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March 2017

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Arizona utility's collections
system grew faster than
inspectors could ensure quality,
but the town has taken control
with strong asset management

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Hondo Judd
Environmental compliance administrator
Gilbert, Arizona

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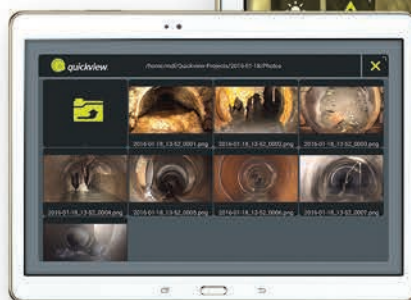
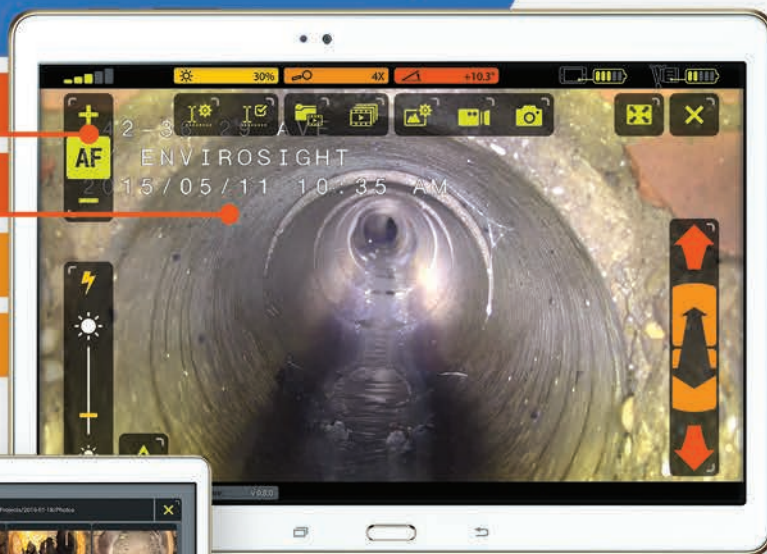
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ON THE COVER: Environmental compliance administrator Hondo Judd on site during a sewer line repair project in Gilbert, Arizona. (Photography by Mark Henle)



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MARCH 2017

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



Kayla Bisnette

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EXPAND YOUR POOL OF POTENTIAL EMPLOYEES

Building a diverse employee base can provide a better future for your utility



FROM THE EDITOR

Luke Laggis

An aging workforce is something a lot of utilities are struggling with. So many seasoned professionals are putting their work boots away and moving on to the next phase of life, and with them, an incredible volume of institutional knowledge is walking out the door.

It's not always easy to bring enough young, career-minded individuals into your utility to build on past successes and push beyond. The pool of candidates is often shallow, but you can add depth.

This month's Human Side column discusses the value in mentoring high-potential female employees. Wastewater may not be a career field that draws throngs of over-qualified women, but beyond mentoring, it makes sense to take a closer look at providing more opportunities to women.

We've all heard about the glass ceiling women are up against. I certainly understand the concept and how it legitimately plays out in the workforce. And I understand the utility field, how it's historically been extremely male-dominated, and how that can sometimes lead to a fear of altering the workplace dynamics. I hope you're not among those who feel this way, but certainly some do.

Now let me tell you a little bit about my experience. I grew up in a single-parent household. My mom worked extremely hard and put three kids through college on her own. I always just knew she was capable of doing and providing anything the family needed. My sister, the oldest of my two siblings and me, graduated from college before I reached high school. She has been very successful throughout her career.

I didn't grow up with any kind of notion that women were less capable. In fact, the women closest to me were incredibly strong and successful people.

The Human Side column points out that evidence shows organizations benefit from increased gender diversity, but the vast majority of female workers keep knocking their heads squarely into the metaphorical glass ceiling.

My point is less about that ceiling specifically than it is about the need to recruit and hire good people, especially as an aging workforce cycles out and new talent is necessary. In the coming years, with our national infrastructure facing massive issues and as people increasingly recognize the importance of clean water and protecting our resources, the need for a strong and dynamic staff will continue to grow.

Given that need, it only makes sense to expand the pool of potential employees. By doing so you'll raise your own ceiling. And as Human Side points out, making an effort to mentor female employees and prepare them for leadership roles can bolster your upper ranks. If you need any more evidence, read this month's profile on Spartanburg Water System COO and WEF Fellow Rebecca West.

Good leadership will play a huge role in moving your utility forward. Embrace all avenues to get there.

I hope these stories can help you and your utilities.

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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BATTLING OVERFLOWS

Toledo Significantly Reduces Overflows With Massive Multi-Year Program

February's cover story focused on an 18-year, \$500 million effort undertaken by the city of Toledo, Ohio, to upgrade infrastructure and cut down on the amount of sewer overflows. This online video profile focuses on a few of the current projects being wrapped up, including a 36 million gallon underground storage basin with a 172 mgd pump station. mswmag.com/featured



OVERHEARD ONLINE

“I would say somebody was falling asleep. Out of sight, out of mind — that's the mentality of too many bureaucratic people running systems.”

— *Infrequent Inspections Likely Led to Chronic Sinkhole Issues Says Former Detroit Sewer Worker*
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WATER AFFORDABILITY

America May Not Be Able to Afford the High Cost of Its Aging Infrastructure

About one-third of U.S. households will be unable to afford water in five years if water rates continue rising at projected amounts. That's the claim of a recent Michigan State University study, which analyzed water consumption, pricing, and demographic and socioeconomic data to come to its conclusion. The reasons behind the impending crisis are explained. mswmag.com/featured

THE TRUMP EFFECT

Will the New President's Promise to Prioritize Water Infrastructure Pay Off?

Leading up to the presidential election last November, Donald Trump said, “We’re going to rebuild our infrastructure, which will become, by the way, second to none. And we will put millions of our people to work as we rebuild it.” Encouraging words, but as utilities across the country struggle with the problems of aging infrastructure, how much rebuilding will actually come to fruition with Trump in the Oval Office? Some industry players speculate. mswmag.com/featured



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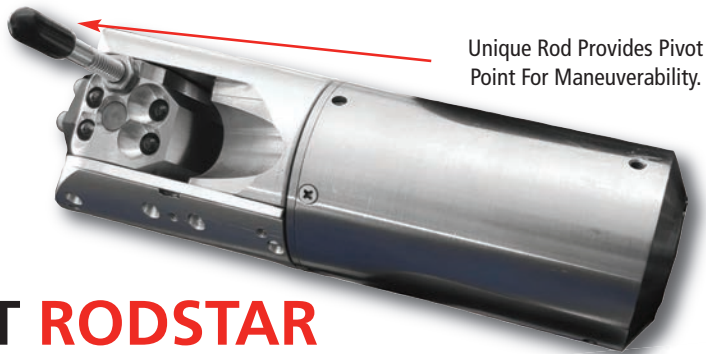
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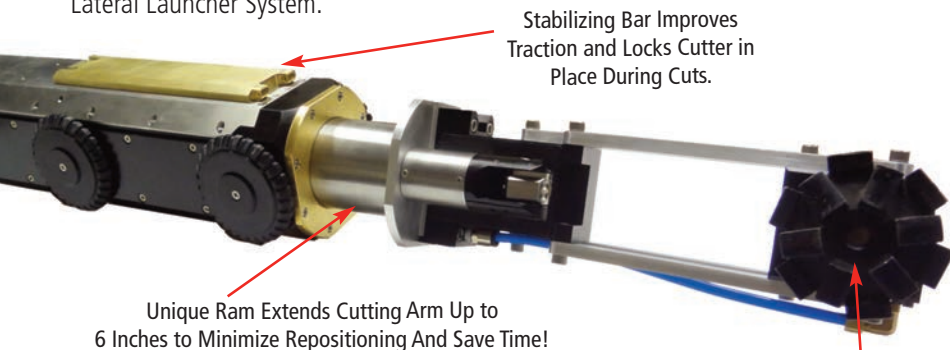
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THE SINGLE *conductor* SOLUTION

Abel Martinez uses a RIDGID NaviTrack locator to mark the path of a damaged sewer line in Gilbert, Arizona. (Photography by Mark Henle)



CATCHING UP TO THE BOOM

Arizona utility's collections system grew faster than inspectors could ensure quality, but the town has taken control with strong asset management

By *Peter Kenter*

The population of Gilbert, Arizona, has skyrocketed from under 6,000 in 1980 to more than 240,000 today. That growth required rapid construction of wastewater infrastructure, but the municipality found itself overwhelmed as growth outpaced its ability to set new building standards, amend building codes and properly inspect new construction.

In the years since, developing a solid life cycle

asset management program has allowed the town to take stock of its infrastructure, budget to repair existing defects and bring much needed oversight to new construction.

Environmental compliance administrator Hondo Judd says the home-building boom from 2008 to 2013 was

“We ranked among the top 10 fastest-growing municipalities in the nation, but that expansion didn’t occur without growing pains. A lot of infrastructure was put into the ground wrong — contractors couldn’t put it in the ground fast enough for their customers.”

— Hondo Judd

(continued)



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“We were always fighting fires as we discovered these defects. We needed to become more proactive.”

— Hondo Judd

the most challenging period in the town’s wastewater system development.

“We were processing more than 1,000 building permits a month,” says Judd, who joined the utility in 1995 and served as Wastewater Division field supervisor from 2000 to 2014. “We ranked among the top 10 fastest-growing municipalities in the nation, but that expansion didn’t occur without growing pains. A lot of infrastructure was put into the ground wrong — contractors couldn’t

put it in the ground fast enough for their customers. At the same time, much of it was put into service without proper inspection due to limited resources available to the city inspection department. In some cases, road inspectors or water system inspectors were called in to inspect wastewater infrastructure that wasn’t in their area of expertise. After the infrastructure was commissioned, we would take it over for operation and maintenance, including deficiencies.”

Gilbert’s collections system encompasses 879 miles of gravity sewers and 27 miles of force main, with pipes ranging between 6 and 42 inches in diameter. Gravity sewers are primarily SDR 35 PVC, with the remainder made of HDPE. Force mains are made of C900 PVC, glass-lined ductile iron, concrete-lined ductile iron and a little clay.

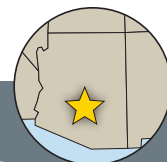
About 2 miles of force main made of concrete-lined ductile iron are currently being replaced because of hydrogen sulfide corrosion. “It should have been specified as C900 PVC, but this was a developer-driven project and the only involvement the town had was startup and training for us to operate and maintain,” Judd says. “Overall, our wastewater infrastructure is in good shape because it’s so new. However, there is still stuff that needs attention simply because it wasn’t installed properly.”



Abel Martinez (top) and Jamie McNamara use a RIDGID SeeSnake to locate a problem in a small-diameter sewer line.



Jamie McNamara (center) and Jeff Boll (right) of the Town of Gilbert clean a sewer line with a Vac-Con jet/vac truck after excavating around a damaged section of pipe.



PROFILE:

Wastewater Division,
Public Works,
Gilbert, Arizona

YEAR ESTABLISHED:
1965 (wastewater)

POPULATION SERVED:
243,000

AREA SERVED:
73 square miles

DEPARTMENT STAFF (WASTEWATER COLLECTIONS, LIFT STATIONS):
21

INFRASTRUCTURE:
Sewer — 879 miles gravity/
27 miles force main, 17,713 manholes,
61 air release valves, 15 lift stations;
water — 1,297 miles

ANNUAL DEPARTMENT OPERATING BUDGET (WASTEWATER COLLECTIONS):
\$7.6 million

WEBSITE:
www.gilbertaz.gov/departments/public-works/water/wastewater

“By developing cost assumptions, we could properly budget for inspection and maintenance against the cost of doing nothing.”

– Hondo Judd

The division took steps in 2008 to press for new standards for contractors and better communications with inspectors.

“We were seeing sanitary sewer overflows because contractors left mechanical plugs in the line, or just cut the plugs and let them flow down the pipe until they got stuck,” Judd says. “We changed the requirements so that contractors had to map out the infrastructure they installed and identify the locations of plugs. We also opened lines of communication, so that inspectors would provide us with CCTV video of pipe inspections so we could provide secondary approval.”

Contractors were also made fully responsible for defective work.

“The builders knew that if the belly of the pipe didn’t meet our standards they would have to dig it out and replace it,” Judd says. “That alone has improved work quality significantly.”

By 2013, the department developed an asset management program to determine what was in the ground already and what shape it was in. “We were always fighting fires as we discovered these defects,” Judd says. “We needed to become more proactive.”

The program consisted of five steps: taking inventory, prioritizing assets, developing an asset management plan, implementing the asset management plan, and reviewing and revising the asset management plan. The entire plan was completed within existing budgets, using no outside contractors.

Taking inventory

The division took existing maps and ensured that infrastructure was accurately represented. Crews located manholes, air-release valves, lift stations, flowmeters and valves. They also located sanitary sewer lines and force mains, and correctly identified pipe material and flow direction. All infrastructure was mapped using ArcGIS by Esri. Infrastructure was also inspected for obvious defects (see sidebar).

“Any discrepancies were redlined and marked for updating,” Judd says. “We had to develop a good relationship with the town’s GIS department to include all of the additional information we were bringing in.”

Prioritizing assets

Each asset was inspected to determine conditions most likely to negatively affect them. “Based on those conditions, we could decide what should be replaced, repaired, cleaned or rehabbed and what those actions would cost,” Judd says. “We also rated the importance of those assets. For example, those assets that would affect hospitals, schools and parks received higher priority.”

The department redesigned inspection forms for each type of infrastructure, to collect the most important information about that asset. For example, a wet well inspection form asks crews to rate each component on a scale of one to five:

- 1-Failure: Immediate replacement
- 2-Poor/Very Poor: Needs to be replaced this year
- 3-Fair: Evaluate in two years
- 4-Good: Evaluate in five years
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Work order software supplied by Lucity was customized to dovetail with the inspection forms.

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Tim Papenthien, Repair Service Supervisor

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Casey Sanchez removes a Flygt dry well pump for repair at the Town of Gilbert's Crossroads Lift Station. The employees wear BW Technologies Gas Alerts for safety.

The department operates two sewer cleaning trucks — one Vac-Con and another from Clean Earth. It also operates two CUES CCTV camera systems. The equipment played an important role during the inspection phase.

Crews were also called on to perform critical repairs uncovered during inspection. In-house crews perform all repairs requiring excavations 14 feet deep or less, which don't require engineering approval for shoring. Crews also perform manhole rehabilitation, but outsource CIPP.

Making assumptions

The department created life cycle assumptions for each asset.

"We tried using industry standards to determine the life expectancy of the asset, and the costs associated with extending the life of that asset, either through full replacement or rehabilitation," Judd says. "In the wastewater system you never know what is coming down the pipe. There are so many contributors ranging from residential, commercial, industries and restaurants."

THE TRUTH BELOW

An important part of any asset management program is thorough inspection and listing of defects. The town of Gilbert, Arizona, embarked on such a program in 2013.

"We believe that contractors want to do good work," says Hondo Judd, the town Wastewater Division's former field supervisor. "However, with inspectors stretched to their limits and contractors meeting tight deadlines, they didn't always hit all the marks."

Among the discoveries of inspection crews:

- Manholes full of construction debris, including chunks of concrete and plywood
- Pipes containing plugs
- Pipes not cut properly after installing a manhole, leading to overflows
- A manhole filled with leftover pea gravel, concrete and rebar
- Cross bores through gravity lines

"In many cases we were finding manholes well below grade," Judd says. "We had to use quite a few new collars, concrete rings and complete inserts to bring everything back up to grade."

The department made educated assumptions based on actual experience, and compared them to information collected by other municipalities. The figures also included the expectation of full replacement with or without maintenance.

"Prior to this, we were paying for unexpected infrastructure work out of our operations or contingency budget," Judd says. "By developing cost assumptions, we could properly budget for inspection and maintenance against the cost of doing nothing. For example, lift station pumps were expected to last four years without maintenance, and 12 years with maintenance. We assumed a future pump replacement expenditure of \$117,000 and could balance those costs against a regimen of quarterly inspection and cleaning, and scheduled pump motor oil changes and pump seal and ring replacement."

One of the most important pieces of the asset management plan was establishing how much money would be required each year to efficiently maintain the wastewater system. Based on such assumptions, for example, the department is working toward a benchmark of cleaning the entire system every four years, and inspecting the entire system via CCTV every five.

Implementing an asset management plan

Implementation of the plan includes securing actual funding to carry out objectives for all projects, both current and capital.

Certain assumptions were also written into the local building code. For example, epoxy coating was assumed to add 15 years to the life of each new manhole. The average cost of epoxy coating was estimated at \$5,000 to \$20,000 against full replacement costs of \$35,000. As of 2010, all manholes connected to sewer pipes 12 inches in diameter or larger must be coated with epoxy or composite prior to acceptance.

Judd also worked with other departments to extend asset life. For example, the department responsible for city streets has now cautioned maintenance contractors to be more careful with manhole lids, which were sometimes handled roughly, tearing the epoxy coating and voiding warranties.

Revising the plan

The department aims to revisit the plan annually and conduct a deep review every five years.

"Operating a wastewater system, you don't have the luxury of sitting on the sidelines and hoping for the best," Judd says. "We've crossed a lot of bridges and broken down silos. Today we are more confident that we can make better operational decisions, have a more thorough knowledge of our system and can allocate funds to capital projects that meet the true needs of the system." ♦

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SEWER HISTORY PROVIDES PERSPECTIVE

Links to the past can strengthen your foundation and vision for the future

By Ted DeBoda

NASSCO's commitment to ensure the continued acceptance and growth of trenchless technologies is supported by an understanding of how far sewage conveyance systems have come. Learning about sewer system development and evolution creates a deep appreciation for those who came before us and worked hard to provide effective sanitary systems to communities throughout history.

Over the past 20-plus years, Jon Schladweiler, the historian of the Arizona Water Association, has researched, collected and archived sanitary sewer system materials. Dating from approximately 3500 B.C. through the 1930s A.D., this dynamic collection of materials demonstrates the evolution of sewers over the past 5,500 years, and is assembled in NASSCO's Sewer History Exhibit.

The exhibit includes sewer system components such as manhole covers from around the world, different type of pipes, pumps, flush tanks, gates and flushing mechanisms. Other features of the exhibit include various design work, early construction projects, the evolution of maintenance and safety, global disasters and sinkholes, the connection between disease and sanitation, ancient private and public sanitary facilities, sewage treatment methods, and sewer history by region and era, going back to Mesopotamia and the Indus Valley from 3000-2000 B.C.

Managed by NASSCO since 2014, various association members have stepped up to sponsor this important display, allowing us to transport the exhibit across the country to expose as many industry professionals as possible to the unique artifacts it contains. Most recently, the exhibit was displayed, in partnership with COLE Publishing, at the WWETT show in Indianapolis, and will be exhibited at other local and national conferences throughout the year, including WEFTEC next fall.

NASSCO recently built a more portable display that resides in our training center in Marriottsville, Maryland. The display includes artifacts that were not previously displayed with the main exhibit, including wood log and wood stave pipe, glazed clay pipe, and even an Orangeburg pipe repair kit. NASSCO's training center receives hundreds of students and industry professionals each year who now have an opportunity to enjoy and learn from this exhibit.

NASSCO's goal in supporting this important collection is to educate people within the sewer industry about our past, and encourage them by demonstrating the strides our industry has taken to continually improve the conveyance of sewage through the ages. Our mission to set standards for the assessment, maintenance and rehabilitation of underground infrastructure is also supported, as the impressive display shows the ingenuity and innovation that has continued — and will continue on — in large part due to the standards developed, achieved and improved upon throughout the years.

If you have historic materials, photographs, books or other relevant information that could support the education of our important past, please contact Jon Schladweiler at jcschlada@msn.com or info@nassco.org. Also, if you are part of an organization that would like to host the exhibit, contact NASSCO at info@nassco.org. ♦

NASSCO (National Association of Sewer Service Companies) is located at 2470 Longstone Lane, Suite M, Marriottsville, MD 21104; 410/442-7473; www.nassco.org

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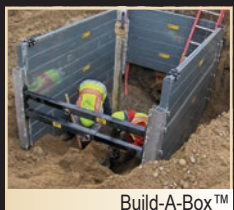
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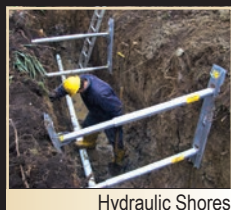
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REACHING ACROSS THE INDUSTRY

WEF Fellow Rebecca West has dedicated her career in water to healthy people and communities

By Steve Frank, APR

Rebbecca West has managed everything from collections systems to community involvement programs, and she knows the water industry.

“My career has been like moving from one stepping stone to another, then jumping on a bulldozer, then back on the stepping stones,” says West, now the chief operating officer of Spartanburg Water System and a new Water Environment Federation (WEF) fellow. The fellow designation recognizes career achievements, stature and contributions to the water profession. West also served as WEF president from 2008-’09.

West’s utility serves what’s called “the upstate” of South Carolina. It’s actually two entities — water and wastewater — that operate under one name. Spartanburg Water System is a political subdivision of the city of Spartanburg, while Spartanburg Sanitary Sewer District is a South Carolina special purpose district.

West oversees engineering, technical services, the capital improvement plan, contracts, regulatory permits, operations and maintenance, human resources, the utility’s

“The neat part was learning how we have to get the public to embrace what we do from start to finish. It’s just like a business. We have a product.”

— Rebecca West

involvement in economic development for the area, and other community involvement efforts. Along the way, she has worked in a lab and managed a biosolids department, collections and distribution systems, three drinking-water facilities and more than 10 clean-water plants, as well as safety and security programs.

Lately she has worked with the Spartanburg Economics Futures Group to help Spartanburg land a large company, Toray Industries, that would supply carbon fiber parts to Boeing. Landing the company would mean an economic shot in the arm for the community. Her role is to help the company’s manufacturing processes work with Spartanburg Water’s needs. It’s pretreatment done right, ensuring that the processes are water-friendly from the start.

(continued)

Rebecca F. West, chief operating officer of Spartanburg Water (Photography by Ken Osburn)



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“Once I realized that’s what asset management helps you do, I understood better how to decide, for example, whether to drive a piece of equipment to failure or just to partial failure. I also learned how such decisions connect to customer service and to regulatory compliance.”

– Rebecca West

The move to water

West has moved steadily up the ladder since she began her career in water. She started in 1986 with a bachelor’s degree in biology from Wofford College in South Carolina. She enrolled at Wofford intending to go into medicine (the biology degree was to be her premed education). But Wofford required courses beyond biology, and West took and enjoyed some environmental courses.

She worked at a hospital for a year, but something about improving the environment kept tugging at her. A lab job opened up at Western Carolina Regional Sewer Authority in Greenville, South Carolina (now Renewable Water Resources), and West said to herself, “I have a biology degree. I can work in a lab.”

She got the job and credits her boss there, Andrea Fagin, with being a great mentor.

The authority was upgrading its wastewater treatment plant and phosphorus removal process, and that introduced West to operations: “I fell in love with it.”

When Western Carolina ventured into biosolids land application, West was chosen to manage the new department. Fagin supported West and sent her to training. West developed the lab methods and worked closely with operations. “That’s what got me into operations,” she says.

‘Bad News Bears’

Solids management then consisted mostly of moving material from Point A to Point B and to landfill. The people in her department were known as “the Bad News Bears” of the organization. “I was a very young manager, and green,” West says. “I knew enough about operations to be dangerous, and they put me in charge of heavy-



Inset: Spartanburg Water is focused on water conservation, as evidenced by the Water Wise Garden outside its administration building. Right: The fountain in front of the Spartanburg Water administration building in Spartanburg, South Carolina.



equipment operators and truck drivers. It was a world I didn’t know anything about.”

She worked through what her team was doing to produce biosolids so she could tell her operators and her customers. “We were going to start this department and we were going to produce biosolids,” she says. “We were going to make a viable product.”

So West began training. Her operators soon became certified Class D biological wastewater operators and biosolids operators. West then developed the biosolids operator certification program. She spearheaded the Biosolids Operator Training School and the Biosolids Operator Certification Program for South Carolina.

“What I learned in managing biosolids was that it was important for marketing and acceptance that you have a product people can trust,” West says. “Our team learned to communicate with the farmers and encourage and teach them that this was a safe product and what they could do to help us. By the time I left that department, it was *the* department to be in.”

(continued)

PROFILE:

Rebecca F. West,
Spartanburg Water System,
South Carolina

POSITION:

Chief operating officer

EXPERIENCE:

28 years (at Spartanburg Water since 2002)

CERTIFICATIONS:

Biological Wastewater Operator,
Biosolids Operator

EDUCATION:

Bachelor of science in biology,
Wofford College

GOALS:

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Manager Josh Smith and lead operator Mike Russell monitor Spartanburg Water's Fairforest Reclaimed Water Facility in Spartanburg, South Carolina.



Teaching experience

West's experience at Western Carolina taught her a lot. "The neat part was learning how we have to get the public to embrace what we do from start to finish," she says. "It's just like a business. We have a product. We have to understand all the inputs and our manufacturing processes, and how they combine to make our final product."

"We have to know the process is right so we can market and sell our product. Having the operators understand what we were doing — that we were not just dumping stuff in a landfill so we could check off a box and be done for the day — made it a great program for the industry."

From biosolids, West became manager of operations. "I got to where I could start to see the bigger picture," she says. "That was my big 'aha' moment." She came to understand that she wasn't just building facilities; she needed to build facilities that matched the skill sets of the people working there.

"You can't just give a toddler a car and say 'Have at it,'" she says. "You have to build a facility that matches the capabilities of your staff, or you have to get staff that has broader capabilities."

The next level

From Western Carolina, West moved on to

become director of technical services with Spartanburg Water 2002-'09 and deputy general manager of engineering and technical services with that entity 2009-'13 before taking her present position, where her duties still include overseeing facility development.

She says considerations with infrastructure design are often tied to similar considerations of the staff. "Is their existing skill set the right one to operate this facility? What are their capabilities? What's their assimilative capacity? How far can I go? Then we have to ask ourselves, 'What are they able to do?' And we determine what is needed to bring them to the next level."

EXPECT THE UNEXPECTED

Aggressive preparation for natural disasters helped Spartanburg Water "dodge a bullet" after the intense storms that inundated parts of South Carolina in October 2015.

Unprecedented rains fell in numerous areas of the state. Two Columbia locations got more than 15 inches in 24 hours on Oct. 3-4, and 16 inches fell in another area. A personal weather station in Columbia got 18.7 inches.

Rebecca West, chief operating officer, says the Spartanburg area got

about 6 inches of rain over two days, but the utility was prepared through its long involvement in climate change discussions and planning for intense weather.

For example, the utility is working to have minimal water and sewer lines crossing creeks, "unless they're on a bridge or under a creek," West says. "We've intentionally designed the distribution system with alternate routing scenarios and redundancies built in." Service outages of more than 12 hours have been rare.

"We've also built temporary systems for the short term when we lost a feed waterline," West says. "It takes planning, but that's a decision made in the beginning that has allowed us to be where we are today."

“I grew up in Charleston on the coast. As a child, I was always wanting to go to the beach, but my mother always said, ‘No, it’s polluted and contaminated.’”

– Rebecca West

Some people, she observes, have already found their level. Then it’s necessary to find other people to complement them, “so we can run the facilities the way they were designed to be run.” All of this thinking brings the question: Why do I need this technology?

“Will it help us operate the facility and meet our service level commitments, our customers’ needs and our regulatory requirements?” she asks. “What will it take to train operators to operate it as designed and intended? Will it create more work? Will it make us less efficient? Sometimes it’s OK to just roll the window down manually instead of using a button.”

Thinking about all this was her grand awakening as an operations manager. As she moved further into operations, she developed asset management skills that “have really shaped how I think about maintenance and how you make decisions about replacing parts in your system.”

She credits asset management with helping her truly know the system’s condition and capabilities of the system: “Once I realized that’s what asset management helps you do, I understood better how to decide, for example, whether to drive a piece of equipment to failure or just to partial failure. I also learned how such decisions connect to customer service and to regulatory compliance.”

Giving back

Along the way, West has given abundantly to the industry. Among her many contributions, she served six years on the South Carolina Environmental Certification Board, including two years as vice chair. She chaired the AWWA Reuse Committee in 2014-15 and for the past three years has chaired the South Carolina AWWA Water Utility Council. She also serves on the board of the South Carolina Water Quality Association and for four years served on the board of the Water Environment Research Foundation.

In 2015, she received the prestigious W.T. Linton Award for service and leadership from the Water Environment Association of South Carolina.

West’s life is not all work. She is active in her church and that has led her on two water-related mission trips overseas. One was to Harghita, Romania, where she oversaw the installation of an onsite wastewater treatment system that helped expand a church camp.

On another mission trip, she oversaw the development and installation of a water well in Kidete, Tanzania. The well serves a village of about 700 people who needed a reliable source of water. The well also provides water for a small farm that supports the children in a nearby children’s home.

Previously, the village had relied mostly on ditches for water supply. Her group worked with the local authorities and got the well drilled. It worked so well a neighboring village did the same thing.

She must have done well on these projects,

because her pastor is lining up another one for her.

“I blame my mother for all this,” West says with a chuckle. “I grew up in Charleston on the coast. As a child, I was always wanting to go to the beach, but my mother always said, ‘No, it’s polluted and contaminated.’”

West remembers telling her mother: “One day I’m going to fix this.” Although she didn’t go into medicine, she’s been working in public health ever since. ♦

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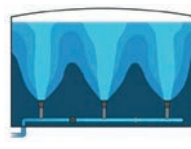
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CONQUERING CORROSION IN CONCRETE PIPES

Study demonstrates the impact of corrosion and effective means of treatment

By Irwin Rapoport

Sulfuric acid poses a danger to people working in the sewers. It can attack eyes, throats and lungs. Two municipal workers in Texas died due to H₂S exposure earlier this year. In extreme cases, when you have anaerobic conditions, the formation of methane gas can occur and result in explosions.

Thiobacillus oxidizes hydrogen sulfide gas to form sulfuric acid, and hydrogen sulfide may also combine with oxygen to form polythionic acids — a weak form of sulfuric acid.

Municipalities not only have to be concerned about odors from waste-

water systems, but from the corrosion caused by *Thiobacillus* bacteria that oxidizes hydrogen sulfide gas to form sulfuric acid, which corrodes concrete sewer pipes and structures and shortens the life span of the systems.

“Hydrogen ions in the acid attack calcium hydroxide in the hydrated Portland cement,” says Joost Goossens, co-author of an Evoqua Water Technologies study on the impact of corrosion. “The calcium ions and sulfate ions combine to form gypsum, a soft corrosion product. Additionally, ettringite may form. Gypsum and ettringite expand, placing stresses on the concrete and resulting in the loss of concrete aggregate materials. Due to the softness of both products, they are easily washed away by the scouring action of wastewater flow. The generally accepted method for preventing corrosion in the collections system is to short circuit the first step in the above process through chemical treatment of the wastewater to either prevent sulfides from forming or remove existing sulfides.”

Cities already chemically treat wastewater to remove noxious smells, but Evoqua’s 2015 study, *A Novel Test Method for Measurement of MIC in a Wastewater Collection System*, authored by Goossens and Tim Matheis, demonstrated the impact of corrosion. The study compared two sections of sewer lines owned by Sanitation District No. 1 in Boone, Campbell and Kenton counties in Kentucky, suburbs of Greater Cincinnati.

The two-year study evaluated the effect of H₂S at two sites 7.6 miles apart. One was treated as part of an odor control program (continuous pumping) and the other was untreated. The untreated site had a net loss in material of 5.4 percent and a reduction in compressive strength of 13 percent. The treated site



After six months of exposure to the treated wastewater stream, the concrete on the left showed minimal corrosion. The sample at right shows significantly more corrosion after the same period of exposure to untreated wastewater.



Concrete exposed to untreated wastewater after one year.



Left: Concrete exposed to wastewater treated to prevent hydrogen sulfide formation for 24 months.

Below: Concrete after 24 months of exposure to untreated wastewater, showing heavy corrosion.

had a net loss in material of only 0.2 percent and no decrease in compressive strength, and effectively reduced the formation of sulfuric acid and corrosion in the neighboring collections system.

The results, stresses Eric Hansen, Evoqua's municipal services product manager, showed that "the best protection against corrosion is a comprehensive control program that includes hydrogen sulfide monitoring, controlled chemical dosing, and performance monitoring and control. This investment will protect your system from dangerous conditions and expensive repairs down the road."

The study notes a 1991 U.S. EPA report to Congress that estimates a national cost, in 1991 dollars, for sewer rehabilitation at \$6 billion. In addition to the direct cost of replacing corroded infrastructure, there are hidden costs in lost time and labor that are diverted to emergency and repair activities, which are not spent on core wastewater collections system operations.

The EPA report was based on the severity and impact of concrete corrosion as surveyed by CSD-LAC, AMSA and WPCF in 89 cities. It found that 32 cities "reported sewer collapses, of which 81 percent of the collapses are believed to be due to hydrogen

sulfide corrosion. Furthermore, the study indicated that almost 70 percent of the 61 respondents experienced hydrogen sulfide corrosion at the treatment plant."

Once corrosion begins and is neglected, concrete pipes (often under roads), weaken and experience additional pressure from daily traffic. This can result in sewer collapses.

"We're at the cusp of municipalities starting to look at this problem proactively," Matheis says. "Am I going to spend a small amount every year

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TECH TALK



The two concrete samples on the left from the treated wastewater stream show minimal corrosion after two years. The samples on the right were exposed to the untreated stream and are significantly more corroded.

to maximize the life of my sewer systems as opposed to waiting for them to fail and spend millions to repair or reconstruct them? Usually, in the U.S., people just let it go and when it fails, they'll fix it. But it is very disruptive to the community because of construction and overflows."

The attacks usually occur at force main discharges, areas of turbulent flow, and other areas conducive to the release of H₂S from wastewater.

For the study, concrete coupons were placed at the discharges of two force mains, similar in terms of potential for sulfide generation and H₂S release. The treated site received a nitrate double-salt solution to prevent the formation of sulfide in the wastewater. Concrete test samples were compared at six-month intervals to assess the impact on the strength and integrity of the material.

The samples deployed downstream of the treated site were exposed to an average of 3.6 ppmv hydrogen sulfide, and showed a 0.2 percent reduction in mass and a 9 percent increase in compressive strength. The primary conclusion from the trial is that minimal corrosion of concrete occurred at hydrogen sulfide concentrations below 5 ppmv.

According to Evoqua, the chemical used for treatment is one of many different formulations available on the market under a variety of trade names and was selected as the best option from a stable of a dozen different odor control chemicals.

The treatment "demonstrated (that) effective sulfide control at other sites within the municipality's treatment area is well suited for sulfide control in wastewater collections systems with anaerobic retention times greater than two hours," Goossens says. "It's also safe to handle, as it is a nonhazardous chemical. You don't have to treat every inch of your system — you have it at a few key points."

The calcium nitrate salt solution contained 3.5 pounds of nitrate oxygen per gallon, which the study notes is used safely and effectively in over 600 municipalities to control hydrogen sulfide-related odors and corrosion on a daily basis.

It was released via the wet well of the pump station upstream of the control point, with dosing set at a constant average rate of 32 gpd.

"You could visually see the corrosion of the coupons in the untreated line," Goossens says.

The treatment, applied at certain points along the line, costs about \$75 per day and uses about 30 gallons of chemicals. Evoqua is currently conducting another study in Florida as part of a follow-up looking into chemical treatment and comparing it with the cost of sewer line replacement. ♦



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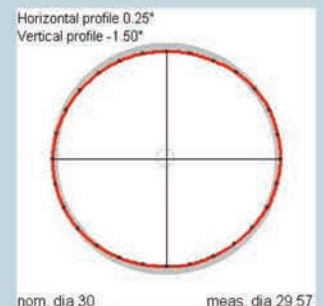
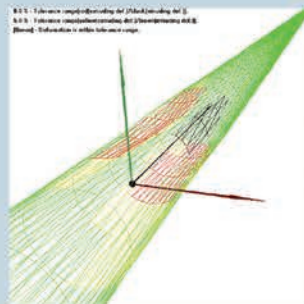
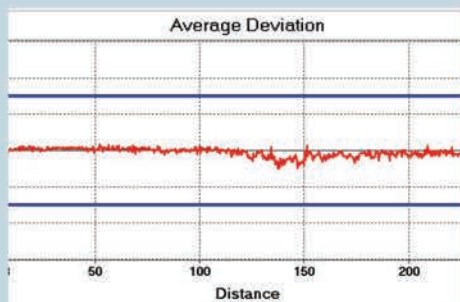
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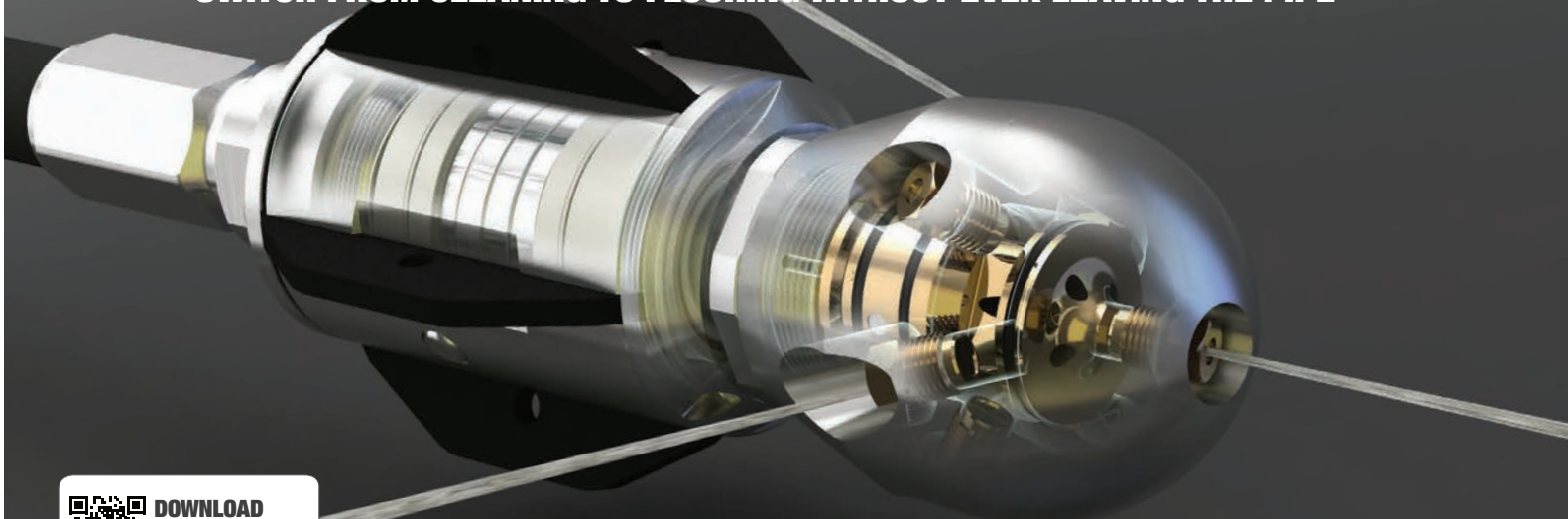
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BREAKING THE GLASS CEILING

Organizations benefit greatly from mentoring high-potential female employees and grooming them for leadership roles

By Ken Wysocky

There's ample and compelling evidence that organizations benefit from increased gender diversity, including improved profitability, innovation and decision-making. But despite that, the vast majority of female workers keep knocking their heads squarely into the metaphorical glass ceiling, unable to rise above middle-management positions.

The numbers are startling. According to a recent study performed by Catalyst, a nonprofit research group, women account for nearly 47 percent of the national workforce, yet only a little more than 5 percent of them are chief executive officers. Another survey performed several years ago by McKinsey & Company revealed that 140,000 women at 60 leading U.S. companies — or roughly one-third of all the female professionals at those companies — are mid-level managers. But only 7,000 hold senior-management positions.

The solution to this vexing problem? Provide mentoring for high-poten-

tial women, defined as those who demonstrate the ability to move beyond their current role and contribute to their organizations, says Dr. Rosina Racioppi, president and chief executive officer of Women Unlimited Inc. The consulting firm focuses specifically on helping organizations develop female leaders.

"Research performed by Carnegie Mellon University shows that diverse teams are more innovative and smarter than nondiverse teams," Racioppi says. "That's not because adding women to the mix raises the teams' IQ. It's because when people different from you challenge your assumptions, it forces you to more clearly articulate your point of view."

"While that may sound easy, it's not," she continues. "It's actually really hard. It's more challenging to manage a diverse team because it's more disruptive than how you might operate normally, due to the more divergent opinions and the unease that people experience when working with people different than them. But once you get over that, you can be so much more effective."

If adding more women to the ranks of senior management is so beneficial, then why don't more organizations do it? In some cases, it's self-inflicted. Some women don't even apply for promotions because they don't feel they're qualified, plus they're typically not as good at self-promotion as men, Racioppi says. In fact, one study shows that men will apply for a promotion if they feel they meet roughly 60 percent of the job requirements, while women will do so only if they believe they meet all the criteria.

Unconscious bias is also a big factor, she adds, pointing to research that shows organizations and decision-makers often view male and female capabilities differently. In general, men are promoted based on their potential, while women are promoted based on their performance, she explains.

Furthermore, women and men have different expectations of and experiences within organizations. Many women figure if they just do stellar work, that alone will speak for their capabilities. They're also not naturally invited into the same networks as men and they usually don't receive any guidance about how to develop those kinds of business relationships, Racioppi says.

As such, even when women do assume higher-level leadership roles, they're often ill-equipped to navigate this new corporate terrain. "They've reached that point through the quality of their work, not because of the relationships they've formed across the organization," she explains. "That's why mentoring becomes so crucial."

Women Unlimited teaches females how to develop beneficial relationships with senior managers that can help them flesh out their workplace development and address challenges they encounter. "We help create a structure for mentoring that provides access to senior leaders," Racioppi explains. "Then they learn how to create developmental relationships. After

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.



our program ends, women are better able to go back into their organizations and develop these ongoing relationships that will support their development going forward."

The challenge for organizations is to identify their high-potential women, select senior managers who would make good mentors and then teach them how to create effective relationships with their mentees. "The differences are in the subtleties," she points out. "It becomes a challenge because organizations are trying to find and define, say, five key reasons why the women in their organizations aren't advancing, and that's an impossible chore."

"Everyone's challenges are unique," she continues. "I believe it's critical to give women the tools they need to assess where they are and identify the challenges unique to them, then give them the resources to develop a plan to overcome those challenges."

Racioppi says high-potential women don't necessarily require female mentors. In fact, having male mentors helps women see how men handle various situations, and at the same time, it makes those male leaders more aware that their perspectives perhaps aren't as broad as they should be.

Successful mentoring depends heavily on mentees establishing a clear focus for their mentoring relationship. For example, what are their career aspirations and how can they go about achieving them? Or perhaps they're not sure what the next career step is, and they need help figuring that out. "The intention piece is critical," Racioppi notes. After applying what they're learning, the mentees then must be "open and vulnerable" while explaining what's working and what's not.

"Mentoring is a learning relationship, so if you're not transparent, you won't gain anything from it," she says. "You need to hold yourself accountable for sharing your experience and be open to thinking about it in a different way. Over time, you're broadening your thinking and your approach and creating a sustainable shift in how you do things."

At the same time, it's important that organizations examine their work cultures and find unintended barriers that sabotage female advancement. For example, research shows that managers often perform job appraisals differently for women than for men. Male feedback centers on how they can grow their skills to become viable candidates for promotion, while female reviews tend to focus more on how they've executed their responsibilities during the past year or on their interpersonal skills.

"It speaks to a certain mindset," Racioppi says. "I don't think it's because men out there want to harm women. I think it's a very subconscious activity. That's why it's so important for women to get the tools they need to navigate the organization. They need those resources as well as male counterparts."

Mentors should not be viewed as someone who

will solve the mentees' problems. Moreover, good mentors should be self-learners. "One thing I've heard from women during my research is that good mentors ask good questions that helped them solve whatever issues they're facing," Racioppi says. "A good trait for mentors is curiosity about not only the mentee, but their goals and how mentors can help them. If mentors maintain that curiosity, everything else will fall into place." ♦

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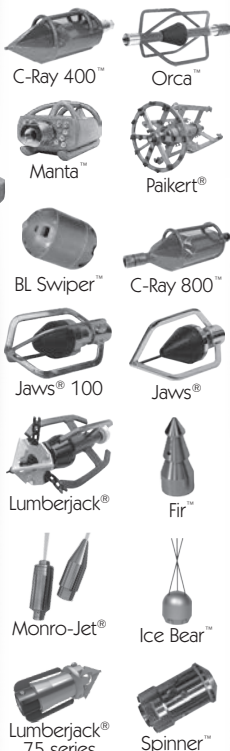
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TAKE CONTROL OF PRESSURE AND FLOW

IVL Flow Control solutions aim to help water utilities build autonomous distribution systems that limit losses and ensure reliable supply

By Ted J. Rulseh



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Creating autonomous smart networks that provide a reliable water supply and high-quality customer service at minimal cost

BENEFITS:

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Flow and pressure control are two of the biggest challenges in operating a water distribution system. Inadequate pressure means substandard service and possibly compromised firefighting capability. Excessive pressure, on the other hand, can accelerate leakage and cause pipe bursts.

The key to an efficient distribution system is balancing flow and pressure throughout the system. IVL Flow Control, a unit of Ham Baker Adams Group, offers an innovative approach based on strategic deployment of hydraulic control valves and air valves.

The company helps utilities create autonomous smart networks that provide a reliable water supply and high-quality customer service at minimal cost. Such a system does not require telemetry control, although linking to telemetry can enable more advanced network control. The flow and pressure management solution can be combined with active leak detection to help reduce water losses. Craig Stanners, an IVL Flow Control director, talked about the offering in an interview with *Municipal Sewer & Water*.

What is the basic concept behind IVL Flow Control?

Stanners: We understand water networks and how they are designed, from the source to the end user and everything in between. We work from knowledge of the network's hydraulics to develop a system of smart valves that can be set up to work on their own, or can be adapted to work with modern-day communications.

What experience does your company have in deploying this solution?

Stanners: We've worked with water companies in the U.K., including that country's oldest, Thames Water. We've also worked elsewhere in Europe with smaller municipalities. We have helped African countries that are implementing new water systems or connecting villages that have never had water service. And we have worked on larger systems in the Middle East such as Qatar, Dubai and Abu Dhabi that are planning very fast infrastructure changes.

The IVL Flow Control valves are pilot-driven and provide a positive seating closure for highly effective flow control. The valves are manufactured of ductile iron graded to at least 25 bar pressure and have stainless steel internal and external components.



The hydraulic control valves are placed at strategic locations around the distribution system.

How are all these valves controlled, connected, monitored, operated?

Stanners: We try to establish an autonomous system, where the valves automatically notice and adjust to changes in pressure in the system. Demand control valves are intelligent valves that use the pipeline network itself as the medium to transfer information. Each valve senses whether water is available upstream and whether water is required downstream. If both con-

In the largest sense, what does your solution do for water utilities?

Stanners: Basically, it deals with pressure management, leak reduction and transient issues like water hammer. If, for example, the system includes aging pipes nearing end of life, our solution will provide longevity by eliminating sharp bursts of pressure in the system. It creates a smooth flow all the way from the treatment works or reservoir to the end client. By balancing the system we can also reduce the electrical cost to operate it.

Please describe the equipment you deploy in the field to implement this solution.

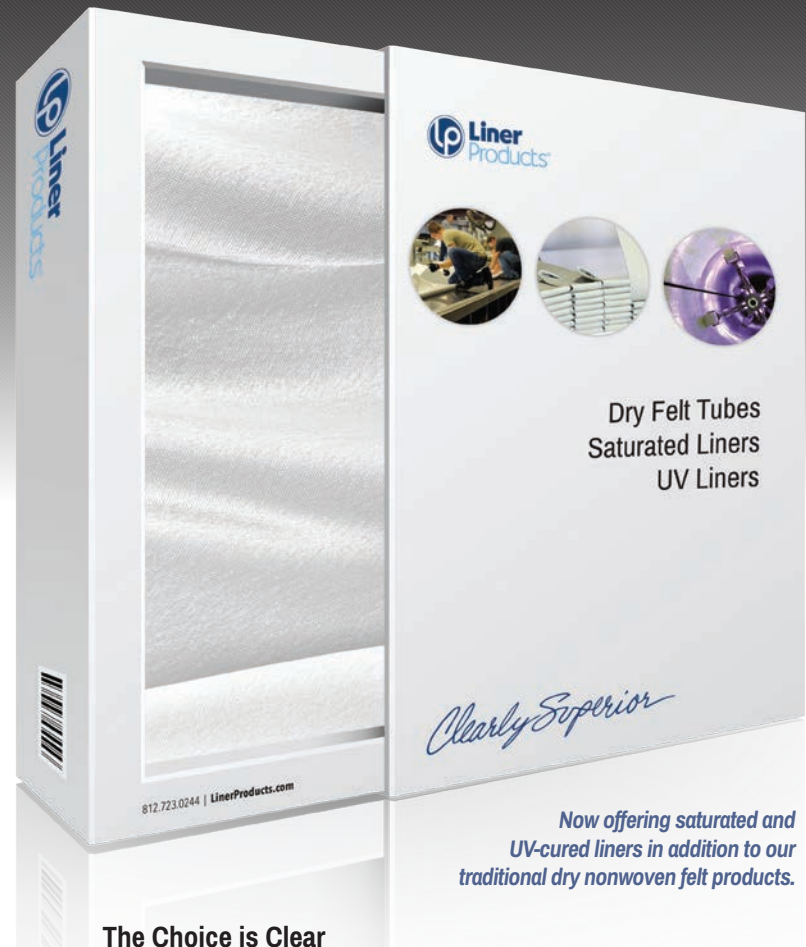
Stanners: We deploy a range of hydraulic control valves, including demand control valves as well as pressure-reducing valves, altitude valves, and in general all the types of valves commonly used in water systems. The advantage of our valves is that they operate from zero flow. That means the valves don't become unstable when the pressure drops to a bare minimum. We also have an extensive range of air valves that are built to deal with transient issues, such as rapid pressure surges. So if a utility needs to charge a main very quickly, these valves will allow that to happen without causing bursts in the system.

What is unique about the valves you deploy?

Stanners: Our control valves are pilot-driven valves. As water pulses through the valve, there is fine control by way of the seat coming from the top cover down to the bottom sealing surface. Our valves provide a positive seating closure, which provides the ultimate flow control. They also have a large belly that allows very high volumes to flow through. The openings range from as small as one inch up to 52 inches. The valves are manufactured of ductile iron graded to at least 25 bar pressure. They have stainless steel internal and external components. The sealing parts of the valve are EPDM rubber.

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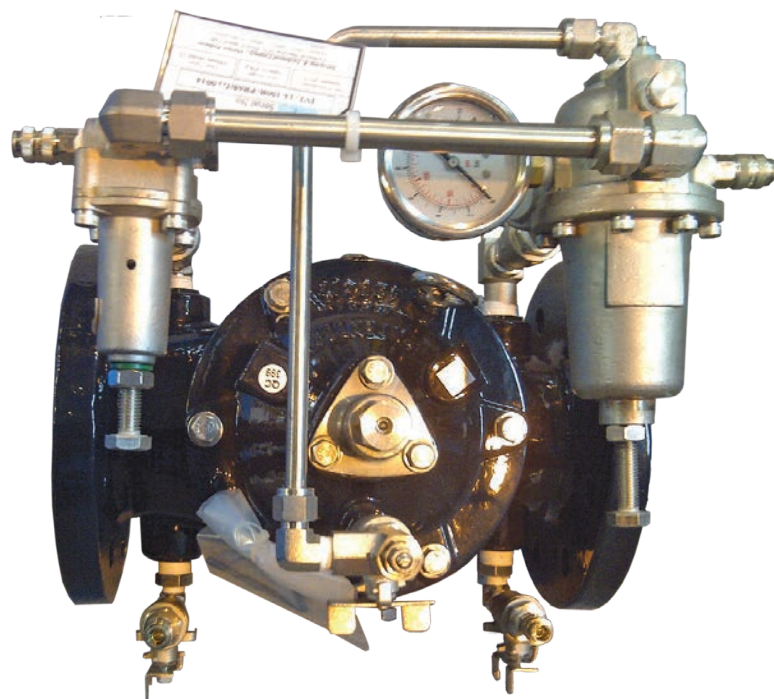
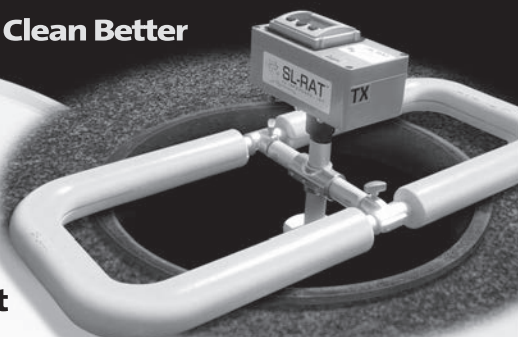
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ditions are met, the valve will operate and deliver water. It's purely a hydraulic transfer. But if a client wants the capability to override and force those valves to do different things at different times of day or night, depending on what is happening at given points in the network, we have adaptations that allow for PLC, telemetry and SCADA-driven control technology.

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Once basic data is in hand, what is the next step?

Stanners: We construct a hydraulic design model that enables us to predict what savings the client can expect if we deploy our system within their network. They can then decide whether to make an investment to achieve the savings that would continue for 30 years or more.

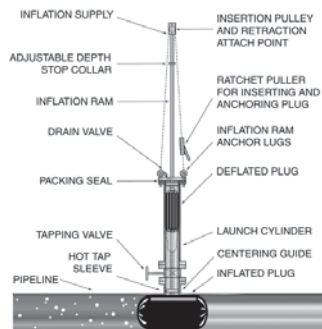
These significant savings can be achieved solely with valve technology and without extensive computerization?

Stanners: We tend to think that innovation is software, but software is only as good as the network itself. If a water network is failing because of its design and the materials in it, the best software in the world won't be able to help that system. You'll still have leaks, you'll still have bursts and you'll still have low-pressure and high-pressure situations. If you have a perfect network, yes, that can benefit from software. At the end of the day, what you need is accurate control of the water that's passing through the system. ♦

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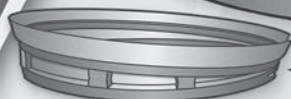
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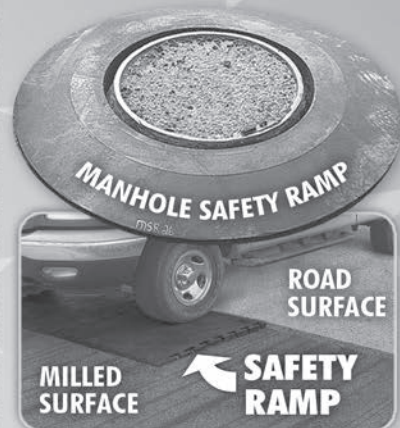


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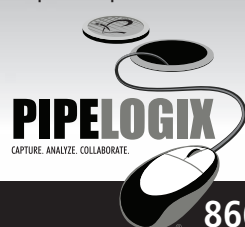
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MAINLINE TV INSPECTION AND LOCATION

By Craig Mandli

CRAWLER CAMERAS

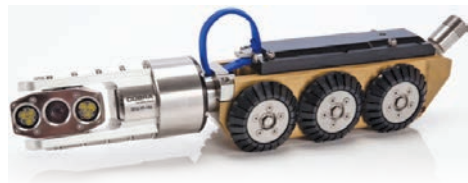
Aries Industries Pathfinder Model TR3310



The **Pathfinder Model TR3310** mainline inspection system from **Aries Industries** operates with long life in harsh pipe conditions. It's a powerful, steerable tractor with a pan-and-tilt camera and self-cleaning lens. Forward weight distribution results in better traction for longer pulls and faster inspections. Continuous-duty-rated motors, all gear-driven drivetrain, and improved pressure testing ensure reliable operation.

With various wheel sizes, it sets up quickly to match pipe contours. A standard-configuration tractor operates in 6- to 24-inch-diameter relined pipe. A large-line kit provides navigation in pipes up to 36 inches. An adjustable electric camera lift with a 7.1-inch extension keeps the camera centered in a wide range of pipe sizes for full visibility. It operates with the Aries Master Controller that enables wireless remote operation using a dual-joystick Xbox controller. **800/234-7205; www.ariesindustries.com.**

Cobra Technologies CT601



The **CT601** crawler from **Cobra Technologies** from **Trio Vision** proves a transporter doesn't need to be large and heavy to be durable. Its brass construction makes it a hardy performer

for its size, without adding undue weight. It can be configured with a powered camera lift and accessory wheels, making the system capable of inspecting 30+ inch lines. It can be paired with the Cobra PTZ Version 9 Camera, which is rated from 6 to 48 inches. **800/443-3761; www.cobratec.com.**

Deep Trekker DT340 Pipe Crawler



The **DT340 Pipe Crawler** from **Deep Trekker** is completely self-contained in two carrying cases, requiring no dedicated service truck to operate. It can be operated in difficult environments, with anodized die-cast aluminum body and magnetically coupled wheel

drives that require no maintenance. The optional track system is made from steel cord-reinforced polyurethane, ready to maneuver over tough obsta-

cles. It is battery powered, with rechargeable lithium-ion batteries contained within the system. This means the unit can be deployed from anywhere. The batteries last between six and eight hours on a single 1.5-hour charge. It can operate both in dry and wet pipes, and is submersible up to 164 feet. **519/342-3177; www.deeptrekker.com.**

Pearpoint P350 flexitrax



The **Pearpoint P350 flexitrax** portable crawler system has the simplicity and transportability of a pushrod system while delivering the functionality and performance associated with more complex crawler systems. It is a modular system, designed to meet the tough requirements of most inspection environments. The command module is fully compatible with the Pearpoint P340 flexiprobe, allowing the user to switch from crawler to pushrod inspection without carrying a second system. It has an intuitive user interface and simple, one-touch control over video and photo capturing. Its ergonomic design and portability means companies can lower the cost per job as less training is required, and the P350 flexitrax allows for one-person operation. **800/688-8094; www.pearpoint.com.**

Ratech Mini Crawler PNT

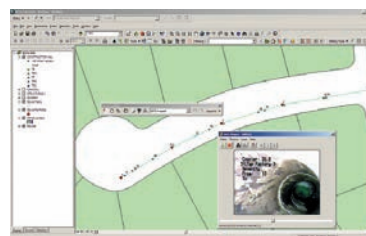


The **Ratech Mini Crawler PNT** is a self-propelled four-wheel-drive multiconductor camera transporter. The 12 super-bright LEDs with variable light intensity control light the way through 5- to 30-inch-diameter pipes. Using the full 360-degree-rotation pan-and-tilt camera, users will be able to see defects and obstructions more closely and in more detail.

This same camera head is interchangeable with the head on the company's push camera system. The power and controls to operate the crawler are in a handy remote control device. It comes with a manual lift and built-in 512 Hz sonde for locating purposes. **800/461-9200; www.ratech-electronics.com.**

GIS GPS

PipeLogix GIS Module



With the addition of the **PipeLogix GIS Module** added to ArcMap, supervisors can view all surveys performed on an asset. The toolbar filters survey data in the master database to highlight pipes with selected conditions, grades or score values, allowing the user to link to the video or survey. Survey conditions can be exported to a shape file or a geodatabase feature class. When opened in ArcMap, this layer displays the condition along the length of pipe. Selecting the condition will link to the video and jump to the correct footage for viewing. Seeing the problem and its location can make it easier to schedule repair and cleaning crews. It is compatible with ArcGIS 9.3 through 10.3. **866/299-3150; www.pipelogix.com.**

(continued)

INSPECTION VEHICLES

CUES CCTV inspection vehicles

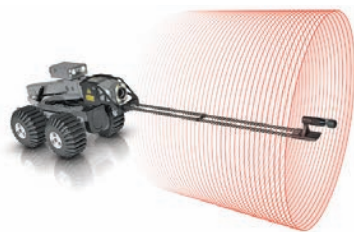


CUES offers custom truck-, van-, ATV- or trailer-mounted systems for TV inspection, condition assessment and rehabilitation. Made to withstand the most severe conditions and ergonomically designed for comfort and efficiency, these vehicle-mounted systems can include TV inspection equipment for sanitary and stormwater lines, laser and sonar pipe profiling systems, mainline joint and lateral sealing and reinstatement cutters for the relining industry. Equipment can be

ergonomically mounted to inspect 6- through 200-inch mainlines and 3- through 8-inch laterals services. The truck interior, cabinets, equipment and mounting configuration can be customized. Truck- and trailer-mounted grout rehabilitation systems are available for mainline, manhole and lateral joint sealing, and can be equipped with CCTV equipment and decision support software for TV inspection with documented condition assessment. **800/327-7791; www.cuesinc.com.**

LASER PROFILING EQUIPMENT

Envirosight ROVER X laser profiler



Attaching in seconds to the ROVER X inspection crawler, the laser profiler accessory from **Envirosight** helps geometrically profile the inside of buried pipelines. Captured profile data is readily analyzed to verify proper pipe installation, plan relining projects, determine remaining pipe life, monitor erosion and corrosion, quan-

tify defects, and analyze partial collapses. The accessory attaches without tools and requires no electrical connections. A hinged mounting system makes it easy to deploy in tight spaces, and twin carbon fiber arms ensure extra rigidity. It can profile lines up to 18 inches in diameter when mounted directly to the ROVER X crawler. Larger lines are addressed by mounting the accessory to a skid that is pulled by the crawler. Profile data can be transferred seamlessly to WinCan inspection software, the laser module of which can trend diameter and deformation frame by frame to generate a solid model, ovality graph or color plot. It operates up to 16 hours on a single AA battery. **866/936-8476; www.envirosight.com.**

RapidView IBAK GATOR Automatic Lateral Detector



The **GATOR Automatic Lateral Detector** is a sensor that mounts on the front armature of **RapidView IBAK GATOR** cutters and allows the user to locate lateral connections through the pipe liner before reinstatement. Using a small microwave emitter and easy-to-use software, it

locates the lateral behind the liner and automatically marks the center of the lateral for reinstatement. The system can be operated in a completely automatic mode, finding the laterals, even if a pre-inspection was not completed prior to lining. The sensor allows rehabilitation companies

to avoid costly and time-consuming mistakes when reinstating laterals. **800/656-4225; www.rapidview.com.**

Rausch Laser Profiler



The **Rausch Laser Profiler** performs measurements in pipe diameters from 8 to 72 inches. It performs three individual tasks using one integrated system — CCTV inspection, crack measurement and laser profiling. The system has two laser diodes inte-

egrated into a mainline TV camera head. The lasers project onto the pipe wall and the rotating camera head analyzes the pipe profile via spinning laser technology. No time-consuming, manual field calibration is necessary — simply place the profiler in the pipe and begin. All data is instantly and accurately generated on site utilizing POSM Pro software. It meets ASTM F3080-14 and ASTM F3095-14 standards. **717/709-1005; www.rauschusa.com.**

LOCATORS

General Pipe Cleaners Gen-Eye Hot Spot Transmitter



The 5-watt **Gen-Eye Hot Spot Transmitter** from **General Pipe Cleaners** has four trace frequencies, and an LCD graphic display that indicates line resistance and current flow. Users can choose 1 KHz, 8 KHz, 33 KHz or 65 KHz line trace frequencies to suit the application. The graphic display with auto backlight indicates battery level,

output level, USB connection, connectivity, type of transmission and active frequencies. Long battery life keeps the unit operating for as much as 100 hours. **800/245-6200; www.drainbrain.com.**

InfoSense SL-RAT



The **Sewer Line Rapid Assessment Tool (SL-RAT)** from **InfoSense** uses active acoustics to provide a quick view of blockage conditions within gravity-fed sewers. The test takes three minutes with no flow contact. It allows a crew of two to inspect 10,000 to 20,000 feet per day. It is EPA validated and GPS enabled. Data can be downloaded to the Sewer Line Data Organizer, or SL-DOG, cloud application

for visualization in Google Earth, or integrated with enterprise/GIS applications. **704/644-1164; www.infosense.com.**

(continued)

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MAINLINE TV CAMERA SYSTEMS



Amazing Machinery Viztrac Max

The **Viztrac Max** camera from **Amazing Machinery** has the same durability and superslick push cable as previous Viztrac cameras, with a 22 percent larger 9-inch LCD color display and a rechargeable lithium-ion battery pack capable of up to eight hours of field use before recharge. The unit includes an AC/DC adapter for direct power supply, a 512 Hz sonde transmitter and a DVR that records to a standard SD card. A 4GB card is included. **800/504-7435; www.amazingmachinery.com.**

Electric Eel Ecam PRO 2



The **Ecam PRO 2** from **Electric Eel** allows users to quickly inspect 3- to 10-inch-diameter pipelines and locate a wide variety of pipeline problems. It has a stainless steel-housed 1.68-inch self-leveling color camera with sapphire lens, 20 LED light ring and high-resolution CCD element. A flexible camera spring navigates 3-inch P-traps. The auto iris adjusts lighting automatically. It provides an industry-standard 512 Hz sonde and has a 10.4-inch daylight-readable display with an on-screen footage counter, 16 pages of text writing with memory saves and click-touch controls with one-touch recording. Users can record directly to a USB flash. It has voiceover recording and audio/video out jacks, an 8X zoom function and adjustable light controls. It comes standard with 200 feet of braided fiberglass premium 1/2-inch-diameter pushrod, and powder-coated steel tube and bar construction with a secure-locking reel brake. It rolls on 8-inch wheels for easy maneuverability. **800/833-1212; www.electriceel.com.**

Forbest Products FB-PIC3688A

The **FB-PIC3688A** pan-and-tilt pipe inspection camera system from **Forbest Products** allows users to have panorama pictures with the remote directional control. It comes with a 2 1/4-inch waterproof high-resolution color camera head with zooming, 400 feet of fiberglass cable and a reel with a meter counter. The 600 TVL camera head with high LED lights offers wide



R.S. Technical Services Helix



angle and focus. The heavy-duty waterproof control box includes a 10-inch LCD color screen with USB and built-in SD card to record photos and videos. Control buttons on the front panel are designed for remote controlling camera head rotation for over 20,000 hours. On-screen status indicators include footage of the cable pushed through the pipe. The built-in rechargeable battery lasts about three hours. **877/369-1199; www.forbestusa.net.**

The **Helix** from **R.S. Technical Services** is a manhole inspection system designed to lower manpower costs and improve system performance by accurately identifying sources of inflow and infiltration as well as structural deficiencies. The fully automated system is deployed by a single operator from a CCTV vehicle, pickup or ATV, and will scan a typical 10-foot manhole in under a minute. It has six high-resolution cameras that capture panoramic imagery of every surface of a man-

hole as well as six active 3-D sensors that record hundreds of thousands of spatial data points for precise measurements. It automatically transmits the scan data to software where it can be reviewed in the office or the field. The system includes the probe, cable reel, launching boom and wireless control unit. Data is compatible with NASSCO's MACP standard. **800/767-1974; www.rstechserv.com.**

MAPPING

Vivax-Metrotech Spar 300



The **Spar 300** from **Vivax-Metrotech** is a precise utility surveying system that collects positions in site coordinates, in a package that adapts to a range pole, ATV, riverboat or push cart. It continuously logs the utility depth and offset with statistical confidence and automatic offset calculations.

Using a Bluetooth or USB link, the instrument outputs the 3-D positions to a Trimble TSC3 or tablet for real-time display on the Trimble Access map, independent of its own perspective with respect to the utility or the GNSS antenna. When a complex locate scenario is encountered, it applies automatic tolerance masks to the position data, flagging these areas on the map. **800/446-3392; www.vxmt.com.**

RECORDING/ARCHIVING/ DATA DEVICE

RIDGID CS65x



The **RIDGID CS65x** digital reporting monitor has Wi-Fi and Bluetooth, as well as immediate access to footage from drainline inspections, providing faster access to inspections. It provides one-touch image recording for fast, efficient documentation of inspections, along with a new, faster processor and solid-state hard drive. It has ample storage for multiple jobs and docks to the



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SeeSnake Max rM200 camera system for on-site reporting. It has a built-in, water-resistant keyboard for easy addition of on-screen titles and annotation of captured media, as well as a daylight-viewable display for a crisp, clear in-pipe image. It has a companion app compatible with Android and iOS devices. 800/769-7743; www.ridgid.com.

LEAK LOCATION



SubSurface Locators LD-18

The **LD-18** digital water leak detector from **SubSurface Locators** reduces ambient, intermittent noises from dogs barking, cars passing by, footsteps and people talking. Its digital electronics sample the sounds every few thousandths of a second, and if it detects an intermittent sound, it suppresses it instantly. Water leak sounds are almost always continuous noises, and the unit can identify continuous leak sounds even in difficult conditions like busy streets. 775/298-2701; www.subsurfaceleak.com.

Superior Signal Company Smoke Fluid Systems



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Video nozzle saves on inspection costs



Problem:

The city of Denton, Texas, was looking for a way to increase CCTV footage to document successful cleaning and to decrease the cost of operation of their conventional CCTV mainline camera truck.

Solution:

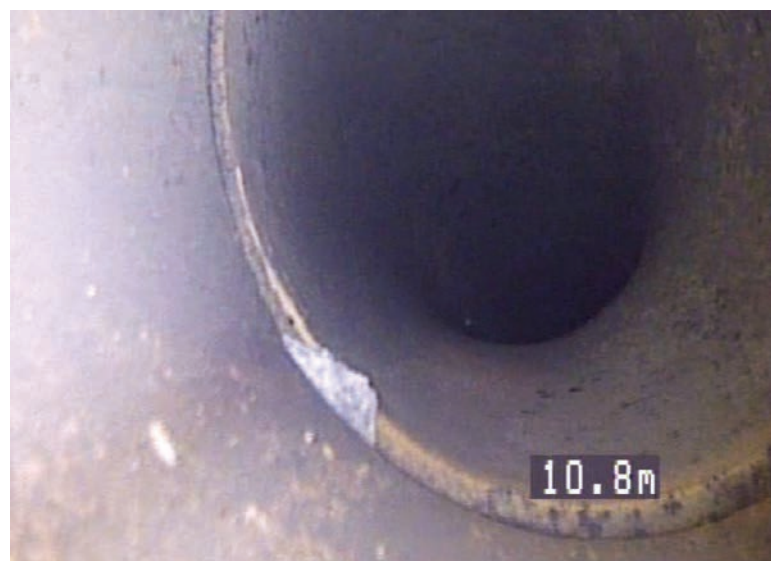
The city purchased an **Envirosight Jetscan** video nozzle, distributed by **Green Equipment**. The nozzle is an easy way to see what is being jetted. The video nozzle is affordable, yet quickly captures valuable HD footage of pipe that can be viewed moments later on a PC or tablet. "We can identify the cause of any kind of stoppage that we have (roots, grease, bore-through)," says Drew

Huffman, Denton field services supervisor. "With this information, the combo truck operators can clean the line more efficiently by being able to choose the right kind of nozzle for the kind of problem that is found in the line."

RESULT:

The city has been able to increase overall CCTV footage while reducing cost and improving productivity. They've been able to keep the CCTV crew on plan, with the ability to not waste time on good lines that don't require full PACP review. The city also found that the cost of operating the Jetscan came in at 19 cents per foot of operation, versus a cost of 83 cents for a conventional CCTV camera truck, saving \$181,674 for 283,866 feet of sewer line inspection. **800/391-7612; www.greenequipco.com.**

Camera helps locate two pipeline leaks



Problem:

A UK utility had identified a leak on an asbestos cement pipeline in a traffic-sensitive area. The pipeline was nonmetallic, therefore traditional technologies such as noise correlation and flowmeters were not successful in pinpointing the leak's exact location. The utility contacted PIPA, an internal pipe inspection product manufacturer and service provider, to help locate the leak using intrusive technology.

Solution:

PIPA uses technology that includes a pressure-rated camera (Hydrocam) and hydrophone capsule (Pipepod) tethered to a 300-foot semirigid pushrod to give the operator live video and recorded audio data during an inspection. The system enters a pipeline through a 2-inch tap, and is fully chlorinated during its insertion. It works on a live basis, with no interruptions to the clients' services.

RESULT:

The tethered insertion technology precisely identified the leak points. One leak was identified at 33 feet and an additional leak at 150 feet. An unknown inline valve was also identified during the survey. The inspection was completed in one day. **910/509-7225; www.matchpointinc.us.** ♦



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Product Spotlight

RRV Series may be the last replacement pump you ever buy

By Jared Raney

Durability and performance are the prime objectives of the RRV Series pressure washer replacement pumps from Water Cannon. In fact, Water Cannon is so confident in this series that CEO Richard Kurtz says they “will surpass the original.”

“What we want to offer is a replacement pump that will hold up to the life of the engine,” Kurtz says. “The package comes complete; there’s virtually no labor involved. It’s been pretested and preset to pressure. ... They have a volumetric efficiency rating of 93 percent.”

The RRV Series features a compact body design, sized for direct drive on gasoline engines ranging from 270 to 440 cc, for medium- to heavy-duty tasks. The replacement pump has a high-strength forged brass manifold, new triplex ceramic plungers with a thicker wall to help prevent thermal shock, stainless steel valves, side-mount valve seat O-rings, high-quality high-pressure seals, two-piece piston guides, large side-cover sight glass, rear-cover oil drain, and forged precision-ground crankshaft.

“It has oversized bearings; that’s key for long life,” Kurtz says. “It has an aluminum crankcase, which helps dissipate heat. And that allows the crankcase life to last as long as the engine.

“The low-pressure seal has a built-in scraper. It helps keep the pump at



high performance and keep it from losing water through the seal system. ... It’s very common at the beginning of a pump failure that it starts dripping water out of the front seals. This pump really resists that.”

The pump is tested for service life at a maximum performance of 4 gpm at 4,300 psi.

RRV Series pumps are fully rebuildable, tested to over a 2,000-hour life. This series fits 1-inch-keyway horizontal engines and includes bolts, oil and vented dipstick.

“Another feature of this particular pump is it can be used with the Hydro-Pulse valve, which allows you to convert a pressure washer pump to a jetter pump,” Kurtz says. “And new for 2016, the connecting rod is designed with 12 percent more load surface.

“It’s a high-quality replacement, so it would be much more durable than a boxed package or something that would be mass-merchandised online,” Kurtz says. “Let’s say you were starting a new job, and you knew you were going to put a pressure washer to use in hard labor for four months, replacing the original pump may be a decision that’s looked at before the job starts. ... (An RRV Series replacement) may be the last pressure washer pump they ever buy.” **800/333-9274; www.watercannon.com**

R.S. Technical Services’ RST Helix manhole inspection system



R.S. Technical Services’ new RST Helix manhole inspection system can be deployed from a CCTV vehicle, pickup truck or ATV, and is capable of scanning a 10-foot manhole in under one minute. The Helix has six high-resolution cameras that capture panoramic images of every surface as well as six active 3-D sensors that record spatial data points for precision measurements. Once the Helix reaches the bottom of a manhole, it returns and automatically transmits scan data to software where it can be reviewed in the office or in the field. **800/767-1974; www.rstechserv.com**.

Hi-Vac’s Combo Hydro



The new Combo Hydro from Hi-Vac Corporation is a hybrid of Aquatech sewer cleaners and X-Vac hydroexcavators, and comes with a powerful 27-inch Hg blower. It has a large-capacity water pump for sewer

cleaning that runs 80 gpm at 2,500 psi and hydroexcavation water flow of 20 gpm at 2,500 psi. Equipped with a 400,000 Btu boiler, the heated enclosure for the water pump and all water components enables the Combo Hydro to work in cold conditions. **800/752-2400; www.hi-vac.com**.

CUES wireless 3-D SPiDER Scanner



The SPiDER wireless, color manhole scanner from CUES can calculate its position in the manhole shaft by using sensor data to measure its incremental motion. It weighs less than 30 pounds and can be hand-carried to easements or other difficult-to-access sites. The processing computer and battery supply are integrated into the scanner, which allows portability.

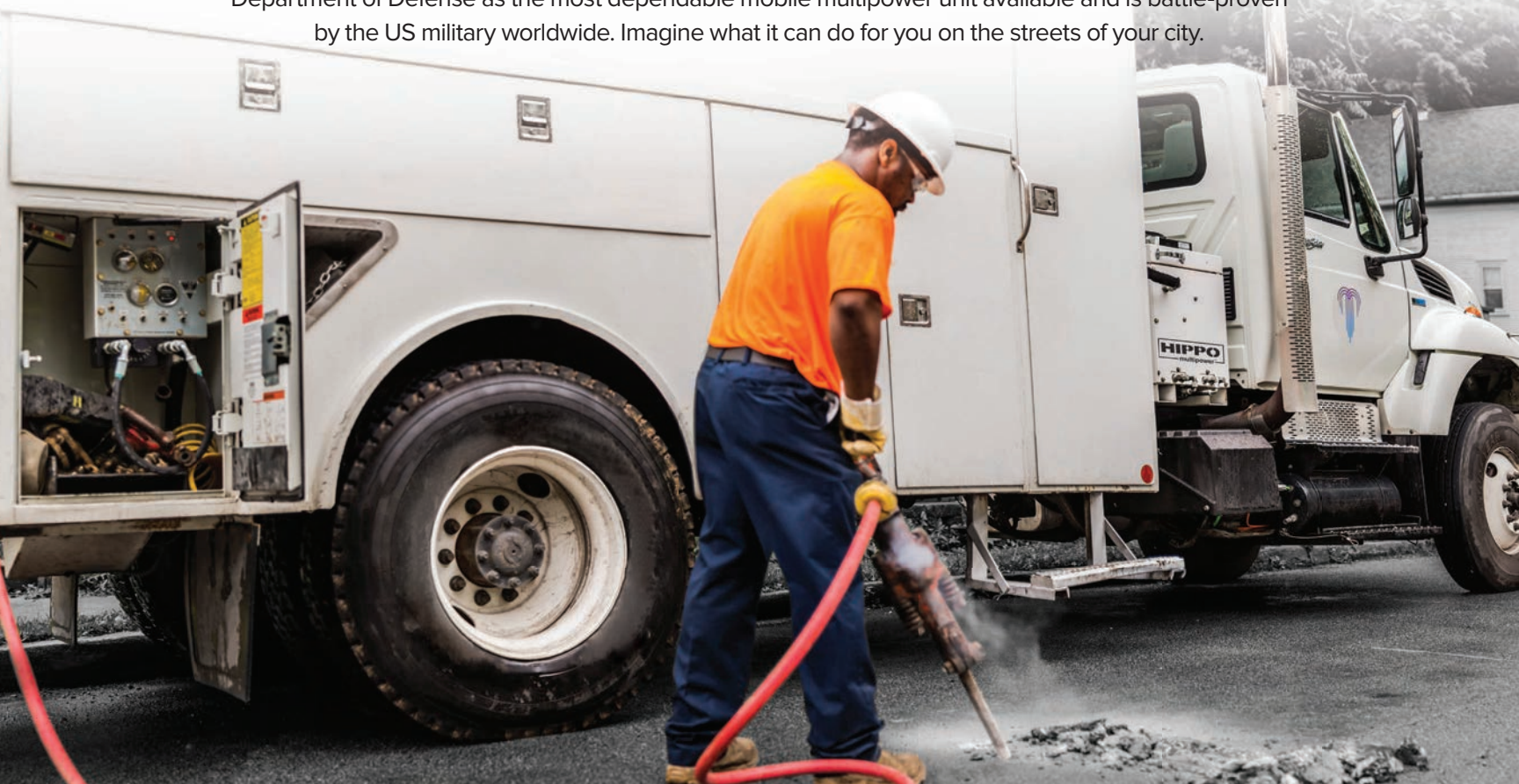
The SPiDER also provides a live video stream and recorded video that can be used for I&I studies. **800/327-7791; www.cuesinc.com**. ♦



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Looking for a job in the water-wastewater industry? WATER DISTRICT JOBS, an online career resource, lists dozens of great career opportunities on its website. Job listings are updated daily. You can also post your resume so employers can find you. Visit www.WaterDistrictJobs.com for more information. (M03)

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INDUSTRY NEWS

MARCH 2017

Trio Vision brings on Proksell as Northeast regional manager

Trio Vision LLC recently tapped Nick Proksell to manage its Northeast region territory. Proksell brings 17 years' expertise in municipal services, most recently with RedZone Robotics Inc. of Pittsburgh.

Generac to acquire Motortech Holding

Generac announced that they entered into an agreement to acquire the assets of Motortech Holding, headquartered in Celle, Germany. The transaction, subject to regulatory approval, is expected to close in the first quarter of 2017.

Woodard & Curran acquires RMC Water & Environment

Woodard & Curran has acquired RMC Water & Environment, a California-based environmental engineering company focused on developing solutions to the complex challenges of using and protecting water. The acquisition expands Woodard & Curran's national footprint to 26 offices in 12 states.

Michels adds sewer and catch basin cleaning

Michels Pipe Services recently purchased eight Camel 1200 wastewater recycling sewer and catch basin cleaning trucks to become the largest owner of the equipment in the U.S. Business development manager John Manijak, who has more than 17 years' experience in the municipal sewer cleaning industry, will coordinate the expanded services from Michels' regional office in Montgomery, Illinois.



John Manijak

Hilti North America president and CEO Cary Evert to retire in 2017

Cary Evert, president and CEO of Hilti North America, will retire March 31, 2017. Over his almost four-decade career, Evert has held nine different roles after first starting with the company in 1980. He has served as president and CEO since 2005. ♦

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PEOPLE/AWARDS

The **American Public Works Association** selected public works professionals for its year-long Emerging Leaders Academy. Participants include:

- Chris Anderson, Public Works manager, city of West Kelowna, British Columbia
- Emmalee J. Browne, civil engineer, Green Bay, Wisconsin
- Angela Jordan, engineering tech II – stormwater, city of Rock Hill, South Carolina

Katie Kaz, general manager at Miller Hill Mall (Duluth, Minnesota) received the 2016 Community Conservation Award from the Minnesota Association of Soil and Water Conservation Districts and Minnesota Pollution Control Agency. The award recognizes her accomplishments implementing conservation practices at Miller Hill Mall, which recently had 72 trees planted throughout its property to improve stormwater management of nearby Miller Creek. Miller Hill Mall recently created a comprehensive stormwater management plan in cooperation with Barr Engineering and the South St. Louis Soil and Water Conservation District using funding from the Clean Water Fund.

The **Indiana Office of Community and Rural Affairs** announced recipients of grant funding through the Stormwater Improvement Program. Recipients include:

- The town of Brookston, which was awarded \$500,000 for rehabilitation of its stormwater collections system
- The town of Crothersville, which was awarded \$500,000 for its Crothersville Stormwater Improvements Project
- The town of Sheridan, which was awarded \$500,000 to install new drainage infrastructure
- The town of Whitestown, which was awarded \$500,000 for improving the stormwater system in the Legacy Core of Whitestown

John Stark was named the director of the Washington Stormwater Center in Puyallup, Washington.

The Los Angeles Section of the American Society of Civil Engineers selected **Ventura County Public Works Agency's Happy Valley Bioswale Meiners Oaks Urban Low Impact Development Retrofit** as the 2016 Environmental Engineering Project of the Year. The stormwater treatment retrofit is a project of the Ventura County Public Works Agency's Watershed Protection District, led by stormwater program manager Ewelina Mutkowska and the Ojai Valley Land Conservancy.

Ashlie Farmer, stormwater coordinator with the city of Clarksville Street Department, received the Person of the Year award from the Tennessee Stormwater Association. Farmer earned the commendation for the time and dedication she devoted to the association in 2016. As stormwater coordinator, Farmer manages the Municipal Separate Storm Sewer System (MS4) permit, which is part of the federal Clean Water Act enforced by the Tennessee Department of Environment and Conservation.

Escambia County (Florida) received a \$2.3 million grant from the Federal Emergency Management Agency's Hazard Mitigation Grant Program. The FEMA program funds projects that reduce the loss of life and property due to natural disasters. Escambia will use its grant to help fund the Delano Street Area Drainage Project, which will implement long-term hazard mitigation measures to reduce flooding around Delano Street in the Englewood area. That area, north of the city limits, was a crucial point of failure that contributed to widespread flooding in many parts of the city in April

2014. The mitigation project would modify existing stormwater facilities and acquire new pond sites to better manage stormwater and increase pond and infrastructure efficiencies and capacities.

LEARNING OPPORTUNITIES

Wisconsin

The University of Wisconsin Department of Engineering Professional Development is offering Using WinSLAMM v.10.2: Meeting Urban Stormwater Management Goals on April 20-21 in Madison. Visit epdweb.engr.wisc.edu. ♦

CALENDAR

March 4-6

National Utility Contractors Association 2017 Convention, Palms Casino Resort, Las Vegas. Visit www.nuca.com.

April 23-26

American Public Works Association 2017 North American Snow Conference, Iowa Events Center, Des Moines, Iowa. Visit www.apwa.net.

April 30-May 3

American Water Resources Association 2017 Spring Specialty Conference, Snowbird Ski and Summer Resort, Snowbird, Utah. Visit www.awra.org.

May 21-25

American Society of Civil Engineers' World Environmental & Water Resources Congress, Sacramento Convention Center, Sacramento, California. Visit www.ewricongress.org.

June 11-14

American Water Works Association Annual Conference & Exposition, Pennsylvania Convention Center, Philadelphia. Visit www.awwa.org.

June 25-28

American Water Resources Association 2017 Summer Conference: Climate Change Solutions, Sheraton Tysons Hotel, Tysons, Virginia. Visit www.awra.org.

June 26-29

National Association of Flood and Stormwater Agencies Annual Meeting, Belmond Charleston Place, Charleston, South Carolina. Visit www.nafsma.org.

July 16-19

American Society of Agricultural and Biological Engineers 2017 Annual International Meeting, Spokane, Washington. Visit www.asabe.org.

Aug. 27-30

American Public Works Association PWX (Public Works Expo), Orange County Convention Center, Orlando, Florida. Visit www.apwa.net.

Aug. 27-31

StormCon: North American Surface Water Quality Conference & Exposition, Meydenbauer Center, Seattle. Visit www.stormcon.com.

Sept. 18-20

National Rural Water Association WaterPro Conference, Reno, Nevada. Visit www.nrwa.org.

Oct. 8-11

American Society of Civil Engineers 2017 Convention, New Orleans Marriott, New Orleans. Call 800/548-2723 or visit www.asce.org.

Nov. 5-9

American Water Resources Association Annual Conference, Red Lion on the River-Jantzen Beach Hotel, Portland, Oregon. Visit www.awra.org.

Municipal Sewer & Water invites your national, state or local association to post notices and news items in this column. Send contributions to editor@mswmag.com.



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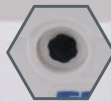
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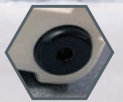
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