipality of Wood Buffalo in northeastern Alberta, Canada, in the June 2015 issue of *MSW*, we had no way of knowing it would essentially burn to the ground less than a year later.

Fort McMurray, Alberta, is the urban center of RMWB, and as I write this column in mid-May, it's in flames. The hub of the Canadian oilsands has been wiped out. The whole city has been evacuated. The population has been reduced almost exclusively to firefighters and police. And the water system operators.

According to local news reports, nine members of the water system crew stayed behind when everyone else was evacuated. They too were evacuated for a short time when flames surrounded the water treatment plant, but they returned hours later, determined to do whatever they could to keep the water flowing for firefighters. They wore dust masks and went about

their business, according to a CBC News report, as fire ripped through trees 50 feet from the plant, which was filled with thick smoke.

Water is an essential service, and the team in Fort McMurray takes it to heart, but it's not the only utility crew that has put the health and safety of its community above all else.

The City of Napa (California) Water Division has dealt with Mother Nature's devastating blows, too. The utility, profiled in this issue of *MSW*, was hit hard when the magnitude 6.0 South Napa earthquake struck on a Sunday morning in August 2014.

The epicenter of the quake was in a canyon outside town, but of the local communities, Napa was hit hardest. Streets opened up. Pipes ruptured. Within just a few hours, well over a hundred leaks were reported. To avoid water contamination, the treatment plants were ramped up from 18 to 32 mgd to feed the leaks and maintain positive pressure.

Your community may not border any sensitive waterways. Maybe you've never felt even the slightest tremor or caught a whiff of smoke blowing through the trees, but there are lessons to be learned in all these stories — lessons on preparedness, resilience, fortitude and success.

By Monday morning, crews from the California Water/Wastewater Agency Response Network and other mutual aid utilities were arriving to help. Even as leaks were being fixed, new leaks began to surface. But with crews going nonstop, 120 leaks were repaired in a single week, and exhausted Napa crews finally took a break on the next Sunday.

Just an hour west, on the edge of San Francisco Bay, the Richmond Municipal Sewer District's battle against the forces of nature has been less dramatic but equally important. The utility, also profiled this month, has been fighting direct tidal inflow, groundwater infiltration from tidal saturation, stormwater inflow from connections between stormwater sources (downspouts and sumps) and the sewer system, and rainfall-dependent infiltration.

Your community may not border any sensitive waterways. Maybe you've never felt even the slightest tremor or caught a whiff of smoke blowing through the trees, but there are lessons to be learned in all these stories — lessons on preparedness, resilience, fortitude and success. Understanding how these utilities have dealt with their issues might help you guide your utility through something similar, or it might help you apply the same approach to an entirely different situation.

Regardless of how or when, I hope these stories can help you. Enjoy this month's issue. ♦

Comments on this column or about any article in this publication may be directed to editor Luke Laggis, 800/257-7222; editor@mswmag.com.



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POPULATION BOOM

Denver Seeks Sustainable Water Solutions

The Mile High City has its fair share of water-related challenges to contend with as it envisions a future filled with more Coloradans. Denver Water is on the forefront of that battle, and a proactive multipronged approach will help the state's oldest and largest water supplier meet the needs of its customers for decades to come. mswmag.com/featured



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— *Historic Water Delivery System Goes Online*
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Educating the public is an important part of any utility's public relations program. At Northeast Ohio Regional Sewer District, stakeholders can take a crash course in wastewater management through a new program called "Sewer U." Find out what the course covers and how it's changing public perception. mswmag.com/featured



PUBLIC AWARENESS

Skilled Staffers Put Talents on Display

It's not always easy for Northwestern Water and Sewer District employees to explain what they do for a living. With that in mind, the agency used its annual open house in Bowling Green, Ohio, to host an operations challenge where water and sewer workers got the unique opportunity to showcase their talents for family and friends. For many, it was an experience they won't soon forget. mswmag.com/featured



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KEEPING I&I AT BAY

Richmond Municipal Sewer District sets an example with its work to reduce SSOs and protect San Francisco Bay

By Dan Heim

Richmond, California, enjoys 32 miles of coastline, the most of any city in the San Francisco Bay Area, but this geography has its downside.

“During heavy or prolonged rain events, our treatment plant flow can increase from 5 mgd to 40 mgd,” says Dan Duffield, source control inspector for the Richmond Municipal Sewer District.

The I&I comes from direct tidal inflow in the southern basin near the Bay, groundwater infil-

tration from tidal saturation, storm runoff inflow from connections between stormwater sources (downspouts and sumps) and the sewer system, and rainfall-dependent infiltration. Many Bay Area communities experience similar issues.

“The goal of our sewer collections system master plan is to eliminate SSOs during conditions up to a 10-year 24-hour storm event,” Duffield adds. “That equates to 4.2 inches of rain in 24 hours, and could send 70 mgd to the plant. As

our collections system is repaired and I&I is reduced, that reduction will be the measure of our success.”

Baykeeper agreement

In 2002, the district contracted with Veolia North America (formerly U.S. Filter), a provider of environmental services in cleaning, energy, waste and water. Beginning in September 2014, Veolia now runs the treatment plant and collec-

(continued)



Source Control Inspector Dan Duffield (left) and George Elaro of Infrastructure Engineering Corporation monitor operations at the wet weather storage facility at the City of Richmond (California) Water Pollution Control Plant. (Photography by Lezlie Sterling)

OUT OF SIGHT, OUT OF MIND

INFILTRATION IS OUT OF CONTROL

Every city battles groundwater migration in the sewer system. Infiltration attacks the integrity of underground infrastructure resulting in excess flow, reduced capacity, higher maintenance, shorter lifecycle, and greater expense to rate-payer. Unresolved, the cost to rehabilitate or replace increases exponentially.

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“I’ve always supported the Clean Water Act, knew we had some problems, and wanted to do what was right for the Bay.”

– Tom Butt



PROFILE:
Richmond (California)
Municipal Sewer District

CUSTOMERS:
68,000 (70 percent residential, 20 percent commercial, 10 percent industrial)

SERVICE AREA:
33.7 square miles

POPULATION DENSITY:
2,018 per square mile

INFRASTRUCTURE:
187 miles of 4- to 66-inch pipe (60 percent 6-inch or less), one treatment plant (capacity 16 mgd), 2,637 active manholes, 14 lift stations

ANNUAL BUDGET:
\$12 million capital, \$8 million operational

EMPLOYEES:
22 (treatment plant), 10 (collections system)

AVERAGE PRECIPITATION:
25.4 inches per year over current four-year drought cycle

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Dan Duffield (left) and George Elaro review SCADA information at the City of Richmond Water Pollution Control Plant, shown above.



tions system. It was an auspicious start to I&I management, but more was soon to be needed.

The original master plan was conceived in 2006, when RMSD entered into an agreement with San Francisco Baykeeper, an NGO founded in 1989 to protect water quality in the Bay Area. Baykeeper wields considerable power with extensive grass-roots support — and it was threatening a lawsuit.

“That was a controversial time,” recalls Richmond Mayor Tom Butt. “I’ve always supported the Clean Water Act, knew we had some problems, and wanted to do what was right for the Bay. And the law was on Baykeeper’s side. The EPA counts on local organizations to do their enforcement, so that’s where Baykeeper came in.”

As a result of this agreement, RMSD was required to reduce SSOs by 90 percent by 2016, and to eliminate overflows into the Bay from their two engineered overflow weirs. The 5-million-gallon wet weather storage facility (see sidebar) was also a result of this agreement.

The two weirs separate the sanitary and stormwater systems. During high tide and associated rain events, the stormwater system often backs up. This can result in flow discharging into the sanitary system at rates exceeding 200,000 gph, or cause untreated sewage to enter the stormwater system, which then goes out into the Bay.

Keeping tabs on I&I

In 2010, West Yost Associates was retained to complete a wastewater collections system master plan, delivered in 2011. In 2012, the city contracted with Infrastructure Engineering Corporation to monitor flows at the two overflow weirs, as well as other locations in the system.

(continued)

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STORING STORMS FOR FUTURE FLOW

Even a “normal” rainstorm can dump a lot of water on the San Francisco Bay Area. The Richmond Municipal Sewer District recently invested \$18 million in a storage system to hold much of that water, and keep it out of their treatment plant.

It was pushed on an aggressive timeline. The district used a design-build approach to facilitate the project. Carollo Engineers, the city’s design-build contractor, prepared a number of construction packages that were publicly bid to ensure the lowest cost for the project. Construction began in June 2014.

The RMSD wet weather storage facility, completed in September 2015, has a 5-million-gallon capacity. During a rain event, wastewater is diverted when the flow at the treatment plant exceeds 40 mgd. When the plant returns to a normal flow rate, water held in the facility is directed to the plant’s influent lines for treatment.

The system includes a diversion box, pump station, pipeline and an above-ground circular prestressed concrete tank approximately 150 feet in diameter and 53 feet tall. The tank is located near the treatment plant. It is covered for odor containment, to reduce algae growth and keep out insects and birds.

“We’ve engineered the system for a 10-year 24-hour storm event,” says Aaron Winer, project manager for Veolia North America (contracted by RMSD). “To date, we have not exceeded that capacity.”

“We installed flow monitors on the weirs,” says IEC project manager George Elaro. “Now, if we get close to an overflow on either the sanitary or stormwater pipelines, an alarm is triggered. The I&I is dependent on both rain intensity and tidal events. So tracking rain gauge data and NOAA tidal data is very important to us.”

During a storm event, when the influent flow rate exceeds 22 mgd, wastewater flow is diverted to two basins with a capacity of 1.8 million gal-



Dan Duffield looks over drawings in the Richmond Utilities Department planning room.

“The goal is to utilize more real-time data, as well as historical trend data, when making operational decisions at the plant. The data also guides planning capital improvements to our infrastructure.”

– Dan Duffield

lons. “When those basins are full, a ‘blending event’ occurs,” says operations supervisor Russ Clifton. “Primary treated wastewater is sent to chlorine contact basins and discharged to the Bay. If the flow reaches 40 mgd, then wastewater is diverted to our 5-million-gallon wet weather storage facility. That shaves the peaks off extreme flows during heavy rain events.”

In 2014, IEC contracted with FlowWorks to host the flow data on their servers. This allows RMSD staff to view the data on a near-real-time basis during storm events. Initially, FlowWorks supplemented the monitoring of plant data such as influent and effluent flow rates, wet well level, and the time, duration and volume of bypass or diverted wastewater.

FlowWorks now incorporates data from the flow monitors, a rain gauge, NOAA tidal charts, and SCADA output from the treatment plant. What RMSD gets is a real-time graph incorporating all that information. With this data, the operations staff gets a better picture of a storm’s impact on their system.

“The goal is to utilize more real-time data, as well as historical trend data, when making oper-

ational decisions at the plant,” Duffield says. “The data also guides planning capital improvements to our infrastructure. A peripheral benefit is that FlowWorks allows multiple users access from any location with an internet connection.”

Lateral program

RMSD also initiated a residential sewer lateral inspection program in 2006. All property owners must obtain a Certificate of Lateral Compliance at the time and in the manner required by the Richmond Municipal Code. That includes:

- Title transfers
- Subdivision of properties containing one or more structures
- Remodels adding two or more sanitary plumbing fixtures

“On a first-come, first-served basis, the city will reimburse residents 50 percent of the cost of the lowest bid submitted,” says Mary Phelps, RMSD source control inspector. “Three bids are required, and reimbursement can be up to \$3,000, but the program is ultimately subject to our annual budget of \$100,000.”

The district subsequently approached 30 major

industrial facilities in the southern basin near the Bay to evaluate and replace their antiquated private sewer systems. Many of them had been installed before 1970. Tidal infiltration in this area was causing sewer capacity issues. This effort, along with targeted point repairs, resulted in a significant reduction of inflow at the treatment plant — from 7 mgd to 5 mgd. The ongoing drought has also played a role in that reduction.

“We’ve seen a big reduction in SSOs this year,” says Duffield. “In 2012, we had 47 SSOs. The Baykeeper limit was then 114. In 2015, we had 21. The Baykeeper goal is 16. We amended our lateral ordinance in 2014, and now require property owners to evaluate their laterals if the system is more than 15 years old.”

Part of the master plan was to enact the ordinances conferring RMSD the authority to require inspections. The City Council granted that power in 2006. RMSD now issues compliance certificates after vetting any inspection or new build.

Of course, keeping point-source stormwater out of the system is also important, and some customers are still diverting downspouts and sumps into the sewer lines. “We have a credit program that allows customers to save on their rates, and we require approved drainage plans on all new builds,” Phelps says.

RMSD offers customers three-year credits of up to 50 percent on their stormwater rates for installation of rain gardens, vegetated filter strips, on-site storage (such as rain barrels and cisterns) and pervious pavement. It’s a popular program, promoted with bill inserts and featured prominently on the RMSD website.

Strategies for success

Duffield says there are a few things worth noting from the district’s experience, including the development and implementation of their master plan, and their lateral program with residential, commercial and industrial property owners.

“The data is also a large part of our success. Doing all the monitoring and pulling it into a web-based platform like FlowWorks really helps us understand what our system is doing, and to

make the right decisions.”

Infrastructure Administrator Patrick Phalen notes that the process includes incorporating sewer lateral data into the GIS with existing maps, and requiring maps to be submitted for new sewer laterals.

“We have the size, type and condition of pipes, manholes, clean-outs, lift stations, elevations, connections to the public sewer system, as-built diagrams, historic documents, inspection videos and modeling software,” Phalen says. “It’s our geodatabase repository.”

RMSD operates a continuous collections system inspection program, utilizing flow monitoring, video inspection and situational smoke testing. The rough schedule is 10 percent of their system each year. Their service area is essentially “built out,” so they rarely need to incorporate additional infrastructure.

“Here’s what it comes down to,” says Duffield. “We educate the public to treat their sewer laterals like any other asset — it might not be as visible as the roof on your house, but if it’s leaking you still gotta fix it.” ♦

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The Lucid Energy turbine system being used by the Portland Water Bureau meets international standards for use in potable water systems. (Photo Cathy Cheney, Portland Business Journal)

TURNING PRESSURE INTO POWER

Hydroturbine system in source water pipe generates substantial electricity while serving the function of a pressure-reducing valve

By Doug Day

The Portland (Oregon) Water Bureau is using a different kind of hydropower to generate electricity, tapping the energy of water flowing through its pipes. Online since January 2015, four 50 kW hydrogenerators make enough electricity to power up to 150 homes for a year.

The bureau installed a turbine system from Lucid Energy, also of Portland, as part of a \$150 million upgrade to its system. The 200 kW Lucid-Pipe Power System will generate an average of 1,100 MWh per year.

Dual function

Bill Kelly, Lucid president and CEO, says the four turbines are installed across 50 feet of a 42-inch gravity-fed pipe that delivers 57 mgd from a new reservoir. “We were willing to finance it and take on the operation and maintenance, and we

“Water and energy are closely linked. The LucidPipe system enables us to contribute to generating electricity for our community in a clean, low-cost and renewable way.”

– David Shaff

negotiated with Portland General Electric to buy the energy,” he says.

Each turbine has five blades with a stainless steel shaft inside the pipe. The power components (Siemens) are outside the pipe. The minimum flow requirements are 20 cfs at 40 psi. Each turbine reduces head pressure by just 1 to 5 psi. That allows them to be installed in series four diameters apart.

For the water utility, the turbine system serves the same function as a pressure-reducing valve. “It operates upstream of the valve to take that energy they’re otherwise burning off through the valve and turning a turbine to produce electricity,” says Kelly. The utility also benefits from sensors in the turbine system that continuously monitor pressure and other metrics.

First of its kind

The Western Municipal Water District in Riverside, California, has also installed a LucidPipe system, but the Portland project is the first in-pipe hydropower installation to have a 20-year power purchase agreement, according to Kelly. In that time, it will generate about \$2.5 million worth of renewable energy to pay for development, installation and operations.

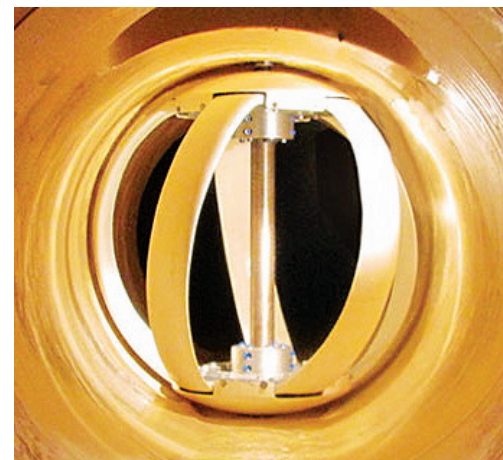
“We welcomed the opportunity to explore the innovative use of a pipe delivering water to create hydroelectric power as well,” says David Shaff, Portland Water Bureau administrator. “Water and energy are closely linked. The LucidPipe system enables us to contribute to generating electricity for our community in a clean, low-cost and renewable way.”

The entire project was funded by Harbourton Alternative Energy and cost the city nothing. All the electricity is sold to the local utility, Portland General Electric, at 8 cents per kWh, with a 4 percent annual escalation. Profits are shared by Harbourton and the Portland Water Bureau.

After 20 years, the utility will have the right to own the system, which has a life expectancy of 40 years. At that time, the bureau could continue to sell the electricity or use it to power its own equipment.



The electrical generating systems were part of a Portland Water Bureau \$150 million upgrade. Lucid Energy financed the installation and sells the electricity to the local utility, Portland General Electric. (Photo Sherri Kaven)



LEFT: Four turbines were installed across 50 feet of a 42-inch gravity-fed pipe, producing enough electricity to power up to 150 homes for a year. (Photo Sherri Kaven) ABOVE: The LucidPipe turbine requires flows of at least 20 cfs at 40 psi. Each turbine also acts as a pressure reduction valve, reducing head pressure by 1 to 5 psi. (Photo Lucid Energy)

“Water agencies are very interested in what we’re doing,” says Kelly. “They don’t have a lot of capital. They’re just trying to keep their infrastructure functional. That’s why we’ve had to innovate on the business model. There is a lot of private capital available that water agencies haven’t tapped.”

“Water agencies need to figure out how to monetize their single biggest asset, which is their pipes. We see LucidPipe as a tool they can use to work with large energy companies that have the know-how and also good balance sheets. Everybody wants to be greener and cleaner, but how

do you afford it?”

Proving the technology

Lucid is not the first company to develop such small hydroturbine products. Its in-pipe comes from an effort by three scientists to develop an efficient turbine to place in a river or stream. “What they found is that it’s very difficult to predict the flow of water in a river or stream,” Kelly says.

“The head of our engineering group got the insight that if you took the turbine and put it inside a pipe, you’d be able to control the con-

ditions, predict the energy output and do it without any environmental impact. It’s not weather-dependent. It’s a very predictable source of low-cost electricity.”

Lucid took the idea to Northwest Pipe of Vancouver, Washington, about five years ago. The two developed LucidPipe, which has systems for pipes 24 inches and up. “The challenge when you’re introducing a new product is that it’s hard to find people who want to be the first,” Kelly says. “Now we have two installations in the United States and are overwhelmed with the interest from around the world. In the future, we believe this will become a standard way that people manage water infrastructure.”

Why not more?

The company is working on turbines for use in small distribution pipes that could power local monitoring systems and distributed sensor networks. “Water agencies could have early warning systems about what is happening inside their infrastructure and get real-time information about the quality of the water, where the water is going,” Kelly says. “We can help home in on where water is being lost so they can attack that problem directly.”

The LucidPipe products meet NSF/ANSI Standard 61 for use in potable water systems and are suitable for wastewater utilities and other large water users, such as industrial facilities and farm irrigation systems. “The potential for the technology, I think, is quite large,” Kelly says. “There’s going to be an enormous investment in water infrastructure over the next 20 years, and using a system like this will enable water agencies to be more efficient about how they manage their pipelines.” ♦

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A PRESCRIPTION FOR TOXIC TALK

Don't let your workplace suffer from a bad case of employee negativity

By Ken Wysocky

Few workplaces are total negativity-free zones. Even the best places to work can suffer from the occasional corrosive effects generated by drama queens, whiners, gossipers and bullies.

But all too often, managers go into denial mode when they encounter such behavior. They either don't know how to confront the problem or figure that it's just impossible to change people's behavior and thus soldier on, which only makes other employees resentful about the lack of action. Or perhaps the problem employee is, ironically enough, a top performer, which gives the manager little motivation to confront the issues at hand.

The end result? Good employees leave, unable to bear the toxic environment created by a problem employee. Morale sinks. Productivity declines. And word gets around, which can derail an organization's recruiting efforts.

"Negativity is counterproductive in almost every way," says Marie G. McIntyre, a nationally known management consultant, employee coach (www.youofficecoach.com) and the author of *Secrets to Winning at Office Politics: How to Achieve Your Goals and Increase Your Influence at Work*. "The shame of it is that the employees that leave usually aren't the negative ones. So the irony is that by not acting on the problem, you end up keeping just the complainers and whiners."

Managers lack training

One of the biggest culprits in this vicious circle is managers that are ill-equipped to handle problem employees for lack of training, or that are so weak-willed that they'd rather just avoid confrontation. "There are just too many wimpy managers out there," McIntyre asserts. "They're usually nice people, but they're afraid to use the authority conferred by their position when they need to."

Some managers even inadvertently encourage further bad behavior. As evidence, McIntyre recalls a manager who complained to McIntyre that she often had to do the work of an employee who was a total on-the-job slacker; she was also upset because she couldn't convince her boss that there was a problem. "Of course she couldn't — all the work was still getting done," McIntyre says. In another instance, a manager told her that he actually let a problem employee vehemently complain about various and sundry issues for 1 1/2 hours.

"That only encourages someone to complain even more," she points out. "You should always listen to your employees, but once you get tired of hearing them complain, you've probably been listening to them too long. You've got to figure out a better way to have a conversation."

To deal with negative employees, McIntyre suggests adopting six strategies aimed at changing behaviors and creating a more positive workplace for other employees:

- **Stop rewarding behavior you don't want.** (See examples above.)
- **Address problems as they arise.** If you don't, odds are they'll turn into something even worse. Moreover, failure to deal decisively with problem employees only weakens other employees' faith in your managerial skills.
- **Be a coach, not a critic.** "Coaching is one of the most important skills a manager needs," McIntyre says. "You're responsible for getting results from employees, just as the coach of a sports team is responsible for getting results from players. But few people are born to do this — it usually requires training."
- **Describe problem behaviors specifically.** Just telling someone that they're negative is too general; they may not know what that means, which prevents them from doing anything about the problem at hand. As such, it's critical to provide specific examples as well as the resulting negative side effects.
- **Focus on the business angle.** Don't center the discussion on personalities; that's a no-win proposition. Instead, point out how certain behaviors hurt your utility — perhaps note how they damage relationships with customers, for example, or curtail teamwork and collaboration with colleagues.
- **Keep your cool.** If you get angry or upset during a meeting, you're acting like a child, too. "You need to snip the wires to your hot buttons," McIntyre suggests. "You need to act like an adult and deal with things in an adult manner. If they push your buttons and you react, you've lost control of the situation."

Collaborative effort

Most of the above strategies can be employed during what's known as a two-way problem-solving discussion. "It's not a forum for criticizing or lecturing," she explains. "It's about sharing observations about what you've noticed and putting them in the context of business issues — don't make it personal."

The meeting should include an explanation of what things have to change; setting clear expectations is critical. Then develop some strategies that can be used to make things different going forward. It's also essential for you and the problem employee to agree on these action

We invite readers to offer ideas for this regular column, designed to help municipal and utility managers deal with day-to-day people issues like motivation, team building, recognition and interpersonal relationships. Feel free to share your secrets for building and maintaining a cohesive, productive team. Or ask a question about a specific issue on which you would like advice. Call editor Luke Laggis at 800/257-7222, or email editor@mswmag.com.

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steps as well as arrange follow-up meetings where you can discuss how things are progressing.

"Follow-up is critical," McIntyre says. "Too many managers view these coaching sessions as one-and-done things. But people just don't change their behaviors that easily or quickly, so follow-up is essential." Furthermore, a lack of follow-up may prompt the employee to think you don't take the issue seriously, which removes any incentive to change.

What if this strategy doesn't work? Even closer supervision and more frequent coaching sessions may be required. And if things don't improve after that, and the issues are serious enough that the person can't get the job done and hampers colleagues from doing so, too, more drastic action is required. "Maybe they're just not a good fit for the job," McIntyre says. ♦

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SHAKEN, NOT DETERRED

Rapid response and cooperation with neighboring utilities helped Napa quickly restore water service after a major earthquake

By Peter Kenter

The magnitude 6.0 South Napa earthquake struck Northern California in 2014, killing one person, injuring 200, destabilizing hundreds of buildings, buckling pavement, shearing water pipes and damaging other critical water infrastructure. Despite the devastation, the City of Napa Water Division quickly rolled into action with the assistance of neighboring utilities to stabilize the system and restore services — all within a week.

“It’s an interesting town,” says Water Division General Manager Joy Eldredge, who has been with the utility since 2006. “It’s the largest community in Napa Valley and is only an hour’s drive

from San Francisco, yet it’s surrounded by vineyards and has a rural feel.”

The city’s water system harkens back to 1883 and now incorporates 370 miles of pipe, nine pump stations, 12 storage tanks and three water treatment plants.

The water delivery system consists of pipes ranging from 4 inches in diameter up to 42 inches for the largest transmission mains. They’re made of a variety of materials, including welded steel, cast iron, ductile iron, asbestos cement, reinforced concrete pipe and newer PVC. The oldest parts of the system are roughly 70 years old.

The city derives its water from three sources,

and also purchases recycled water from the Napa Sanitation District, an independent special district that provides wastewater services to the city and other customers.

An emphasis on improvement

Most of Napa’s new development involves infill housing and subdivisions, so water system work tends to favor upsizing and improvement. In 2012, the utility replaced almost 7,500 feet of transmission main with 24-inch PVC. In 2013, the utility employed horizontal directional drilling to replace and upsize a number of under-highway mains to improve water circulation.

(continued)

The Edward I. Barwick Jamieson Canyon Water Treatment Plant in Napa, California. (Photography by Lezlie Sterling)

“We experienced some aftershocks, and for the next six months we experienced another 120 leaks, most of them in the same area that was hardest hit. Our crews worked a lot of overtime right through Thanksgiving.”

– Joy Eldredge



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Water Division engineering assistant Tonya Espinoza looks over plans on the conference room floor.



“Our bookshelves were intact, but every book had been thrown on the floor. Somewhere on the floor was the binder for our emergency plan.”

– Joy Eldredge

Although the effort is in its early stages, water system mapping is being gradually converted from AutoCAD using Esri ArcGIS as part of the city’s asset management plan.

System maintenance represents a high priority. Although crew members use acoustic leak detectors to pinpoint water loss, leaks are usually easy to spot.

“The pipes are buried between 3 and 5 feet belowground, the minimum coverage required to protect them,” says Eldredge. “At that depth and with dry soil, if there’s a leak, someone will report it quickly — either staff or citizens.”

Distribution system crews handle most pipe repairs. They’re adept with anything from clamps, transmission couplings and sleeves to welding in larger sections of pipe to replace mains damaged by lateral fissures and splits.

The earthquake hits

Those skills proved valuable two years earlier when the earthquake turned the water system into a temporary sieve. The quake hit town on Sunday, Aug. 24, 2014, at 3:20 a.m.

“The epicenter of the quake was out of town

in American Canyon,” says Eldredge. “But the earthquake radiated and hit some geological formations so that our community was hardest hit. It came up in the west side of town, opening up streets and creating two new faults.”

Eldredge arrived at utility headquarters at about 6:45 a.m. Electrical service had been interrupted and she required a flashlight to hunt through the darkness.

“Our bookshelves were intact, but every book had been thrown on the floor,” she says. “Somewhere on the floor was the binder for our emergency plan — although most of our planning was for floods, which occur every five to seven years.”

Computers were removed from the office and set up at the designated emergency operations center at the utility’s corporate yard. Cellular and landlines were intact, although incoming calls sometimes overwhelmed city phone circuits.

Quick inspection by utility crews revealed that all dams, water treatment facilities and transmission mains were operational.

Ramping up pressure

To avoid water contamination, the treatment

PROFILE:

City of Napa (California)
Water Division

FOUNDED:
1883

POPULATION SERVED:
25,000 connections/80,000 customers

AREA SERVED:
Approximately 100 square miles

DEPARTMENT STAFF:
54

WATER INFRASTRUCTURE:
370 miles

ANNUAL DEPARTMENT OPERATING BUDGET:
\$26 million

ASSOCIATIONS:
American Water Works Association,
California Water/Wastewater Agency
Response Network

WEBSITE:
www.cityofnapa.org

plants were ramped up from 18 to 32 mgd to feed the leaks and maintain positive pressure.

In some areas where the SCADA system was providing no feedback due to electrical outages,
(continued)



I was installed in 1963.

I have three
bad cracks.

Two of my
taps are backwards.

When I was installed they didn't
backfill properly.

When it rains I overflow.

I haven't been cleaned in four years!

I am 532 feet long.

I have eight laterals.

Someone installed a tap with a hammer! My joints are pulled.

I was low bid. I will fail in two years!

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Water pours from an open street fault in the Browns Valley area of Napa the morning after the magnitude 6.0 South Napa earthquake in August 2014. (Courtesy of City of Napa)



“The relief crews came through the gate like the cavalry on Monday morning. By then we had determined that we were dealing with 90 actual leaks.”

– Joy Eldredge

crews also put boots to the ground to investigate. Crews found that the roof of the city’s million-gallon Browns Valley water storage tank had been

damaged by the shock, which had created 6-foot waves inside the tank.

“The roof was made of corrugated metal and redwood support beams,” says Eldredge. “A wooden splinter became jammed in a valve, which was stuck in the open position, and the tank drained into the system in just a few hours.”

Crews were also dispatched to provide a generator for one pumping station affected by the power outage.

“We wanted to be sure that a second pumping station could take over if the generator failed,” says Eldredge. “We quickly outfitted it with variable-frequency drives so that it could effectively feed the zone if the first one failed.”

Leak reports were being handled through a dedicated phone line. In a typical year, the utility experiences between 80 and 110 leaks. By 9 a.m. on Sunday, 120 had been reported.

“The phone was ringing off the hook,” says Eldredge. “We were putting leak reports onto a spreadsheet and trying to get street addresses

because in some cases we were getting multiple reports of the same leak — the corner of Cypress and Mannering might be reported as two distinct leaks. We had everything plotted on a whiteboard, but realized that we needed to be closer to the action and sent staff into the field to determine how many breaks we were dealing with.”

For much of Sunday, the utility prepared for the arrival of crews from the California Water/Wastewater Agency Response Network (CalWARN) and other mutual aid utilities with which Napa had agreements. The utility quickly established 12-hour shifts for crews and ordered fuel, replacement parts, repair materials and backfill.

The cavalry arrives

“The relief crews came through the gate like the cavalry on Monday morning,” Eldredge says. “By then we had determined that we were dealing with 90 actual leaks. Napa crews wanted to get into the trenches and work, but we found out they were much more effective as management because they were familiar with the system and knew where to find valves, for example.”

The utility christened eight crews who went into production mode. Mutual aid crews flushed the system and provided traffic control and prep work, while CalWARN crews excavated and fixed leaks. Napa crews supervised, delivered replacement parts and took water samples. Private contractors were assigned to backfill the excavations.

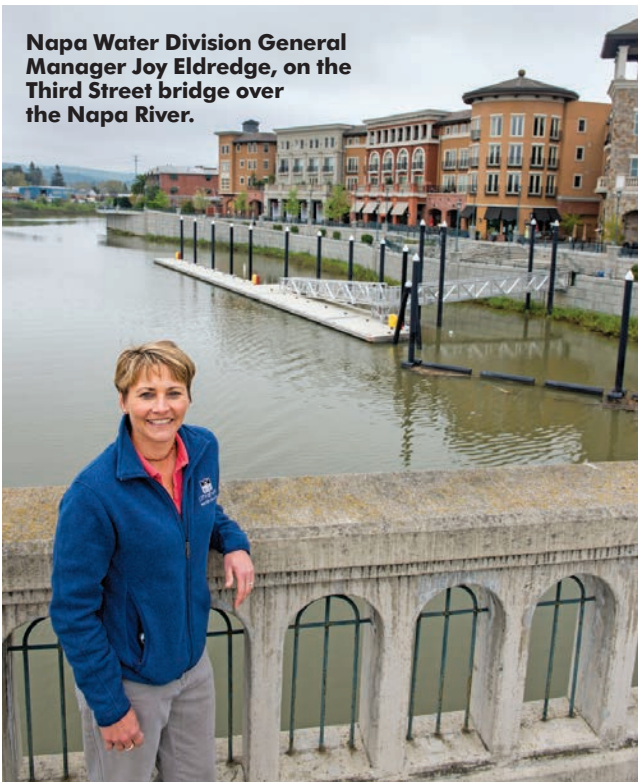
The rigid cast iron pipes installed in the 1940s experienced the most significant breakage.

“We were able to fix a lot of leaks with clamps, but a few were full circumferential shears that required replacing entire sections of pipe,” Eldredge says.

With the large number of water samples collected for testing throughout reconstruction, the crowded incubator began to overheat.

“Instead of crowding more vials into the incubator, we switched to something like an ice cube tray with smaller samples, so that we could test more samples faster,” Eldredge says.

Napa Water Division General Manager Joy Eldredge, on the Third Street bridge over the Napa River.



A PICTURE IS WORTH A THOUSAND ... DOLLARS?

For a water utility dealing with the aftermath of an earthquake, taking photographs might be the last thing on someone's mind. For City of Napa Water Division General Manager Joy Eldredge, however, photography proved to be an invaluable tool following the South Napa earthquake of August 2014.

"We were advised to take photos of leak sites, leak damage and repairs to help create a record of all work done in order to receive compensation from FEMA following declaration of a disaster," Eldredge says. "You need

to document, document, document everything you've done in order to get maximum reimbursement."

The utility carefully accounted for all work performed by its own crews, relief crews and contractors, recording all expenses related to the recovery. While documenting disaster recovery requires significant effort, Eldredge notes that it helped the utility to balance budgets later. Two years following the earthquake, the Napa Water Division continues to receive reimbursement payments that resulted from successful applications to the disaster agency.

"It would be almost impossible to re-create what happened four months after the event, when you present your paperwork to FEMA," says Eldredge. "Pointing to a patched-up spot on the street isn't a great way to demonstrate the work you've done."

Repaired by Labor Day

Even as leaks were being fixed, new leaks began to surface. With the participation of all the crews, however, 120 leaks were repaired in a single week, allowing relief workers to go home on Friday and allowing exhausted Napa crews to enjoy at least two days of the long Labor Day weekend.

"We experienced some aftershocks, and for the next six months we experienced another 120 leaks, most of them in the same area that was hardest hit," Eldredge says. "Our crews worked a lot of overtime right through Thanksgiving."

While the transmission mains originally appeared unscathed, the asbestos cement pipes developed major leaks in November and December of that year.

"Most of these occurred at the collar where two sticks come together," Eldredge says. "When the ground shifted and the pipes moved, the rubber gasket rolled out. Once that happened, water pressure eroded the lips of the pipes."

The effects of the earthquake continued to be felt in 2015. For example, in one of the city's low-pressure zones, a break in a 20-inch transmission main precipitated six other breaks in subsequent hours on mains that were likely weakened by the quake.

Today, the utility is playing catch-up on some of the maintenance tasks that were necessarily delayed by the massive repair effort.

"We're probably doubling up on hydrant flushing this year alone, using two crews instead of one," Eldredge says. "We're now seeing a more normal leak pattern and we've achieved an overall system water loss of less than 5 percent. With the diligence of our crews, we have a very tight system." ♦

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THE ROOT OF THE PROBLEM

Herbicidal treatment helps California community keep its collections system clear

By Angus Stocking

Ceres, a town of about 45,000, lies at the center of California's rich and fertile Great Central Valley. But as sewer network operators everywhere know, fertile ground can have a downside: root growth in sewer lines.

For the past decade, Ceres has been managing root control in-house. The initial impetus for getting into root control came from just one subdivision, Morrow Village. "It was built in 1957, and all the utilities and easements were put in backyards," explains Wastewater Systems Supervisor Terry Turner. "So, it's the only place in our network where we have to enter private property to do maintenance. Plus, the city has no control over plantings in backyards, so there are all sorts of trees and shrubs — that means lots of roots."

The Morrow Village sewer main network includes 6.25 miles of 6- and 8-inch vitrified clay pipe running about 6 feet underneath backyards, and roots find their way into the pipe through mortar joints and small cracks. Once roots are in, they grow and expand rapidly, causing back-

ups and damaging pipe.

"Prior to 2006, we averaged 12 callouts per year for backups caused by roots, just in Morrow Village," Turner says. "Most of those were emergency callouts, costing us overtime and sometimes making it even harder to get into backyards without doing damage. It was an expensive problem, it affected service and it was only getting worse as the clay pipes continued to crack."

Given the location, replacing the VCP with HDPE or similar pipe was not an attractive option — trenching and replacing on private property is the kind of "solution" that network managers like to defer as long as possible.

A good program

Turner says Ceres was attracted to RootX because it's relatively mild and has no significant downstream consequences. It's also simple to use and the initial investment was minimal.

(continued)



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The Ceres crew works in 300-foot runs, from manhole to manhole, when treating its system for roots. Lines are always flushed before the root treatment is applied.

“We really like to do things in-house, to keep costs down,” Turner says. “It just makes sense to use our own manpower and to get more out of our investment in equipment. We’ve had companies submit bids, but they just can’t compete on price. So, we’ve elected to keep control.”

After beginning the program in Morrow Village, Ceres established a biannual schedule that keeps roots under control. “We service the subdivision every two years, and we’re on site approximately three weeks,” Turner says. “We work in 300-foot runs, from manhole to manhole (manholes are also in backyards), and we’re able to schedule the work with owners, so they can clear a path for us.”

During this three-week period, the city deploys a four-man crew with a jet/vac truck, an easement machine and a regular service truck. The actual workflow is straightforward; crews set up the combination truck

“We really like to do things in-house, to keep costs down. It just makes sense to use our own manpower and to get more out of our investment in equipment. We’ve had companies submit bids, but they just can’t compete on price. So, we’ve elected to keep control.”

– Terry Turner

as near to the manhole as possible and move the easement machine into the backyard.

After hoses are hooked up, actual pipe treatment begins with a flush of the pipe. “We always clean the pipe first,” Turner explains. “We use a nozzle we call a sand head, which is a little larger than the RootX applicator. Cleaning is important, because the treatment works better on vigorous, healthy roots — they take up the herbicide more effectively.”

Due to the access issues, crews will proceed with herbicide foaming immediately after cleaning. Where access isn’t an issue, it is sometimes better to wait a few weeks after cleaning so that roots have time to recover and grow a bit before treating.

Turner says that foaming has turned out to be a key factor in the success of Ceres’ root control program. “The foam coats the whole pipe, sticks to roots and leaves a residue of herbicide on the upper pipe interior surfaces, where roots typically come in,” he explains.

“That will stay active, killing off new roots that find cracks. It really works well, and unless we have some sort of storm event that floods pipes, the residual will stay in place for up to two years.”

One advantage of applying root control in a limited area, like a subdivision, is that it is relatively easy to measure results and return on investment — in effect, the root control program served as a large, well-studied pilot project. Obviously the results were encouraging, and Ceres is now extending the root control program to the entire sewer network.

Good numbers

Ceres, like most of California, has been experiencing drought conditions for several years. Counterintuitively, drought actually exacerbates the root challenge, all over the city. “The thing with roots, especially in drought, is that the trees are not getting what they need in terms of moisture, so they dive in deeper and will seek out any little pinhole they can find,” Turner says. “Drought has also led to a few more vacant houses, where plants aren’t being watered or cared for — that also leads to more aggressive roots.”

Although Morrow Village access issues were the main impetus for investing in a root control program, Ceres quickly extended the program to the entire network. Outside the subdivision, root treatment is more reactive. The city has its own CCTV crew and inspects about 5 percent of the network annually. When root growth is identified by video or other means, RootX is applied, and the pipe area is scheduled for a follow-up inspection.

Since the city developed its root control program, the change has been dramatic. Turner now receives just two callouts per year in Morrow Village, and those are mostly for problems in the owner-controlled lateral lines.

“It’s nice,” Turner says. “I can prove we’re saving money, we’re providing better service and the callouts now are rarely emergencies — that means we can coordinate with owners, come out on a normal workday, and access is much easier for everyone.” ♦

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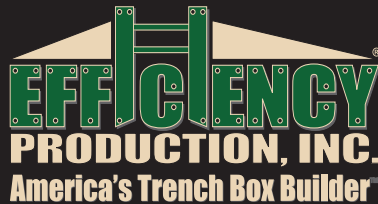


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ON THE CUTTING EDGE

Exact Pipe Tools introduces lightweight pipe cutter to the US market

By *Luke LeNoble*

Over the years, Exact Pipe Tools has developed a number of modern tools for pipe cutting. However, those tools haven't been available in the United States until recently. That's why the Finland-based company decided that the Water & Wastewater Equipment, Treatment & Transport Show was an ideal place to highlight its diverse line of pipe cutters designed to safely cut all kinds of pipe.

While there are larger units designed for larger-diameter pipe, the lightweight PipeCut 170E is specifically designed for pipes ranging from .5 to 6.7 inches in diameter, making it ideal not only for municipal residential sewer system contractors, but also for plumbers, septic system installers and those who perform sewer and drain cleaning and maintenance. It can be used to cut any pipe material, including steel, copper, cast iron and all plastics. Mike Helwich, national sales manager for Exact Pipe Tools, says the pipe cutter has been well received, both overseas and domestically.

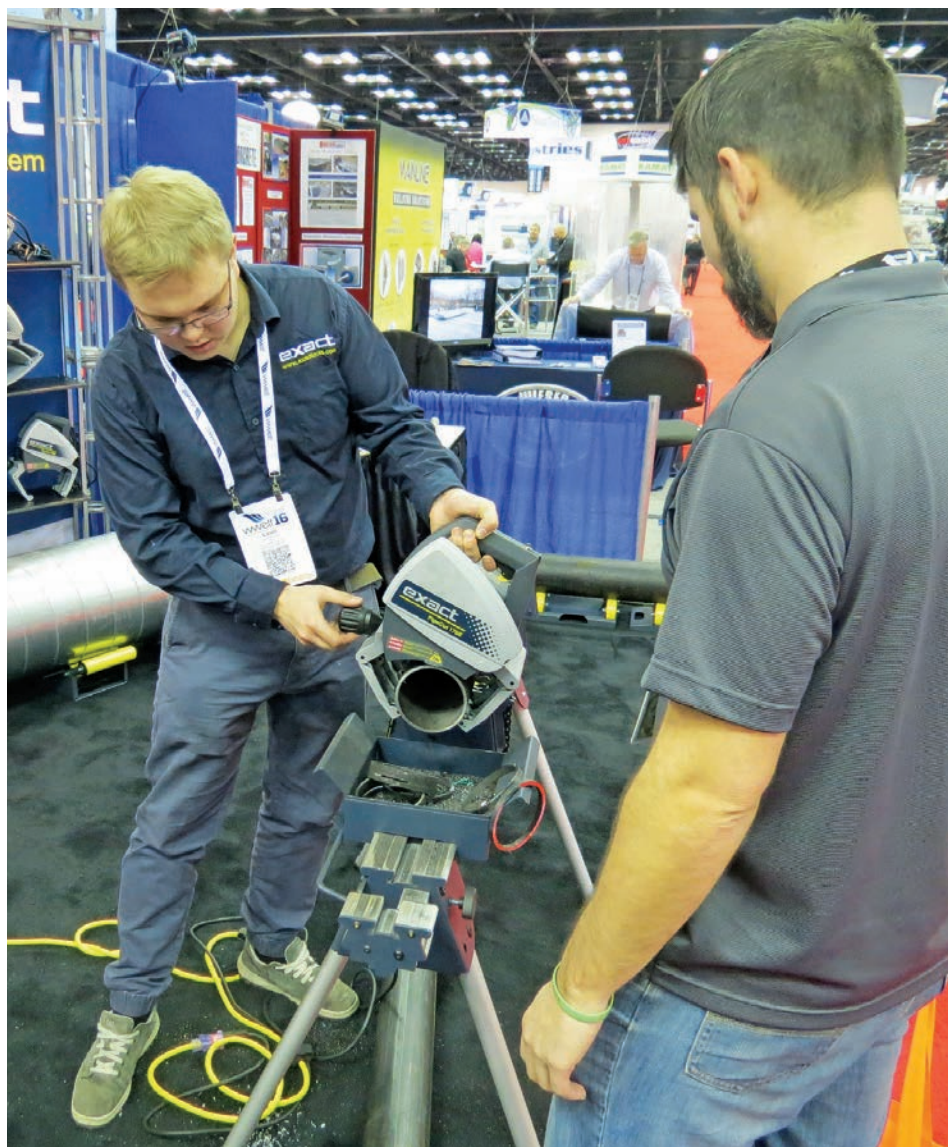
"It's been all positive," he says. "There's over 40,000 of these units in the market worldwide. We just came to America roughly two years ago and started selling and distributing the product here probably 15 months ago."

The blade diameter is 5.51 inches with a mounting bore of 2.44 inches. It is ideal for cutting stainless steel and cast iron pipes because of the pipe cutter's adjustable speed and steady torque feature.

"What's unique about this system is the gripper," Helwich says. "The product will grip itself around the pipe. It has eight pressure points on it where it will not kick back once on the pipe, and the blade is never exposed until it's in the plunger mode."

The ergonomic design and additional safety features of the pipe cutter help eliminate job-related accidents, and the unit weighs just 12 pounds.

"A lot of people now are becoming very safety conscious," Helwich says. "That's why they like this product. The blade is never exposed until it's actually into the material. Another aspect is, when you're cutting the pipe, the pipe is never hot. You'd think when you're cutting a piece of steel pipe or



Lauri Makkonen, a sales representative for Exact Pipe Tools, demonstrates the lightweight PipeCut 170E unit for an attendee at the 2016 WWETT Show. The unit can be used to cut any pipe material from .5 to 6.7 inches in diameter. (Photo by Luke LeNoble)

cast piping in half, the piece that you cut would be very hot. But all your heat is transferred out into the chips, which fall to the ground, so the cut piece is actually warm to the touch; it's not red hot as you think it would be."

The WWETT Show has exposed Exact Pipe Tools to a new and larger audience, and Helwich says he spent as much time answering questions about the company as he did about pipe cutting.

"We've received a lot of questions like, 'Where have you been? I've never heard of you before.' Then we have to tell them the history that we just came to America, so we're in that process right now where we're building a dealer base, doing as many shows as we can, getting the word out about Exact Pipe Tools.

"The exposure that we got here has been very positive," Helwich adds. "We sell through distribution, so we're basically showing the product here. Everybody knows that noise creates attention, so once we start making a cut, it seems to attract a crowd." 844/392-2800; www.exacttools.com. ♦



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Editor's Note: This is part two of a three-part series on pump station design.

WET WELLS VS. DRY WELLS

Economics, simplicity of service, site restrictions and owner experience all influence pump station design

By Thomas E. Jenkins, P.E.

One of the first decisions in pump station design is whether to take a traditional approach with pumps installed in a dry well or use a wet well with submersible pumps.

As submersible pump technology has improved and become accepted, submersible pump stations have become more common. They have a small footprint and are less costly. Suction head is not a problem for submersible pumps. Valves and headers may be enclosed in a valve vault for easy access. However, some owners dislike submersible stations because maintenance requires hoisting the pump. Submersible pumps often require factory repair because of specialized components and stringent sealing requirements.

Most large pump stations and many small stations have separate wet and dry wells (Figure 2). This locates the pumps in an area readily accessible for inspection and service. There is a broader range of pumps available and standard motors can be used. Headers and valves are installed in the dry well.

To avoid flood damage, traditional designs install the motor above grade. A long shaft with intermediate bearings couple the motor and pump, but the extended shafts could develop vibration issues. To eliminate vibration and

reduce cost, some owners prefer submersible pumps in a dry well.

Custom engineered/factory built

Both dry well and submersible stations are available as factory built “packaged” lift stations or as custom designs to be constructed on site.

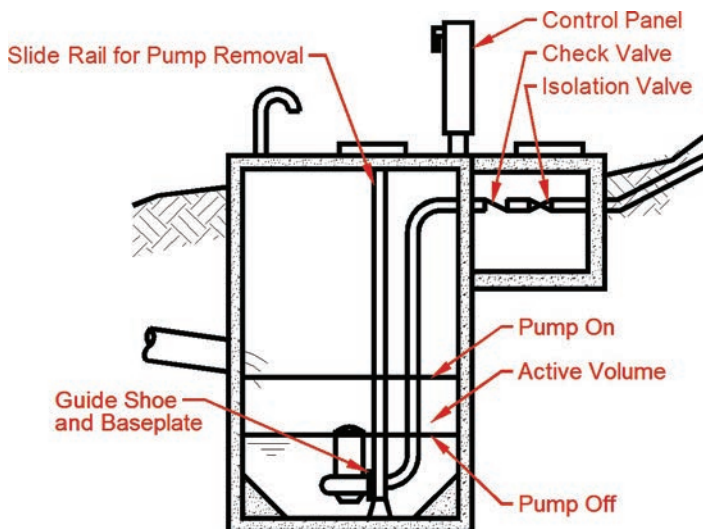
Factory built pump stations are available in a wide variety of configurations. All but the very largest capacities can be accommodated. Most suppliers can provide any type of pump and provide either dry well or submersible designs.

Factory built pump stations are generally less expensive than custom designs and have a smaller footprint. For some owners, having the supplier take all responsibility for the station is an advantage. On the other hand, because they are generally steel fabrications, the station life may not be as long as custom-built stations.

Custom design obviously allows the owner to ensure that the most desired features are included. Although they are more expensive, the materials of construction for custom-design stations mean long life. Space for easy maintenance and future expansion can be incorporated.

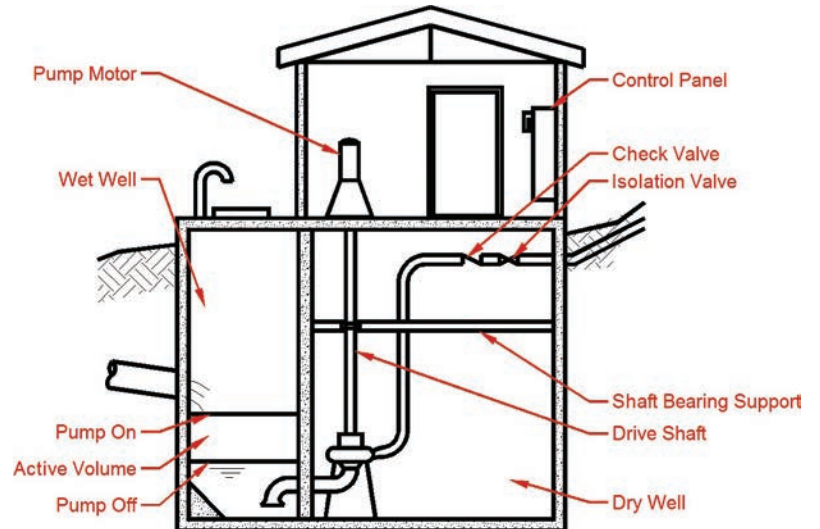
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Figure 1

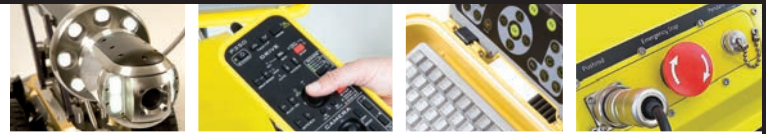


As submersible pump technology has improved and gained acceptance, submersible pump stations have become more common. They have a small footprint and are less costly.

Figure 2



Most large pump stations and many small stations have separate wet and dry wells. This locates the pumps in an area readily accessible for inspection and service.



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Pump selection

Deciding between submersible or dry well pumps is just the beginning of the pump selection process. The categories and varieties of centrifugal pumps can seem endless. Some types are designed to solve very specific problems and others are designed for broad application. The options include:

- Solids handling dry well and submersible pumps can pass a sphere up to the specified size; they are specified for wastewater service
- Grinder pumps and vortex impellers
- Self-priming pumps if flooded suction is not feasible
- Double suction pumps, used for large-capacity clean-water applications
- Stuffing box or mechanical seals
- Horizontal or vertical shafts
- Single or double volute
- Close coupled or extended drive shaft

Selecting the number of pumps and the size (capacity) of each depends on optimizing many factors. Life cycle cost, which includes power and maintenance expense as well as initial cost, is used to guide the selection process. If the pump head is primarily static and the electric billing is for energy only, then a few constant-speed pumps may be best. If the energy cost includes time of day and demand charges, then variable-speed pumping may be best. If the difference between current capacity and peak or future capacity is large, then using several pumps may be cost-effective. The impact of variations in flow on downstream stations or treatment processes should also be considered.

The recommended time between successive starts for constant-speed pumps should be more than five minutes and less than 30 minutes. Small pumps and pumps equipped with soft starts or variable frequency drives can operate at the lower end of this range, but large pumps should cycle less frequently. The time between successive starts of a pump can be estimated:

$$t_s = \frac{29.9 \cdot V_{ww}}{q_p}$$

t_s = time between successive pump starts, minutes

V_{ww} = active volume of wet well, cubic feet

q_p = pump capacity, gpm

It should be noted that not all pumps in a station need to be the same size. There are maintenance advantages to having all pumps identical, but these are usually less significant than energy considerations. Installing different diameter impellers in each pump is another possibility. This allows for future capacity increase without jeopardizing current performance.

Piping systems

Getting the wastewater from the pump discharge to the conveyance system requires piping and related components inside the pump station. There are two principal considerations in the design of the piping system: size and material.

Sizing involves an economic trade-off. Larger pipe means higher capital cost. This is offset by reduced energy cost because of lower friction losses. Cost increases directly with diameter, and friction decreases with the diameter to the fifth power. By calculating life cycle cost the optimum pipe size can be determined. Water velocities should be between 2 and 8 feet per second. (A velocity of at least 2 feet per second is required to keep solids from settling in the piping.)

Pipe material selection is a compromise between cost and durability. Steel is typically less expensive, but more susceptible to corrosion than ductile iron. Ductile iron pipe is often cement- or polyethylene-lined for improved durability. Although nonmetallic piping is often used for buried service, it is seldom used inside the pump station. The joining method can substantially influence final system cost.

Check valves and isolation valves represent a considerable portion of piping cost. Cast iron bodies with a variety of trim and sealing materials are typical. Suppliers should be consulted for guidance.

Wet well design

Determining the wet well configuration can be complex. The wet well may seem like a simple tub for holding stormwater or sewage, but poor design can cause problems for operators and damage to pumps. Considerations that influence wastewater wet well size and design include minimizing odors, eliminating air entrainment, and avoiding solids deposition and scum entrapment.

The elevation of the maximum water surface is usually below the invert of the lowest incoming sewer. However, when large fluctuations in flow occur, such as during rain events, the water may be allowed to back up and surcharge the sewer. This provides additional storage capacity. Obviously the level should never exceed the elevation of the lowest customer connection.

The floor elevation and dimensions of the wet well are determined by site constraints and volume requirements. The minimum depth of the water should be sufficiently above the pump intake to avoid the vortices. Submersible pumps should also maintain sufficient submergence to provide motor cooling. The active volume of the water (the difference between high and low level settings) is typically between 3 and 6 feet. The height of the pump intake above the floor should be high enough to avoid restrictions but low enough to minimize solids deposition.

Solids in the wet well can become septic and develop odors. To avoid this, the corners of the wet well floor should have fillets. Odor creation is also minimized by keeping the retention time in the wet well under a half hour. Retention time can be calculated:

$$\text{HRT} = \frac{7.48 \cdot V_{ww}}{q_i}$$

HRT = hydraulic retention time, minutes

V_{ww} = active volume of wet well, cubic feet

q_i = influent flow rate, gpm

It is considered good design practice to split the wet well in half and have pump inlets in each. This allows draining one half of the wet well for cleaning and maintenance without taking the station out of service.

Many pump suppliers have extensive experience and detailed design recommendations for wet well and pump station design. They should be consulted for guidance during the design process.

Once the physical design is completed, the major design tasks are finished. The third and final article in this series will cover the additional systems and components required to provide satisfactory operation. ♦

About the Author

Thomas Jenkins is a professional engineer and the owner of JenTech Inc. in Milwaukee, Wisconsin.

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UNDERSTANDING CERTIFICATION AND MEMBERSHIP

Certification is an important step on the path to professional development

By *Ted DeBoda*

There is a misconception among many within our industry that certification in a NASSCO training program such as the Pipeline Assessment Certification Program or Inspector Training Certification Program means you automatically become a NASSCO member. The PACP and ITCP have become important to our industry, so I can understand why that misperception exists, but that's not how membership works.

Becoming certified in our training programs does not mean an individual is automatically a member of NASSCO. In fact, NASSCO membership requires an application process and approval by the NASSCO board of directors. Membership is generally for companies and organizations, although we do provide an avenue for individuals to join.

Conversely, NASSCO membership is not a prerequisite for certification in ITCP or PACP. Any underground infrastructure professional interested in learning more about consistency and quality of data in the assessment of underground infrastructure can apply to become PACP-certified. Additionally, inspectors interested in learning about the inspection of underground rehabilitation — including CIPP and manholes — can do so through ITCP.

That being said, while PACP- and ITCP-certified individuals do not automatically become NASSCO members, once they are certified, one of the best ways to keep that knowledge fresh in their advancing careers is through NASSCO membership. NASSCO members are on the front line of new trench-

less technologies as they emerge, contributing to our mission to set standards for the assessment, maintenance and rehabilitation of underground infrastructure, and to ensure the continued acceptance and growth of trenchless technologies. We do this by bringing together professionals to share knowledge and experiences through our active committees, divisions and events, such as the increasingly popular NASSCO Technical Day, which is held every year at our annual conference.

We have learned through research that many individuals who have completed our certification programs do, indeed, become more involved through NASSCO membership. In a recent poll conducted among members who joined NASSCO since 2010, the No. 1 way (nearly 40 percent) that new members learned about NASSCO was through their participation in PACP and ITCP. These new members consider education and training, the development of specification guidelines and technical references, industry advocacy, scholarships and NASSCO committee participation to be the most important initiatives in which to become active and involved.

If you are not yet a NASSCO member, apply to join us today at nassco.org. Or, if you are simply interested in becoming PACP- or ITCP-certified, you can also learn more at nassco.org. Your involvement at any level helps us set standards and, in the end, provide a healthier infrastructure for us all. ♦

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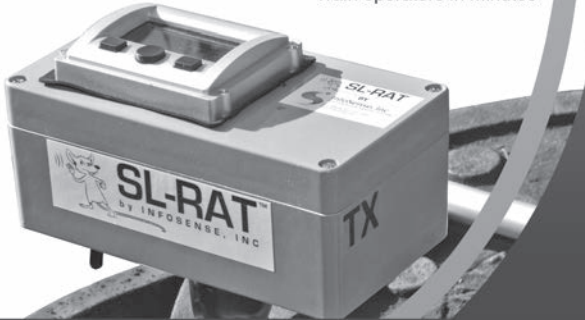
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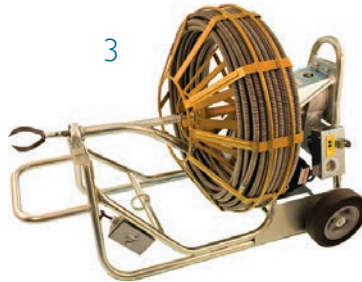
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CABLE MACHINES

1. Duracable Manufacturing DM55

The **DM55** sled drain machine from **Duracable Manufacturing** has a maintenance-free gearbox, an industrial 3/4 hp motor at 175 rpm and a durable frame. The high-performance gearbox with a 10-1 gear ratio delivers high torque and horsepower. Enclosed polyethylene reels are available in a variety of sizes, which make for less mess when operating the machine. It is designed to handle several different sizes of reels to provide the operator with flexibility of cable size. The power cable feed and return feeds and returns cable automatically at a steady pace, helping service technicians run long lengths of cable in drainlines. It can be used on mainlines, industrial, commercial and residential jobs including overhead and wall cleanouts, flood drains, grease and roots. **877/244-0556; www.duracable.com.**

2. Electric Eel Model 800 hydrostatic sewer cleaner

The **Electric Eel Model 800** hydrostatic sewer cleaner is engineered to clean 4- to 24-inch-diameter pipelines for distances up to 650 feet, with infinitely variable drive speeds and an automatic transmission. A convenient hand lever controls the infinitely variable cleaning speeds at full torque from 50 to 1,000 rpm. The unit runs 8-foot sectional heavy-duty self-feeding municipal cables that require no handling by the operator and allow for faster cleaning. Right-hand-wound outer coils and 11/16-inch-diameter left-hand-wound inner coil, both anchored to the coupling, reduce helixing and loss of cable in pipeline, while the open space outer coil design helps loosen deposits and auger them back. Snap-lock couplings provide easy and dependable joining of the heavy-duty cable sections with no set screws, nuts or loose pins. An 8 hp gasoline engine or optional 9 hp diesel engine provides power. The handle is removable for compact storage and transport. **800/833-1212; www.electriceel.com.**

3. Gorlitz Model GO 68HD

The **Gorlitz Model GO 68HD** heavy-duty electric drain cleaning machine is available in two different versions, either with an open steel reel or enclosed polyethylene drum, and can be outfitted with an optional power feeder. Standard configuration is 150 feet of 11/16-inch hollow-core cable, which should reach most blockages with a single reel. The overall weight of the machine is 185 pounds. Adding a loading ramp and electric winch to any vehicle makes transportation quick and simple. It is designed to clean pipes from 3 to 8 inches in diameter. **562/944-3060; www.gorlitz.com.**

4. Logiball lateral cleaning launcher

The lateral cleaning launcher from **Logiball** is pulled in tandem with a multi-conductor camera, positioned at the service connection where the guiding arm is rotated with tractor controls. The jet operator turns the pump on and a 1/2- or 3/8-inch hose and nozzle are launched into the lateral from the main, cleaning grease, roots and buildups from 5 to 70 feet into the lateral. Units are available for 6- to 18-inch mainlines. **800/246-5988; www.logiball.com.**

5. Picote Solutions coating system

High-efficiency, high-speed drain cleaning chains from **Picote Solutions** attach to Picote Miller drive units. The Original and Cyclone range from 1 1/4 to 10 inches. The Cyclone opens up to the inside diameter of the pipe to descale and remove the finest of roots. The Original rolls around the inside of the pipe removing roots and heavy tuberculation. Special drill heads and removal tools are available for severe heavy-duty roots and blockages, all without damaging the host pipe. To prevent further root infiltration, the coating system seals and forms a watertight, noncorrosive pipe. This easy-to-use system coats the pipe using a coating pump and brush application to work the resin into the host pipe. **219/440-1404; www.picotesolutions.com.**



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6. RIDGID K-60SP sectional machine

The **RIDGID K-60SP** sectional machine's compact size makes it small enough to fit into cramped spaces, yet powerful enough to clear tough blockages. Designed for institutional, commercial and residential drain cleaning, it is an ideal tool for septic tank vacuum truck operators and for cleaning vent stacks. Equipped with a 1/2 hp motor, it cleans 1 1/4- to 4-inch drainlines and a simple jaw set adjustment lets the unit spin both 7/8- and 5/8-inch-diameter cable. The 7/8-inch cable cleans 2- to 4-inch lines up to 150 feet and the 5/8-inch cable cleans 1 1/4- to 4-inch lines up to 125 feet. A rear handle allows for easy transporting up ladders and onto rooftops. **800/769-7743; www.ridgid.com.**

CUTTING NOZZLES

7. Enz USA Bulldog 37 Series cross jet nozzle

The **Bulldog 37 Series** cross jet nozzle from **Enz USA** has been designed for operation with both fresh and recycled water. The cross jet design concentrates on opening completely blocked lines, frozen pipe and interlaced root intrusions. An integrated oil-free braking system results in a low wear-and-tear operation and controlled numbers of rotation. It is available in 1/2- and 3/4-inch connecting threads, and is effective on pipe diameters ranging from 2 1/2 to 8 inches. **877/369-8721; www.enzusainc.com.**

8. Hydra-Flex Switchblade

The **Switchblade** static, zero-degree nozzle from **Hydra-Flex** has the impingement and stream quality to allow operators to dig fast and use less water, providing greater efficiency on the job site. Designed for durability, this heavy-duty, high-impact nozzle operates at up to 3,200 psi and is constructed with stainless steel housings and tungsten carbide wear surfaces. The non-conductive urethane coating on the nozzle body works to extend the life of the nozzle while protecting the safety of the user and sensitive underground assets. A range of flow rates and spray patterns are available for different applications such as potholing and trenching. **952/808-3640; www.hydraflexinc.com.**

9. ID-TEC WJ180 PJC

The modular **WJ180 Precision Jet Cutting (PJC)** unit from **ID-TEC** transforms the SR-SERIES reinstatement cutter into a jetting robot with a precisely steerable water blast for clearing roots and other materials from 8- to 40-inch pipelines. The low-flow, high-pressure settings are adjusted from 4 gpm at 7,250 psi for roots up to 7 gpm at 32,000 psi for concrete and calcium. The camera, with powerful lighting, provides eyes on the job when the operator, during a pre-inspection, precisely aims the water blast where the root enters the pipe. It is fast, but also safe to use at cross bores. The targeted approach makes precision jet cutting efficient on water and fuel. **503/504-8474; www.sr-series.com.**

10. NozzTeq Lumberjack

The **Lumberjack** cutting nozzle from **NozzTeq** is a low-torque, high-speed cutter for use with high water pressures. It is especially good at cutting roots, but is also commonly used to cut grease, tuberculation, protruding laterals and other buildups. Because it's low torque, it's unlikely to cut through host pipes. The bearings are sealed, grease-lubricated and water-cooled, and largely maintenance-free. It rotates at a minimum speed of 10,000 rpm with flow rates from 10 to 250 gpm at varying pressures. It can operate in pipes from 3 to 48 inches. All models clean with chain links, with optional cutting blades for severe blockages. All come with a propelling jet housing, and tow rings are available. **866/620-5915; www.nozzteq.com.**

11. StoneAge Switcher

Switcher cleaning heads from **StoneAge** eliminate extra runs by switching between pulling and descaling jets. Technicians can use the same tool to quickly run down the line, then engage full cutting force to clear obstructions, and switch again to move debris. Every time the pump is idled down and brought back to pressure, the tool alternates function between two different sets of jets. Field use of the WGR Magnum with Switcher head versus the traditional method of using two tools (rotational and fixed nozzles)

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zle) demonstrates up to 35 percent less water usage and job times close to 50 percent faster. **866/795-1586; www.sewernozzles.com.**

JETTERS

12. Amazing Machinery J/VB9030HGEA390-AM

The **J/VB9030HGEA390-AM** portable cart jetter from **Amazing Machinery** is powered by a commercial-grade Honda GX 690 twin-cylinder, air-cooled four-stroke engine. It has low-oil shutdown and electric start. The General pump produces 3,000 psi at 9 gpm. It is plumbed with the bypass back to the customer's water tank and a thermal relief valve to prevent overheating. It is mounted on an aircraft-grade aluminum frame with oversized pneumatic tires. It comes with 200 feet of low-friction jetter hose, three nozzles and a foot pedal for easier start/stop of the jetting process. The wheeled hose reel gives you the option of jetting inside or outside drains with the machine operating safely outside. It is designed to clean 4- to 12-inch pipes. **800/504-7435; www.amazingmachinery.com.**

13. American Jetter 51T PRO Series

The **51T PRO Series** from **American Jetter** offers flows from 8 to 40 gpm at up to 5,000 psi. Consistent power is provided by dual 37 hp Kohler gasoline engines, creating the cleaning power of 74 hp. The hydraulic reel rotates 180 degrees for easy access. Low water shut-off prevents pump damage if the optional 400- to 600-gallon tanks run low. A hose reel speed control allows for precise cleaning in both directions. The 1-mile open-range wireless remote option allows for water on/off, engine shutdown and hose reel control. The heavy-duty square tubing trailer offers standard electric brakes on both axles. **866/944-3569; www.americanjetter.com.**

14. Cam Spray RCJ Series

RCJ Series skid-mounted jettors from **Cam Spray** are offered in flows and pressures of 8 gpm at 3,500 psi and 7 gpm at 4,000 psi. A three-plunger industrial pump with pulse is powered by a 688 cc Honda engine.

Its 200 feet of jetter hose can be used to supply an optional 200DS4 portable reel cart, available with 200 feet of 3/8-inch jet hose. It comes with a 35-gallon buffer water tank with float control, powder-coated heavy tube frame, washdown gun and a four-nozzle set. It easily mounts in the side door of a cargo van, on a truck bed or inside a service truck. A root-cutting nozzle enables residential root cutting. **800/648-5011; www.camspray.com.**

15. Hi-Vac Corporation O'Brien 7000 Series

The **O'Brien 7000 Series** trailer-mounted jetter from **Hi-Vac Corporation** comes with water tanks and a sediment pump for easier cleaning and longer life. The trailer has the muffler and air cleaner mounted inside the enclosure for improved sight lines, electric reel control for smoother rotation and easier operation, and hydraulic and water gauges mounted in the main control panel for easier viewing. **800/752-2400; www.hi-vac.com.**

16. Hot Jet USA HotJet III

The **HotJet III** from **Hot Jet USA** offers an output of 20 gpm at 3,850 psi (with an option to run at 35 or 70 hp with either hot or cold water), cutting roots with either a custom root-cutting tool or a Warthog nozzle in pipes up to 24 inches. It provides the option to run 300 feet of 3/8-inch line or 500 feet of 1/2-inch line, depending on the size of line the operator is cleaning. The 3/8-inch line is effective in cleaning 12-inch maximum-size pipes and the 1/2-inch line is effective in cleaning up to 24-inch pipes. **800/213-3272; www.hotjetusa.com.**

17. NLB Corporation 225 Series

The **225 Series** of water jet units from **NLB Corporation** improves productivity for pipe cleaning and similar applications, maximizing contractor flexibility and reliability. These diesel-powered triplex plunger pump units are easily convertible to any of seven operating pressures (up to 40,000 psi) and flows from 6 to 82 gpm. They offer a choice of heavy-duty diesel engines from 200 to 350 hp. Units are available with an UltraGreen package and environmentally friendly Tier 4 Final engines that comply with the latest EPA emissions regulations and can reduce operating costs. **800/227-7652; www.nlbcorp.com.**

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18. Sewer Equipment Co. of America 747-FR2000 ECO
Sewer Equipment Co. of America's 747-FR2000 ECO trailers have frames made of fully welded steel tubing, maximizing strength and corrosion resistance, while their Duraprolene water tanks are fully baffled to eliminate surging during stopping and turning with a load of water. Once on the job, the standard rotating safety hose reel allows operators to position the trailer in the safest possible manner while simply rotating the reel, complete with NEMA 4 watertight control panel, to conveniently face the access point. The ECO operating system allows the engine to run at 33 percent lower rpm than traditional designs, saving fuel costs and creating a safer work environment for operators. Built with Caterpillar engines and F.E. Myers pumps as standard equipment, additional machine options include various pump configurations, wireless and tethered remote controls, tool storage, dual reels, safety lighting and an integral CCTV system. **877/735-4640; www.sewerequipment.com.**

19. Super Products Camel Jet 1600
 The **Camel Jet 1600** from **Super Products** is a truck-mounted, high-pressure waterjetting system that offers a convenient method for dealing with root control issues and for keeping municipal sewers, sanitary and storm sewer lines, laterals, and drainage lines clean and free flowing. It uses three modular tanks to carry up to 1,600 gallons of water. The tanks are formed of rotationally molded polyethylene with ultraviolet stabilizers. Its Lexan Containment System means that users have additional safety protection from hose rupture or high-pressure water. It has a heavy-duty triplex continuous-flow water pump to provide up to 80 gpm and pressure up to 2,000 psi. In addition to its single-engine design, which translates to lower fuel costs, the unit provides users with a host of options, including water pump and drive system options, as well as a front- or rear-mounted 180-degree rotating hose reel with a 1,000-foot capacity. **800/837-9711; www.superproductsllc.com.**

20. US Jetting 4018
 The **4018** trailer jetter from **US Jetting** is available with powder-coated or galvanized frames, as well as aluminum components such as fenders, toolboxes, antifreeze tanks and fuel tanks. The 4,000 psi at 18 gpm unit

has a true run-dry pump with a stainless steel fluid end and triplex plungers that are easy to maintain and service. A HATZ Tier 4 Final four-cylinder diesel engine is fuel efficient, lightweight and generates a high amount of power. **800/538-8464; www.usjetting.com.**

21. Vac-Con Hot Shot
 The **Hot Shot** high-pressure water jet machine from **Vac-Con** is used for removing stones, bottles, cans, grease, sludge and other debris from sanitary sewer and/or storm drainlines. It comes with a noncorroding polyethylene water tank and can be operated by a single person with all controls for high-pressure water and hose reel located at the front of the machine for ease of operation and increased safety. Units are available with 1,000- and 1,600-gallon water tank capacities. Options include variable flow, articulating hose reel, polyethylene water tanks, 30 gpm at 3,000 psi water pump system, auxiliary engine or hydrostatic drive, cold weather recirculation system, side-mounted toolboxes, air purge system, hose footage counter, arrowboard, strobe lights, inspector cam, high-pressure spray bar, hose rewind guide, 600 psi hand gun system with 25 feet of hose and a selection of nozzles. **855/336-2962; www.vac-con.com.**

22. Vactor Ramjet
Vactor Ramjet trailer jettors are ideal for fast, safe response to sewer blockages as well as regular preventive line maintenance. The line of reliable, high-pressure water jettors is designed for cleaning municipal sewer, drain and pipelines, and culverts. They provide high pressure at low water volume and are ideal for cost-effective maintenance and emergency response in tight, confined environments. Jettors are available with a variety of engine and pump configurations, water tanks up to 1,000 gallons and a range of optional equipment. **800/627-3171; www.vactor.com.**

23. Water Cannon 17H85 Water Blaster
 The **17H85 Water Blaster** from **Water Cannon** has a Honda GX 690 engine with electric start, 15-gallon long-run fuel tank, roll cage, poly chain drive, a TSP Series General triplex plunger pump that offers 4 gpm at

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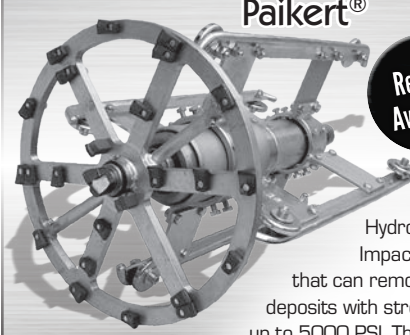
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MECHANICAL ROOT CUTTERS

24. Arthur Products Cnt-r-KUT Elite

The **Cnt-r-KUT Elite** from **Arthur Products** is a rotating mechanical tool designed to symmetrically clean pipes. Equipped with interchangeable chain and cable on the same rotor, the unit operates at pressure from 2,000 to 10,000 psi. The lightweight, flexible centering device, engineered from an aerospace elastomer, allows the unit to navigate the contour of the pipe. Advance jet porting uses both rotor sidekick jets, optimizing rotational force and rear thruster jets for propulsion maximization. It is available in 3/8-, 1/2- and 1-inch NPT. **800/322-0510; www.arthurproducts.com.**

25. General Pipe Cleaners Root Ripper

The **Root Ripper** from **General Pipe Cleaners** has a heavy steel spring with a tapered point that screws into roots and a claw at the front that rips them out. It's made of hardened spring steel for durability and coated to protect against rust. It can also be adapted to sectional machines, or to other brands of cable-type drain cleaners. It can be used in combination with Flexicore cables that are strong enough to deliver the torque needed to cut tough stoppages. Heavy-gauge wire is coiled tightly around 49-strand aircraft-type wire rope and heat-treated, offering strength and flexibility. **800/245-6200; www.drainbrain.com.**

26. MyTana Mfg. Company HSCI

The **HSCI** high-speed cutter from **MyTana Mfg. Company** offers high-speed, low-torque power for reinstatement, descaling, cutting, over-shoot cleanup, collapsed liner removal and root cutting. Various tools are

provided, and safety features include an air-actuated foot switch with guard, GFI protection and a design that has a telescoping handle, making it easy to maneuver. The machine is lightweight and operates at 1,750 rpm. It is suitable for 2- to 6-inch pipes and offers a 70-foot range with a lightweight flex shaft. **800/328-8170; www.mytana.com.**

27. Nu Flow Micro-Cutter

The **Micro-Cutter** from **Nu Flow** is a pneumatic cutter used to clean and remove calcite and roots from the inside of a variety of pipes, including steel, cast iron and Orangeburg. The system rotates at approximately 2,000 rpm and will negotiate turns of 90 degrees in pipes down to 2 inches in diameter. It runs at 40 cfm and allows for multiple cutting heads to be attached. These heads can cut through dense corrosion and root intrusion that is commonly found in drainlines and can be challenging to clean. The drill tip has an adjustable spline available in various sizes to match different pipe diameters. The cutting head does the job of three tools, working efficiently and saving time. **800/834-9597; www.nuflowtechnologies.com.**

28. Southland Tool Super Red Hot

The round-body **Super Red Hot** heavy-duty bearing root-cutting motor from **Southland Tool** comes with a specially machined front bearing that is oversized to allow the motor to perform. This hydraulic root cutter motor allows the user to cut, rip and destroy roots in sewer lines. It is a direct replacement for the Patriot Motor. It puts out more than 14.58 ft-lbs of torque. It has the exact tail thruster to bolt to green skids or smart cutter skids. It is available in 1- and 3/4-inch hose models. **714/632-8198; www.southlandtool.com.**

29. Pipeline Renewal Technologies PowerCutter

The **PowerCutter** for sewer mains from **Pipeline Renewal Technologies** handles 6- to 10-inch (PC150) or 8- to 28-inch lines (PC200). It self-positions via a high-torque four-wheel-drive chassis, and travels up to 328 feet. It performs horizontal cutting with a powerful air motor offering up to 1.9 hp. The unit articulates on four axes (up/down, rotation, tool pivot, cutter forward/back), and displays live footage from an illuminated, vibration-isolated self-cleaning camera. It offers CANbus-based controls with twin multifunction



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joysticks for easy position recall. Interchangeable bits address a wide range of pipe materials and cutting tasks. **866/936-8476; www.pipelinert.com.**

30. USB - Sewer Equipment Corporation Turbo Chain Cutters

Turbo Chain Cutters from **USB - Sewer Equipment Corporation** are made of tempered stainless steel and offer continuously adjustable guide skids. The chain retainer is driven by a high-performance turbine to remove roots, grease and mineral deposits from 4- to 48-inch sewer lines. With an optimized 3-D hydromechanics design in conjunction with ceramic nozzle inserts, the cutters use recycled or clean water. They can also be used as barrel cutters with diamond bits for smooth removal of protruding laterals. Heavy mineral deposits can be removed with carbide bits attached to the specialized chain. **866/408-2814; www.usbsec.com.**

ROOT CHEMICALS

31. Duke's Root Control Razorooter II

Diquat-based **Razorooter II** root control herbicide from **Duke's Root Control** is registered by the U.S. Environmental Protection Agency for controlling nuisance tree roots in sanitary sewer line collections systems and received a classification of "evidence of non-carcinogenicity for humans." In 2014, the EPA further approved an amendment of labels to lower the signal word from "warning" to "caution." Crews insert a hose from manhole to manhole, preparing to fill the affected sewer pipe with herbicide. The foam is then released, compressing against pipe surfaces and penetrating cracks, joints and connecting sewers. Roots are killed on contact, decay naturally and slough away. Applications prevent root-related stoppages for two to three years. **800/447-6687; www.dukes.com.**

32. Lenzyme/Trap-Cleer foaming root control

Foaming root control from **Lenzyme/Trap-Cleer** has double the dichlobenil active ingredient of previous solutions and a latex base that

helps it stick to roots longer. It is easy to apply and provides a slower foaming action to coat the entire pipeline and eliminate fast foam-over messes. **800/223-3083; www.lenzyme.com.**

33. RootX chemical root control

Chemical root control from **RootX** is a long-term solution to pipeline root intrusion, as it stunts new root growth without damaging the pipe, clearing pipeline roots that can cause blockages resulting in sanitary sewer overflows. It's been verified to have no harmful effects on water treatment systems. The simplicity of the application means crews can perform root control on demand or as scheduled preventive maintenance. It is registered with the EPA for both sanitary and storm use (EPA Reg. No. 68464). **800/844-4974; www.rootx.com.**

34. Vaporooter scientific formula

The **Vaporooter** scientific formula is guaranteed to destroy roots on contact and inhibit regrowth for years. A combination of two unique herbicides approved for use in sewers create a devastating one-two punch on roots by penetrating root cells to destroy roots on contact, and binding to pipe walls, joints and cracks to inhibit new growth. Application equipment allows operators to simply jet up the line, push a button and fill the pipe with Vaporooter foam while retrieving the hose. The system fits any jet truck and is available as an option from many leading truck manufacturers. **800/841-1444; www.vaporooter.com. ♦**

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CASE STUDY

CHEMICAL AND MECHANICAL ROOT CONTROL *By Craig Mandli*

Hydraulic root cutter clears tough pipe blockage

Problem:

The American Embassy Tunisia in Washington, D.C., was experiencing a major sewer blockage in one of their 8-inch lines. Over time, massive root intrusions blocked the pipe. The problem was compounded by hardened grease and calcium buildup on the pipe walls. A standard approach using a mechanical cable machine was not feasible due to the heavily impacted roots, and using a high-pressure sewer jetter alone would also be very time-consuming and require a significant number of man-hours to complete. The embassy needed a quick solution that wouldn't damage the pipe walls in the process.

Solution:

Spartan Tool's 468 hydraulic root cutter with an 8-inch saw blade was used in conjunction with a high-pressure water jetter to clear the root mass



effectively. The unit operates at 2,000 psi; at this pressure the risk of damage to pipe walls and seals was significantly reduced in comparison to using a rotating nozzle at 4,000 psi. As the cutter moves through the pipe, roots are pinned against the pipe wall and the steel saw blade rips and tears them away. Combined with a flow rate of up to 15 gpm, the unit flushes the root pieces out of the sewer line. The final step involves using a high-pressure water jetter to remove any remaining roots or buildup from the pipe walls.

RESULT:

The unit cut through the roots and the sewer line's flow was restored. The embassy resolved their drain problem without damage to the pipe walls, and the job was completed in less time than using a single cleaning tool alone. 800/435-3866; www.spartantool.com. ♦



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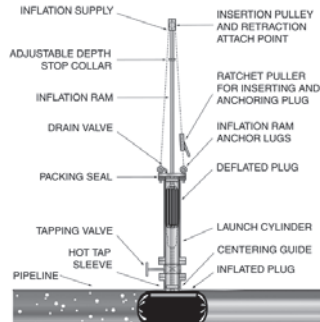
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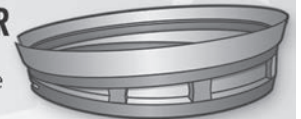
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Vacall AllClean water recycling system conserves water and increases productivity

By *Luke LeNoble*



The AllClean water recycling option for Vacall AllJet-Vac combination sewer cleaners is designed to conserve water and allow operators to work all day without needing to refill water tanks.

The system uses a series of filters, screens and centrifugal motions to remove matter from water collected in the debris tank before returning it to the water tanks.

“Productivity is going to increase tremendously,” says Bill Petrole, vice president of sales and marketing for Vacall. “If you have a large job with a lot of jetting to do, it doesn’t take long to empty your water tanks. The benefit would be the length of time you can stay on the job or stay away from the dump.”

The system is located at the front of the AllJetVac debris body, protected from damage by stones or other vehicles. Petrole says this also allows them to offer an inexpensive alternative to a dedicated truck.

“We can take a normal sewer truck that we’re producing and, as an option, add the recycler onto it so the municipality has a dual-purpose machine,” he says. “They can fill up the water tanks in the morning and go out and use it like a conventional combo truck, or they can go out in the morning and recycle water and use it as a recycler.”

A multistage recycling process starts with an initial sediment separation followed by a floating V-Filtration screening process further separating water from debris. The V-Filtration also has backflush, self-cleaning capability. Centrifugal action removes remaining solids, including particles down to 100 microns. Solids and fine particles are returned to the debris tank via a pressure-regulating valve system. Recouped jetted water — up to 65 percent from a sewer line — is returned to the water tanks for reuse.

“One of the biggest reasons we did this at this time is to conserve water,” Petrole says. “Why would you go out and waste thousands and thousands of gallons of clean water cleaning a sewer? The recycling concept has been in Europe for a long time, and the system that we’re using has been around for a long time. It’s a proven way of doing things.”

The recycling system includes a segregated 240-gallon clean water tank attached to a 10 gpm pump and 50-foot hose reel for washdown. To customize AllJetVac models for specific applications, municipalities can choose decant valves, a cold-water recirculation system, backup hose reel hydraulics and multiple blower and water pump choices. Debris tank capacities are available in 10 or 12 cubic yards, and water tank capacities range from 1,000 to 1,500 gallons. **800/382-8302; www.vacall.com.**

Jetstream of Houston rotary nozzle

The Orbi-Jet X22 rotary nozzle from Jetstream of Houston is designed for surface cleaning applications. The self-rotating nozzle is rated for up to 22,000 psi. Features include a lightweight Twis-Lok shroud that ensures safer water displacement and protects the nozzle from damage during operation. A magnetic braking system controls rotational speed. Nozzles are safety colored for pressure recognition. The premium kit includes an optional 15,000 psi adapter, 50-hour maintenance kit and secondary rebuild kit. **800/231-8192; www.waterblast.com.**



KOHLER Power Systems diesel-powered mobile generators

Diesel-powered mobile generators (90REOZT4 and 120REOZT4) from KOHLER Power Systems are designed to withstand the



elements, run long hours in prime and standby applications, and meet all EPA emission requirements. Generators run on a John Deere Tier 4 Final 4.5L engine. Features include a heavy-duty air cleaner with restriction indicator, fuel tanks designed for 24-hour runtime, external emergency stop and stainless steel door latches and hinges. **800/544-2444; www.kohlerpower.com.**

Endress+Hauser radar level sensor

The Micropilot NMR81 radar level sensor from Endress+Hauser is designed for high-accuracy custody transfer applications and liquid level measurements in tanks with baffles. The instrument offers a transmission frequency of 79 GHz with a 3- or 4-degree microwave beam angle that ensures safe and reliable measurements in narrow tanks for up to 229 feet. **888/363-7377; www.us.endress.com.**



General Equipment Company temporary lighting

Tower Light temporary lighting products from General Equipment Company provide an inflatable, temporary lighting solution for large and confined areas. A cylindrical load-bearing nylon tower is inflated with constant

air pressure, delivered by an integral blower system. Designed for indoor or outdoor use, lights can be installed and ready for operation in about one minute with no special tools or additional components. Operational heights of 7.5, 10 and 14 feet provide 360-degree illumination. **800/533-0524; www.generalequip.com.**



American Machine & Conveyor cold weather outdoor water sampling station

The EZ-02FCW outdoor water sampling station from American Machine & Conveyor provides a pristine testing environment in inclement weather conditions. Made of stainless steel, the sampling station is designed to reduce false positives and safely collect bacteriological samples from a designated point that is fed directly from the water main. A built-in, full-flow flushing valve and weathertight sealing closure contains protective wind/rain guards. The three-position, self-sealing lid seals flush to protect against weather, infestations and other contaminants. When sampling during inclement weather, the lid's second position forms a cover over the sampling area. **805/642-9924; www.american-mc.com.**



DPL Telematics GPS tracking system with anti-tamper protection

The Trackall OBDII vehicle tracking system from DPL Telematics delivers real-time vehicle and driver behavior data. The unit plugs into the existing OBDII port of most vehicles and installs in seconds. Anti-tamper features include a backup battery that delivers immediate disconnection notifications with location, as well as GPS jamming detection. Managers can wirelessly monitor vehicles through an internet-based software package and mobile app. **800/897-8093; www.dpltel.com.**



FCI – Fluid Components International flow switch/monitor

The FS10i flow switch/monitor from FCI – Fluid Components International is designed for industrial processes, manufacturing operations, pumps, compressed air, gas compressors and HVAC systems requiring flow assurance and alarming wherever detection and user warning of flow rate is required. The SIL 2-compliant device features an air/gas sensitivity and setpoint range of 0.25 to 400 SFPS and 0.01 to 0.5 feet per second for water or liquids. It is suitable for use in fluid temperatures from -40 to 250 degrees F and at up to 2,000 psi. **800/854-1993; www.fluidcomponents.com.**



Protective Industrial Products protective gear

Falcon protective gear from Protective Industrial Products is designed to offer protection from rain and other elements and provides splash protection for industrial pressure washing applications. **800/262-5755; www.pipglobal.com.**



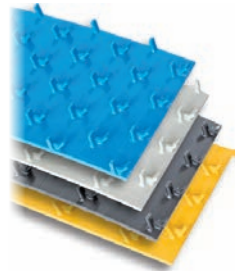
Victaulic knife gate valve

The Series 795 knife gate valve from Victaulic is made for fluid lines containing solids or abrasive materials. All wear parts are enclosed in a single-seat cartridge kit. The design allows the valve to remain installed through ongoing maintenance cycles, reducing downtime by eliminating the need to remove the entire valve from the pipeline. The knife gate valve joins either grooved-end carbon steel or plain-end HDPE pipe. It is available in sizes from 3 to 12 inches and rated to 150 psi. **610/559-3300; www.victaulic.com.**



Agru America concrete liners

Sure-Grip concrete liners from Agru America extend the life of tanks, pipes and other structures. Liners are made for new cast-in-place construction, rehabilitation projects and prefabricated elements such as concrete pipes and manholes. V-shaped Ultra Grip anchors are designed for concrete structures subject to high groundwater back pressure. Taller anchors are designed for rehabilitation of structures where a thicker layer of grout is required. Liners are available in a wide variety of resins (HDPE, PP, PVDF, ECTFE), thickness and sheet/roll dimensions. **800/373-2478; www.agruamerica.com. ♦**



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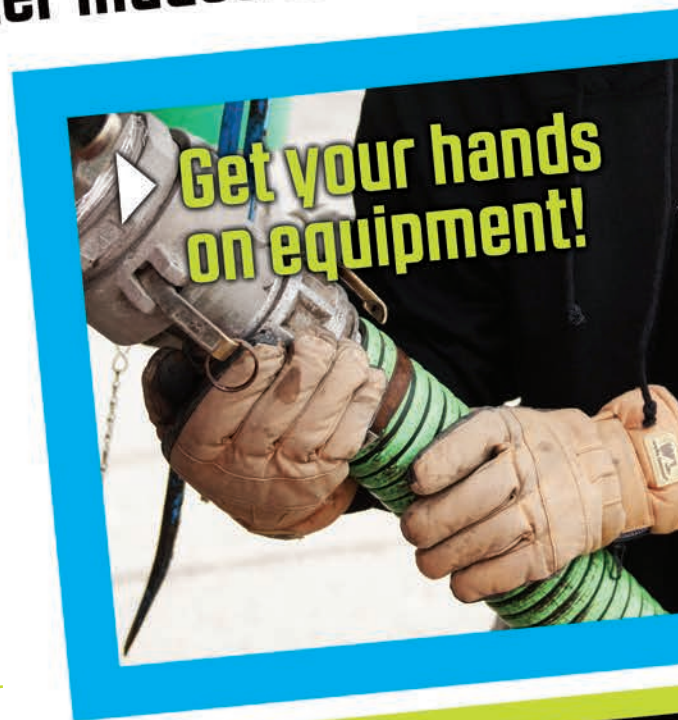
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Oldcastle Precast acquires Colorado Precast

Oldcastle Precast, a manufacturer of precast concrete, polymer concrete, composite and plastic building products, acquired the assets of Colorado Precast Inc. with a manufacturing location in Loveland, Colorado.

Green Truck Association names board of governors

The Green Truck Association, an NTEA affiliate division, named Shawn Brougham chairman, Amy Dobrikova vice chairman and Chris Weiss treasurer. Brougham is director of product development at Altec Industries. Dobrikova is president of Intelligent Fleet Solutions, and Weiss is vice president of engineering at The Knapheide Manufacturing Company.

Aqua-Aerobic Systems releases product brochure

Aqua-Aerobic Systems published a cloth media technology brochure that highlights the features and benefits of its OptiFiber technology. The 12-page brochure is available to view or download at www.aqua-aerobic.com.

Fluid Imaging Technologies celebrates growth

The FlowCam particle imaging and analysis system from Fluid Imaging Technologies is now in operation in 50 countries, including all seven continents and on a fleet of ocean vessels worldwide.

Tigre-ADS USA names regional sales manager

John Kane joined Tigre-ADS USA as regional sales manager for Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Oregon, Nevada, Utah, Washington and Wyoming. He has a sales and marketing background with a history in the wastewater management segment and plumbing distribution market.



John Kane

Cretex Specialty Products names regional sales rep

Cretex Specialty Products named James Dugger regional salesman. He will oversee sales and marketing elements for the Cretex product lineup and will work to expand product specifications and use through promotional efforts.



James Dugger

GapVax nears completion of first phase of expansion

GapVax is nearing completion on the first phase of a 160,000-square-foot addition to its manufacturing facility in Johnstown, Pennsylvania. The first phase encompasses about 100,000 square feet for blasting, painting and finishing product. The upcoming second phase will focus on the fabrication process. GapVax will have about 250,000 square feet of manufacturing space on 15 acres once expansion is complete.

McElroy Manufacturing redesigns website

McElroy Manufacturing launched a redesigned website, www.mcelroy.com. The site features a new menu structure where machines are grouped into two categories based on the type of industries served and a search feature.

Avanti International names regional manager

Avanti International named Jacob Swanson Midwest regional manager. He has over 10 years of injection grouting experience.



Jacob Swanson

Envirosight releases Sewer Zoom Camera Buyer's Guide

Envirosight released a new *Sewer Zoom Camera Buyer's Guide*. The complimentary guide can be downloaded off the company's website, www.envirosight.com.

Isuzu Commercial Truck of America names Skinner president

Shaun C. Skinner was named president of Isuzu Commercial Truck of America, where he previously served as executive vice president and general manager. Skinner, who also serves as president of Isuzu Commercial Truck of Canada, joined American Isuzu Motors in 1987.



Shaun Skinner

LMK Technologies names regional sales manager

LMK Technologies named Pete Tortorici regional sales manager for the Central Midwest. He has over 30 years of experience in the trenchless, water and sewer industries, which includes representing protective coatings and lining products in the municipal and industrial markets.



Pete Tortorici

Ring-O-Matic partners with Utility One Source

Utility One Source, which provides sales, rental and aftermarket service of heavy equipment, will make Ring-O-Matic's vacuum jetters available to customers nationwide from its 23 locations.

Trio-Vision acquires Cobra Technologies

Trio-Vision acquired the assets of Optical Robotics' Cobra Technologies brand. Trio-Vision will keep the brand of Cobra Technologies' products and introduce a new range of inspection products, including portable crawler systems and manhole cameras. ♦

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PEOPLE/AWARDS

The **City of Mississauga, Ontario**, was recognized by Credit Valley Conservation for its “support and adoption of innovative stormwater practices” and presented with the 2015 Friends of the Credit Award for the development of the Central Parkway Rain Garden, which uses a creative way of catching and using water runoff. Rainwater is filtered through soil in underground units called soil cells. The water is then provided to the trees above. This new process improves stormwater management in the area while adding to the urban tree cover. The rain garden is located in Ward 4 on Central Parkway East, south of Burnhamthorpe Road and north of Mississauga Valley Boulevard.

Jason Craft, engineer with the City of Clinton, Iowa, was honored by the Iowa Stormwater Education Partnership for his leadership effort to implement green stormwater infrastructure to address urban stormwater quality and quantity issues associated with Clinton’s combined sewer overflows.

Joanna Colletti was selected by the Illinois Jaycees as an honoree for its Outstanding Young Persons of Illinois awards program. Colletti, who was recognized in the Personal Achievement category, volunteers with the Cary-Grove Jaycees and the Fox River Grove Lionesses Club. She is the water resources manager and chief stormwater engineer for the McHenry County Department of Planning and Development. She also sits on the Sustainability Committee for the Illinois Chapter of the American Society of Engineers and is a member of the Illinois Association for Floodplain and Stormwater Management and the Northwest Water Planning Alliance.

The American Council of Engineering Companies of Illinois recognized **Baxter and Woodman** (based in Crystal Lake, Illinois) for engineering a \$10 million construction project in suburban Glenview. The Harms Road Regional Stormwater Project protects residents from river backflows while simultaneously allowing local storm flows to drain. Officials from Glenview and the Glenview Park District cooperated and assisted Baxter and Woodman on the project. The council selects winning projects based on project originality and complexity, client expectations, and social, economic or sustainable design effects.

The Rockdale County (Georgia) Board of Commissioners announced that **Todd Cosby** was named the county’s Employee of the Year for 2015. Cosby is the general engineering manager of the county’s Department of Planning & Development – Stormwater Division.

LEARNING OPPORTUNITIES

American Water Works Association

AWWA is offering a webinar titled *What You Need to Know About Climate Risks to Water Utility Infrastructure and Assets* on Nov. 30. Visit www.awwa.org.

Wisconsin

The University of Wisconsin Department of Engineering-Professional Development is offering *Using WinSLAMM v. 10.2: Meeting Urban Stormwater Management Goals R324* on Oct. 6-7 in Madison. Visit epdweb.engr.wisc.edu. ♦

CALENDAR

July 3-6

Canadian Society for Bioengineering Annual General Meeting and Conference, Halifax World Trade and Convention Centre, Halifax, Nova Scotia. Visit www.csbe-scgab.ca.

July 11-13

American Water Resources Association Summer Specialty Conference: GIS and Water Resources, Hilton Sacramento Arden West, Sacramento, California. Visit www.awra.org.

July 17-20

American Society of Agricultural and Biological Engineers 2016 Annual International Meeting, Orlando, Florida. Visit www.asabe.org.

Aug. 14-18

Geo-Chicago 2016: Sustainability, Energy and the Geoenvironment, Sheraton Chicago Hotel & Towers, Chicago, Illinois. Visit www.asce.org.

Aug. 22-25

StormCon, Indiana Convention Center, Indianapolis, Indiana. Visit www.stormcon.com.

Aug. 28-31

American Public Works Association International Public Works Congress and Exposition, Minneapolis Convention Center, Minneapolis, Minnesota. Visit www.apwa.net.

Sept. 12-14

National Rural Water Association WaterPro Conference, Orlando, Florida. Visit www.nrwa.org.

Sept. 28-Oct. 1

American Society of Civil Engineers 2016 Convention, Oregon Convention Center, Portland, Oregon. Call 800/548-2723 or visit www.asce.org.

Nov. 13-17

American Water Resources Association 2016 Annual Conference, Florida Hotel and Conference Center, Orlando, Florida. Visit www.awra.org.

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