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FOR SANITARY, STORM AND WATER SYSTEM MAINTENANCE PROFESSIONALS
July 2013
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# HOLISTIC APPROACH

## Lynchburg, Va., attacks CSO problems with innovative planning

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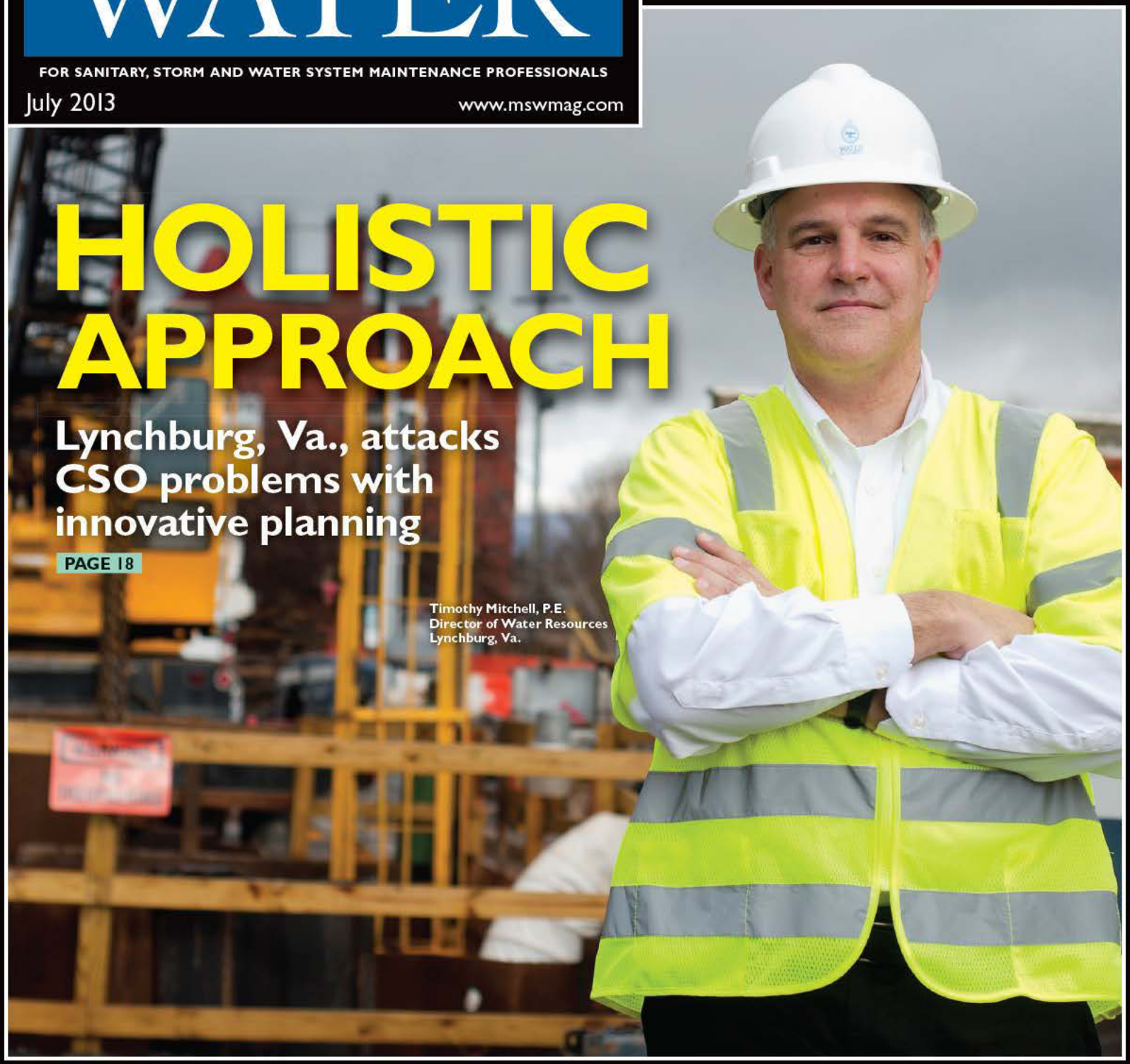

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Lynchburg, Va.

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# INSIDE:

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ON THE COVER:
Timothy Mitchell, P.E., director of water resources for the City of Lynchburg, stands in front of a 279-foot tunnel in which 6-foot-diameter reinforced concrete pipe will be installed as part of a CSO project below Jefferson Street in downtown Lynchburg. The James River Interceptor Division 3A project will cost $6.2 million. (Photography by Jill Nance)


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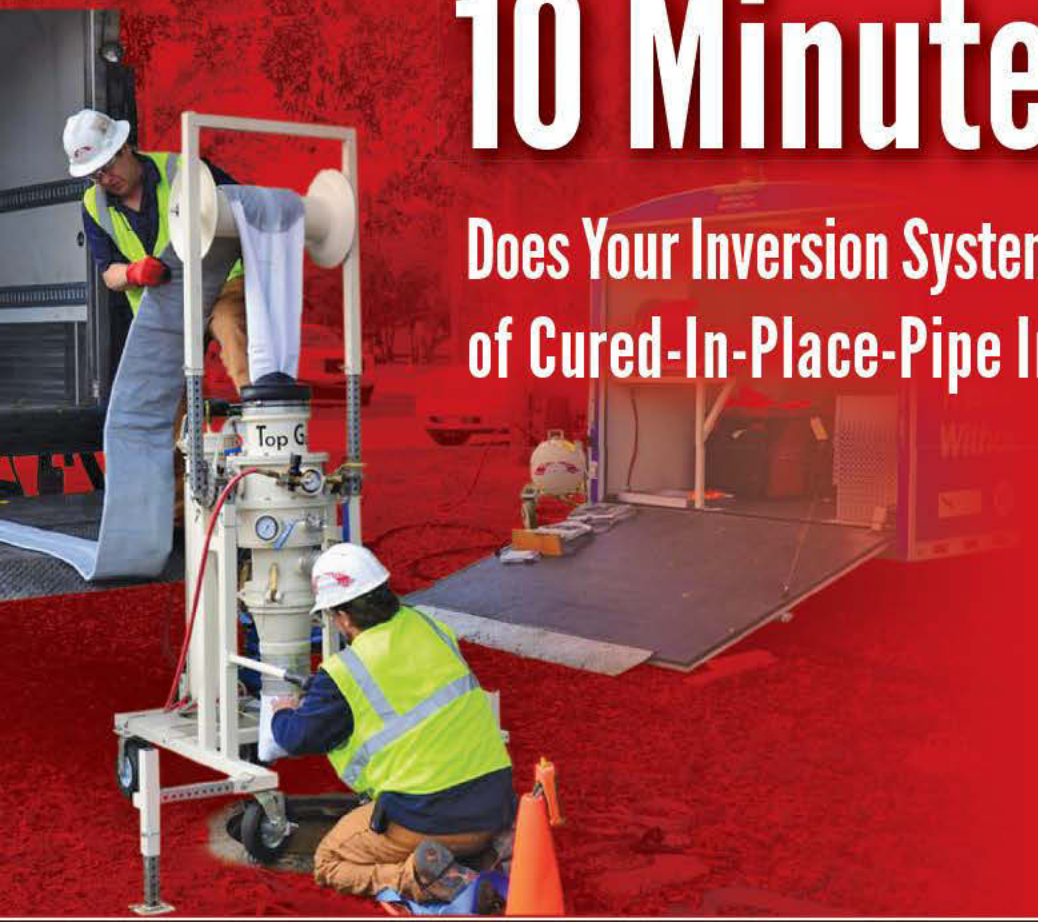

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# A NEW WAY FORWARD

We need to change attitudes, in our communities and at the highest levels of government, if we are ever to solve our infrastructure problems

## FROM THE EDITOR

*Luke Laggis*

As I was editing the stories for this issue back in late April, there were several things going on in the municipal sewer and water world that struck me, and together they paint an interesting picture of the state of this industry.

First, Earth Day prompted many utilities to promote various initiatives related to clean water and conservation. Countless stories of municipal leaders talking to classes and organizing activities came through my Google Alerts. Attitudes and behaviors are difficult to change, especially in cases where people have grown to take things for granted. That's why working with our youth and teaching them all about this resource and what goes into sending clean water to their taps is so important.

If you instill in our young people an appreciation for the resource, and energy and additional resources that go into delivering it to their homes, they might grow up with a different perspective on the importance of maintaining these systems and being wise with their water use. That can have significant implications for municipalities struggling with deteriorating infrastructure.

The second thing that struck me was the gathering of municipal water leaders in Washington, D.C. They were part of the Water Matters! Fly-In sponsored by the American Water Works Association and the Water Environment Federation, and aimed at educating lawmakers on the issues facing water utilities. The delegates also visited Capitol Hill to urge passage of legislation that would create a Water Infrastructure Finance and Innovation Authority to confront the growing water infrastructure challenge.

**If the federal government is in any way serious about repairing our infrastructure, putting more people to work and spending taxpayers' dollars wisely, creating and sustaining WIFIA is something that must be done.**

WIFIA would help address the staggering cost of repairing and expanding existing water infrastructure — an estimated $1 trillion over the next 25 years — by making low-interest federal loans available for large water and wastewater infrastructure projects, with little or no long-term cost to the federal taxpayer.

Every dollar spent on water infrastructure generates about $2.62 in the private economy, and for every job added in the water industry, over three and a half jobs are added to the national economy, according to estimates from the federal Bureau of Economic Analysis. If the federal government is in any way serious about repairing our infrastructure, putting more people to work and spending taxpayers' dollars wisely, creating and sustaining WIFIA is something that must be done.

The third thing that struck me was a news story about a wastewater utility in my home state of Wisconsin. It was a long winter here, even by Wisconsin standards, and snow lingered longer than most were capable of appreciating. When the snow hangs on, and eventual spring rains combine with runoff from the thaw, storm and wastewater systems can be overwhelmed. This utility, and many others along the eastern side of the state, were dealing with heavy stormwater flows by releasing untreated wastewater into Lake Michigan.

What really struck me is the fact most people go about their daily business and never give these things a second thought, or never even realize what's happening in the first place. Our infrastructure is failing. Sewage is being dumped into our streets and waterways. Municipal utility leaders are being forced to limp along without adequate funding to correct these problems and improve our communities. In the meantime, our lakes and rivers, our water wells and even our homes suffer. More needs to be done. Get your communities on board and let your voices be heard.

The stories in this month's issue highlight utilities that are being proactive and progressive about improving their systems. I hope their successes can prove of value to you.

Enjoy this month's issue. ✦

# EDITOR'S CHOICE

## Don't miss out on our exclusive online content at MSWmag.com

*By Luke Laggis*

We've been posting a ton of new content at MSWmag.com. In addition to everything you see on these pages, the site features a wealth of product and industry information, as well as original features you won't find in print. The following are just a few of the items you're missing if you're not visiting the website.

EDITOR'S BLOG:

### Nearly $400 Billion Needed for Water Infrastructure

The U.S. Environmental Protection Agency's fifth Drinking Water Infrastructure Needs Survey and Assessment, the results of which were released earlier this week, show that $384 billion in improvements are needed for the nation's drinking water infrastructure through 2030 for systems to continue providing safe drinking water to 297 million Americans. The survey identified investments needed over the next 20 years for thousands of miles of pipe and thousands of treatment plants, storage tanks and water distribution systems.

GUEST BLOG:

### $16,000 Water Bill Causes Uproar in California

When a woman in Escondido, Calif., received a $16,000 water bill for roughly 30 days worth of service from December 2012 to January 2013, she knew something wasn't right. According to an article on the San Diego NBC affiliate website, Margaret Kreusser said her bills are normally around $115 for about 150 gallons of water used per day. The recent bill is almost 150 times that. The local utility claimed Kreusser's property must have had a leak that averaged more than 87,000 gallons of water a day. However, there's no evidence of any leaks such as pooling water or excess groundswell to suggest that Kreusser used 3,625 gallons of water an hour or 60 gallons a minute.

### Pipeline Inspection Evolves to Handle Mature Market

New technologies and condition assessment programs along with a more knowledgeable customer base have transformed the way drain cleaning contractors and municipalities inspect pipelines. The industry has moved from one that could only observe existing pipe conditions to one that inspects, reviews, catalogues and analyzes collected data, allowing technicians to forecast potential problems in sewers and drainlines.

### Tips for Buying Your Next CCTV Inspection Van

Shopping for a new CCTV inspection van can be overwhelming. With so many pipeline inspection equipment manufacturers, narrowing down the search to just one can be a challenge. The right CCTV inspection van for one municipality may not be the right choice for your utility. It's important to identify what you need and to understand how inspection equipment differs among manufacturers.

EDITOR'S BLOG:

### New Game Takes You to the World's Sewers

The people of this industry are certainly no strangers to the foul conditions of the average sewer system, but worldwide rat infestations and feline manifestos go beyond the typical day-to-day. Yet those are the challenges Joe Gillis, employee of the Las Vegas Sewer Maintenance System, faces in Sewer Wars, a new game available for the iPhone and iPad. The game allows you to scour the world's sewer systems with him in the effort to maintain order and control.

**Check out all these stories at www.mswmag.com/ec/2013/July**

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FOCUS: SEWER

# A SYSTEM FOR CLEAN SEWERS

Dallas drastically reduces FOG blockages by tracking compliance with collection requirements through simple manifests

*By Pete Litterski*

In a major metropolitan area with close to 6,000 restaurants, one of the major challenges for the Pretreatment and Laboratory Services Division of Dallas Water Utilities is keeping the city's wastewater collection system clear of FOG and flowing freely.

Senior Program Manager Morgan Dadgostar, P.E., says that tracking compliance with the city's requirements for keeping fats, oils and grease out of the collection system became more manageable about five years ago when her division acquired a program from XC2 Software to monitor private liquid waste haulers who collect and dispose of waste from the grease and grit traps at restaurants.

As DWU employees worked with XC2 on the system to track waste, it became apparent the data collected by the software could also be used to track restaurants' compliance with city regulations governing the maintenance of grease traps.

Dadgostar says the need for the liquid waste manifest system arose from a growing concern that some haulers were improperly disposing of loads. Although Texas and local regulations require that haulers take their loads to state-licensed disposal facilities, DWU had no system for tracking the final destination of grease, grit, portable toilet waste, septic tank waste, oil and "other" liquid wastes. Only septage from portable toilets and septic tanks is dumped at DWU treatment plants; the rest of the liquids are taken to private disposal businesses.

"We had noticed that the grease would get picked up, but then there would be no evidence of where it went. So we came up with software that would follow it from cradle to grave," Dadgostar says.

And once the manifest software was ready, DWU worked with a second vendor, Scantron, to develop a form that automatically records the manifest data from the haulers into DWU's system. Scanning greatly reduces the time required to upload the data and helps organize the information in a searchable database complete with images of the original manifests.

That way, the XC2 software can be used to track individual restaurants' compliance with Dallas regulations, which require a cleanout at least once every 90 days, and can also determine whether a restaurant needs more frequent cleaning of its grease trap. Field inspectors in the liquid waste operation are able to access the compliance data from the field or in the office at the end of a shift as they enter their reports and plan their next shift.

## Manifest destiny

The manifests, which have been in use for three years, are a five-part

**PROFILE:**
City of Dallas, Texas, Pretreatment and Laboratory Services Division of Dallas Water Utilities

**FOUNDED:**
1881

**POPULATION:**
1.2 million (Dallas) plus 1.2 million in wholesale customer cities

**CUSTOMERS:**
300,000 retail customers

**AREA SERVED:**
699 square miles

**PALS DEPARTMENT STAFF:**
54

**ANNUAL BUDGET:**
$4.86 million

**WEBSITE:**
www.dallascityhall.com/dwu/water_utilities.html

**OPPOSITE PAGE: The leadership team at the DWU Pretreatment and Laboratory Services Division includes, from left, Morgan Dadgostar, senior program manager; Maurice Akech, assistant manager/pretreatment operations; Yilma Zerihun, pretreatment section supervisor, pretreatment program; and Richard Statser, liquid waste section supervisor. (Photography by Pete Litterski)**

form with three sections to be completed at each step of grease disposal. Each section has "bubble" boxes where businesses record basic data as well as a box where a representative signs off on the date and time of the transaction. In the first section, the waste generator is required to describe the waste being picked up and the capacity of their trap or fixture. In the second section, the transporter reports the volume of the material removed, and in the third section, the licensed disposal site reports the volume disposed.

"We made sure that we touch all the different components of tracking compliance with our regulations for grease," Dadgostar says. "That way, if we can see a problem in our records, we can go to a restaurant, a waste hauler or a disposal site and look into it more closely."

All liquid waste haulers operating in the city are required to have a city permit as well as appropriate state permits. All vehicles used for transporting liquid must be annually inspected and approved by DWU inspectors. City codes require waste transporters to use the manifest system (DWU sells books of 25 manifests for $10) and it is the responsibility of a transporter to insure that all manifests are properly completed and turned in to the utility by the 10th day of each month.

Although the forms are simple to fill in, they provide all the data DWU needs to track liquid waste disposal. Richard Statser, DWU's liquid waste section supervisor, says waste haulers sometimes grumble about the added paperwork, but most of the businesses are satisfied with the simplicity of the process and many of them recognize the added business it can bring them. "If a restaurant wasn't having its drains cleaned every 90 days before we started tracking this data, now they are probably going to comply. That means more business for the waste haulers."

## A good model

Statser says the data recorded with the software helps the division make better use of the five field inspectors, one scanner operator/inspector and one supervisor assigned to overseeing the food service operators.

The DWU system for tracking the transportation and disposal of grease has attracted attention from other communities and the division is often asked to provide speakers for a variety of meetings and gatherings attended by wastewater utility officials.

The liquid waste-tracking software has been in use for about three years and Statser says it has made a big difference in compliance by the city's restaurants.

In the normal cycle of checking the thousands of grease and grit traps in use across Dallas, Statser says an inspector can be expected to visit a restaurant once every three years. But if there are problems with FOG blockages in a sewer line or if a waste hauler reports possible problems at a restaurant, an inspector can be dispatched to assess the situation. And if records show that a restaurant is not meeting minimum requirements for having its grease and grit pumped out, an inspector can see that in the data and pay a visit right away.

**"We had noticed that the grease would get picked up, but then there would be no evidence of where it went. So we came up with software that would follow it from cradle to grave."**

**Morgan Dadgostar**

Dadgostar says the city is more interested in fostering compliance than issuing citations, and she has found that even when a restaurant is having a problem with grease getting into the sewers, owners are often open to advice and assistance in correcting the problem. "We think that people really understand and care about the impact they have on the system and on the environment," she says.

## Education and compliance

DWU's inspectors are trained to


DWU Director Jo M. Puckett, center, was on hand to pass out the Blue Thumb Award to companies such as Frito Lay.

PHOTO COURTESY OF CITY OF DALLAS

## BLUE THUMBS UP FOR CLEAN INDUSTRIES

A quarter century ago, industrial customers served by the Dallas Water Utilities met with employees of the utility's pretreatment program and said they believed that in addition to the enforcement actions at the city's disposal, they thought DWU should recognize companies that did a good job of pretreating their wastewater. The DWU team agreed and the Pretreatment and Laboratory Services Division launched its annual Blue Thumb Award in 1986-87.

Blue Thumb awards were the first carrots offered in an enforcement philosophy that it is more effective to praise good behavior than to punish users for their errant ways.

The DWU awards recognize "significant industrial users" that meet three criteria for a full year. They must be:

- In compliance with discharge limit requirements
- In compliance with all reporting requirements
- Permitted for the entire pretreatment year (July 1 through June 30)

Prior to the awards, the main feedback the industrial users received usually came in the form of notices of violations, citations, administrative fines and the publication of Significant Noncompliance notices in the newspaper.

Maurice Akech, assistant manager of pretreatment operations, says that industries have responded well to the awards program over the years and take their awards very seriously. "You go to their offices and they'll have their plaques framed on the wall. They'll have their photos from the awards program," he says. "They really want their customers to know about it, they want their investors to know."

The nature and the volume of a company's waste determine how much attention it gets from DWU inspectors, Dadgostar says. "Some of them, we go and collect samples every day, some are quarterly and some are just once a year."

For some major users, the utility goes out twice a year to inspect the entire operation to see if there have been changes in their processes that could affect the content or the volume of their wastewater. Dadgostar says it's important to be proactive and catch potential problems before they can enter DWU's treatment system.

At the most recent Blue Thumb Award ceremony, one Dallas business — Occidental Chemicals Corp. Specialty Business Group — received a 20-year award for two consecutive decades of pretreatment compliance. Aircraft Engines & Accessory Co. received a 15-year award, while Dallas City Packing Inc. and Soriano Special Coating Inc. received 10-year awards. In all, more than half the city's significant users received Blue Thumb awards for the 2011-12 year.

**DWU environmental specialist III Chad Clancy demonstrates how he scans manifests turned in by liquid waste haulers to capture data on the grease and other wastes removed from wastewater before it enters the city's sewer lines.**


**Dallas residents can take their used household cooking oils and grease to one of 20 drop-off stations located around the city.**

PHOTO COURTESY OF CITY OF DALLAS

focus on educating owners and managers when they find problems with a restaurant's records. Those restaurants are targeted first for regular inspections, Dadgostar says. "Before we had this software, we were operating kind of blind."

The DWU website lists a variety of factors that determine the action that could be taken if the city finds a customer in violation of codes governing liquid waste disposal. These factors include:

- The magnitude and duration of the violation
- Any effect on the Publicly Owned Treatment Works (POTW) or the Trinity River
- Any injury to personnel or the public
- The compliance history of the business
- Any good faith demonstrated by the offender

But the pre-treatment program is even more proactive than that. DWU employees spend a lot of time in the community attending local restaurant expos and other gatherings of restaurant owners and employees to speak about the need and the ways to keep FOG out of the wastewater collection system. Dadgostar says the time invested in those efforts is much less costly than the time and the resources needed to remove a major blockage in the city's sewer system.

## Cease the Grease

Restaurants might be DWU's largest individual source of FOG, but in a system that serves more than 2.4 million people the greatest threat to the wastewater collection system might be the grease that comes from residential sources. Because of that, the utility has stepped up its attention to public education about the problems their kitchen wastes could cause in the city's sewers.

In 2005, a year when its crews were called out 112 times to clear FOG-based blockages in the wastewater lines serving Dallas and several suburbs, DWU launched its Cease the Grease program aimed at educating the public about the need to keep fats, oils and grease out of the sewers. In the fiscal year that ended Sept. 30, the utility recorded only four such events, a 96 percent reduction.

Cease the Grease coordinator Helen Cantril Dulac says the evolving program tackles the problem with a multi-faceted approach that focuses on everything from the costs and conveniences that adults might be most concerned about to the environmental concerns that might attract the attention of the region's students. Dulac visits up to 200 classrooms per year to speak about the importance of keeping FOGs out of the wastewater system and part of her pitch is to tell students how the wastes can be used as an alternative, environmentally friendly fuel source.

Relying on characters ranging from Earl the Plumber, who stands ready to send them a hefty bill for cleaning their FOG-clogged lines, to Perry the Pipe whose video (www2.dallascityhall.com/cease/ceasethegrease.html) gives students a first-hand look at the problems that household grease can cause, the Cease the Grease program focuses on the simplest preventive measures people can take to avoid those problems. And the program goes beyond just education. DWU offers a variety of ways to help people keep FOG out of the collection system.

One of the most visible measures is a growing network of oil disposal stations deployed around the metropolitan area. There are 20 current locations with cabinets where Dallas residents can dispose of cooking oil and grease. Some of the collection points are at partner businesses like four Whole Foods supermarkets while others are at conspicuous curbside locations. Dulac says that when the stations were first set up, the city collected about 300 to 400 gallons per year. Now, it is more like 400 gallons per month. The disposed oil was once donated to a local school bus operation to use as bio-fuel, but the city now takes it to its own digester at the DWU Southside Treatment Plant where it is converted into methane to fuel a generator that helps power the plant.

Dulac says DWU employees have found everything from 5-gallon jugs of used cooking oil to little containers the size of baby food jars at the collection sites. Some of the oil might also arrive in some of the containers that DWU employees distribute when they are staffing displays at a variety of community events in all corners of the city.

From large plastic jugs and zip-top foil pouches for collecting household FOG to funnels that help people avoid spills while filling the containers, Cease the Grease envoys try to make it as easy as possible for people to avoid dumping their oils down the drain. In addition to the 20 collection stations, DWU employees also distribute information about other sites that collect household oils and fats for recycling. But Dulac says she and her colleagues also tell people that if they can't recycle, it is still better to contain the oils and put them in the garbage rather than pour them down the drain.

Dadgostar oversees a staff of 52 people in DWU's Pretreatment and Laboratory Services Division. About half of the employees work in the three labs operated by the wastewater operation while the rest work in the pretreatment programs.

Two labs are located at DWU's two wastewater treatment plants — the Southside and Central plants — where the employees perform process analysis and final discharge analysis to ensure the facilities are performing properly. The third lab is primarily working on the analysis of samples taken from industrial customers subject to pretreatment regulations. ✦

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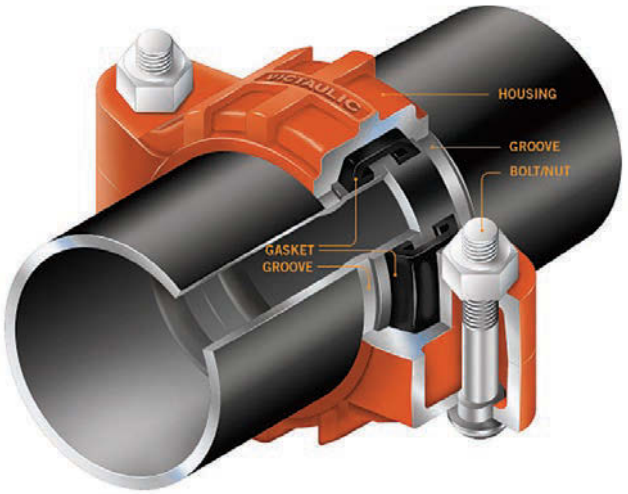
# IN THE GROOVE

## Coupling options and quick installation give grooved pipe a flexible advantage for many projects

*By Steve Morrison*




**Sections of grooved pipe are joined with a coupling system. A gasket is positioned between two abutted pipe ends, then enclosed in the coupling housing, the key sections of which engage the grooves. The bolts and nuts are tightened with a socket wrench or impact wrench, which holds the housing segments together.**

Unpredictable conditions can make the outdoor installation of pipework more difficult than in enclosed construction sites. Grooved piping systems offer advantages in laying pipework that can make them a superior choice over other joining techniques, and as a result, are increasingly being selected for the transport of water in municipal and hydroelectric applications.

### The challenges of outdoor pipe installation

Installing piping systems outdoors can create numerous challenges, mainly weather and site conditions. Inclement weather, difficult or uneven terrain, ground swell and landslides can create a variety of problems for installation crews, which engineers should account for when specifying the pipe-joining method.

Both wet and dry weather extremes can affect welding activities. In dry conditions, particularly when the risk of forest or brush fires is high, welding may be limited or even prohibited. In wet or cold conditions, welding can suffer from delays because the pipes may need to be covered and/or preheated before work can begin.

Weather conditions may be unpredictable, but site conditions are predictable and should be factored into the system design. Welding on steep or rough terrain is difficult, and the quality of work could suffer as a result. In some situations, access to basic amenities can also be an issue, and power generation equipment may need to be brought in.

When designing a water transport piping system, there are a lot of details to take into consideration, some predictable, some unpredictable, and attention to these factors can affect project schedule and cost.

### Solving environmental challenges

Grooved mechanical piping systems help alleviate many of the environmental issues, as well as the disadvantages associated with welding or flanging piping systems.

A grooved mechanical joint consists of four elements: grooved pipe, gasket, coupling housing, and bolts and nuts. The pipe groove is made by cold forming or machining a groove into a pipe-end. A gasket is positioned between two abutted pipe-ends, then enclosed in the coupling housing, the key sections of which engage the grooves. The bolts and nuts are tightened with a socket wrench or impact wrench, which holds the housing segments together. In the installed state, the coupling housing encases the gasket and engages the groove around the circumference of the pipe to create a leak-tight seal in a self-restrained pipe joint. Only the gasket is exposed to the media inside the pipeline.

Two-piece mechanical couplings are available in sizes up to 60 inches in diameter, and are offered in a rigid or flexible style. The rigid style forms a completely rigid pipe joint similar to that of a welded joint, whereas the flexible style allows limited linear and angular movement to accommodate expansion, contraction, deflection, seismic movement and settling.

Unlike welding, which requires dry pipe, grooved couplings are ideal for outdoor, remote use because they can be assembled in any weather condition without the need for power tools. Installation is as simple as aligning the pipe ends, positioning the gasket and coupling housing segments on the joint, and tightening the nuts and bolts. Once installed, many grooved couplings offer visual confirmation of proper installation, eliminating the need for X-ray testing.

A typical large-diameter joint will require several hours to weld, while a grooved mechanical coupling can be installed in less than an hour. In fact, joining pipe with grooved couplings is up to six times faster than welding and three times faster than flanging. In harsh climatic conditions, the difference is even more dramatic.

**Unlike welding, which requires dry pipe, grooved couplings are ideal for outdoor, remote use because they can be assembled in any weather condition without the need for power tools. Installation is as simple as aligning the pipe ends, positioning the gasket and coupling housing segments on the joint, and tightening the nuts and bolts.**

**Inclement weather, difficult and uneven terrain, ground swell and landslides can create a variety of problems for installation crews, but grooved pipe's coupling system provides more flexibility at installation.**

The speed and simplicity of installation dramatically cuts labor time, resulting in reduced total costs. Reduced labor and added flexibility with work crews significantly impacts installation time on projects. There are also indirect cost savings associated with grooved piping, including the elimination or reduction of rework, X-ray/non-destructive testing, purge gases, generators, and excavation required for welding. Additionally, the faster the job is completed, the less money that is needed for on-site insurance, equipment rentals and other indirect costs.

A trench carrying a flanged or welded pipe must be nearly twice the width of a trench carrying a grooved line, so the use of grooved technology can reduce a project's environmental impact. At a recent penstock installation in British Columbia, the use of a grooved system successfully narrowed the piping trench from 42.5 feet to 19.5 feet for the 2.5-mile length of the line.

Grooved mechanical piping systems are flame-free assemblies, which reduces the risk of fire as well as other hazards during installation, and also eliminates any work stoppages due to weather or environmental conditions.

## Design advantages

With a union at every joint and 360 degrees of rotational movement, grooved piping systems provide optimal field flexibility and are easily adjusted as needed.

Pipe misalignments during installation are easier to resolve as angles can be changed with less difficulty, and with their deflection capabilities, flexible couplings can accommodate for minor misalignments. For major misalignments, pipe sections can be added to or removed from a grooved system in the field much faster than adding or removing pipe from a welded or flanged system.

Maintenance is also simpler with grooved joints, which can be disassembled and reassembled quickly. A coupling can be removed by loosening the nuts and removing the housing segments and gasket — a process that takes just a few minutes. Once the maintenance is complete, the coupling can be reassembled on the pipe at the same speed as initial installation. No new parts are required. This characteristic also simplifies system modification and expansion.

Welding converts individual pipe sections into a single unit, making it difficult to access a specific point in the system. If not accessing a welded system at a union, the pipe would need to be cut to provide access. Although flanges provide system access, maintenance can be time consuming because each of the bolts needs to be loosened and removed, and in some cases, the gasket needs to be scraped off and replaced following completion of the work. Re-assembly requires the same star-pattern tightening sequence as initial installation.

Grooved piping systems are a good option for a variety of water transport applications, but they may not be appropriate for all circumstances. Grooved mechanical couplings, like all joining methods and materials, have limitations. These limitations include excessively high and low temperature extremes, excessively high pressures and chemical compatibility with various chemical services. It is recommended to consult the manufacturer's website, technical support or published literature when questions arise about specific services and product performance.

## Many benefits

There is potential for significant financial savings when using mechanical grooved piping systems. Faster field installation, elimination of hot-works and reduced need for expansion joints are all advantages that are particularly important when choosing a pipe-joining method for cost-conscious projects.

Choosing a grooved piping system is an attractive option for owners, engineers and system designers alike in a sector where margins are increasingly tight. ✦


### About the Author

Steve Morrison is Global Water Systems Technology Market Manager with Victaulic, a leading producer of mechanical pipe-joining systems. For more information, visit www.victaulic.com.

# HOLISTIC APPROACH

Lynchburg, Va., tackles significant overflow issues by taking on the easiest work first, then developing a cost-saving plan to deal with the toughest jobs

*By Peter Kenter*

Like many American cities, Lynchburg, Va., faces a combined sewer overflow problem. By following a strategy of performing the least costly work first, the city has made significant progress on reducing overflow volumes while developing a new holistic approach to handle the most challenging aspects of the program.

The Lynchburg public water system is one of the oldest in the country, with the first water pumped from a dam on the James River to a reservoir in 1829. In almost two centuries, the public system has grown to provide water, sewer and stormwater services to 75,000 residents of the city. The department also provides wholesale sewer and water services to nearby Amherst, Bedford and Campbell counties.

Nicknamed The Hill City, Lynchburg takes advantage of its geography with a gravity-fed sewer system, requiring no public lift stations. The system incorporates 450 miles of sewer lines, including the combined sewer segments. Pipes are made of various materials, including clay, concrete, ductile iron and some corrugated metal. The oldest pipes date back more than a century.

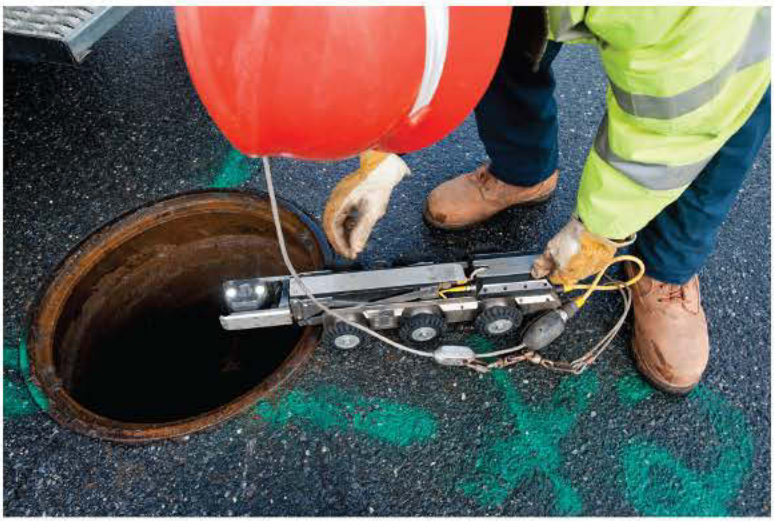
The CSO problem primarily affects the James River and its tributaries, which ultimately affects the water quality of Chesapeake Bay.

## Survey identifies CSO points

An infiltration/inflow evaluation survey (IIES) conducted between 1974 and 1979 used a computer model provided by the U.S. Army Corps of Engineers to help quantify the extent of the city's CSO problem. It identified 132 CSO points and offered direction for initial sewer improvement efforts.

Lynchburg invested more than $4 million during the 1980s to close several overflow points and to collect data to help fashion a long-term


Mike Pope-Key, left, utility line tech 1, and Daniel Phillips, utility line tech 3, use a Vac-Con combination unit to clean a sewer line. Crews televise and clean up to 150,000 feet of sewer line each year. (Photography by Jill Nance)



**Kenny Hodges, utility line tech 3, uses an RS Technical Services camera to inspect a sewer line. Lynchburg's Utility Line Maintenance Division maintains and repairs all water and sewer lines, valves, fire hydrants, manholes, inlets and cleanouts, and installs new service connections.**

control plan (LTCP) for CSOs.

The survey was updated in 1989 using more sophisticated computer models to estimate the frequency, volume and pollutant loads of each CSO event under various rainfall conditions. The study also parceled the city's combined sewer territory into 59 different project areas, ranked according to criteria that included their impact on the James River. The original LTCP was comprised of three components, which included complete separation of the combined system and elimination of all overflow points, interceptor replacement, and rain leader disconnection.

The city formalized its approach to the CSO problem by negotiating a unique consent order with the state Department of Environmental Quality in 1994.

"We refer to it as one of the best consent orders in the country because it has no timeline," says Timothy A. Mitchell, P.E., director of water resources with the City of Lynchburg. "We were proactive in negotiating with the state and the order is structured on our ability to afford to implement the program."

The order, the first of its kind to be approved by the Environmental Protection Agency, requires the utility to tie the sewer bill to at least 1.25 percent of the city's median household income.

Lynchburg soon began to eliminate additional CSO points. The efforts were financed, in part, by a combination of state and local grants and low-interest loans through state revolving funds. An update of the LTCP in 2000 reaffirmed that the three original components were still the best approach to meeting water quality goals.

"Our approach was to pick the low-hanging fruit first," says Mitchell. "We targeted the most cost-effective ways to minimize CSOs within the budget delineated by the consent order while working to upgrade, maintain and repair the system."

## Sewer system survey

In 2011, the department initiated a $1.2 million sewer system evaluation survey conducted by the city's consulting engineering firm, Brown and Caldwell. The study placed temporary flowmeters at 30 locations. It also included extensive smoke testing, night flow isolation and manhole inspections.

"The study was aimed at controlling the contributions of the sanitary system to volumes of sewage that could lead to sanitary sewer overflows," says Mitchell.

**"We refer to it as one of the best consent orders in the country because it has no timeline. We were proactive in negotiating with the state and the order is structured on our ability to afford to implement the program."**

**Timothy A. Mitchell**

**Lynchburg's Utility Line Maintenance Division team includes, front row, from left, Richard Wilcox, Edwin Marsh, Mike Mundy and Shirley Jones. Second row: Rodney Gibson, Jason Meyers, Daniel Phillips, Gary Looze, Bill Berry and James Miller. Third row: Brenda Woody, Will Blair, Shane Hodges, L.C. Campbell, Johnathan Raper, Kevin Gallier, Joseph Terenyi, Derrick Helm and Superintendent Harry Doss. Fourth row: John Fulghum, Kenny Hodges, Harry Bateman, Mike Pope-Key, Scott Sablack, Elijah Merat and Robert Davis.**

## PROFILE: Lynchburg (Va.) Department of Water Resources

**YEAR UTILITY ESTABLISHED:**
1829

**WATER CUSTOMERS SERVED:**
22,400 connections

**AREA SERVED:**
50 square miles

**DEPARTMENT STAFF:**
125

**INFRASTRUCTURE:**
450 miles of sewers;
450 miles of water mains

**ANNUAL DEPARTMENT BUDGET (2013):**
Sewer, $19.7 million; Water, $13.6 million, Stormwater, $3.8 million

**ASSOCIATIONS:**
American Water Works Association, Water Environment Federation, National Association of Clean Water Agencies, Virginia Municipal Stormwater Association, Virginia Association of Municipal Wastewater Agencies

**WEBSITE:**
www.lynchburgva.gov/welcome-water-resources

"Those include pipe failures and defects, inflow and infiltration problems, and blockages caused by roots, grease and debris. The study provided a lot of good information to enhance the CSO plan."

The study's conclusions provided the department with a model on which it based its current sewer Management, Operations and Maintenance program.

The city currently contracts out new sewer construction and replacement, but performs its own repairs. Sewer lines are replaced with PVC pipe and larger interceptors are replaced with ductile iron or concrete.

The city's Utility Line Maintenance Division maintains and repairs all water and sewer lines, valves, fire hydrants, manholes, inlets and clean-outs, and installs new service connections. It also responds to water main breaks and sewer overflows. The division fields five maintenance and repair crews, while a sixth repairs inlets, meter boxes and manhole tops.

Four wastewater maintenance crews clean and televise sewer lines, manholes and storm inlets. The crews operate two Vac-Con combination trucks and two Ford F-450s used as CCTV camera trucks with camera equipment by RS Technical. Crews televise and clean up to 150,000 feet of sewer line each year.

**"Our approach was to pick the low-hanging fruit first. We targeted the most cost-effective ways to minimize CSOs within the budget delineated by the consent order while working to upgrade, maintain and repair the system."**

**Timothy A. Mitchell**

Lynchburg has, in the past, also contracted with Insituform Technologies, to provide cured-in-place pipe lining, and with A.J. Conner General Contractor, Inc. to line sewers using Ultraliner PVC Alloy Pipeliner by Hydroliner.

By 2012, the city had eliminated 112 of the original 132 overflow points, reducing almost 80 percent of CSO volume. It had replaced 26 miles of interceptors, disconnected 70 percent of rooftop downspouts, and 36 of 59 priority projects had been completed, designed, or were under construction. Estimated amounts of solid pollutants had also been cut down to size.

## RANDOLPH COLLEGE DISCONNECTS

Lynchburg's private Randolph College presents a considerable amount of roof space to the open sky, making it an excellent poster child for downspout disconnection.

"We worked with Randolph and Wiley|Wilson consulting engineers to develop a plan to eliminate stormwater flows from 20,000 square feet of college roof space," says Timothy Mitchell, director of water resources with the City of Lynchburg.

Most of the project's $466,000 cost was covered by stimulus funds under the American Recovery and Reinvestment Act Green Project Reserve.

The project saw 600 square yards of pavement removed from the campus. The flow from the disconnected downspouts was directed to six newly planted rain gardens which acted as bio-filters. Additional flow is captured in two 300-gallon rain barrels.

"The project represents a great example of a successful public-private partnership that will have a measurable effect on the city's combined sewer overflow program," says Mitchell.

Six-foot-diameter reinforced concrete pipe will be installed in a 279-foot tunnel below Jefferson Street as part of the CSO project in downtown Lynchburg.

**Upgrades have been made to the Lynchburg Regional Wastewater Treatment Plant in recent months, such as the secondary clarifiers. The headworks, primary clarifiers, aeration basins and return activation sludge system also were upgraded.**

### The turning point

All the city's progress, however, also represented a turning point.

The city had already spent $233 million on the CSO program. Funding received from the American Recovery and Reinvestment Act had been exhausted. Increases in the city's median income had stagnated, and the city's sewer fund was out of debt capacity. The city became concerned that if it slowed down or halted its CSO program for an extended period of time, it could invite a review of the existing consent order by the EPA, which had ordered sewer rate increases in some cities by 2 percent of median income.

"We were also running out of high-yield projects that could result in significant CSO reductions," says Mitchell. "And we were closing in on the 4 square miles of our historic downtown where we knew that the cost of CSO construction projects would increase significantly. That, combined with more stringent stormwater requirements, warranted a more holistic look at our water quality programs and goals."

If the city continued with the same approach, the department estimated that it could expect to pay another $280 million to eliminate the remaining 20 CSO points over an additional 30 years.

*(continued)*

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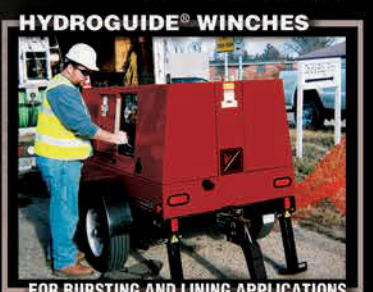

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Scott Sablack, utility line tech 2, uses a tamper (BOMAG) to compact and flatten the surface after a water service renewal in Lynchburg.

**"By using this multi-pronged approach, we can achieve overall better water quality results in a fraction of the time — within the next decade — and at a significantly reduced cost. When the program is complete, the system may still experience overflows, but it will be overflowing less often, at lower volumes and represent a higher quality of overflow."**

**Timothy A. Mitchell**

## Doing things differently

"At that point, we decided we were going to try to do things differently," says Mitchell. "Instead of settling for the status quo and continuing with our original long-term plan, we invested $3 million on a study by environmental engineering firm Greeley and Hansen that would take a scientific approach to looking at the system holistically. It would look at the goal of meeting water quality standards in the James River and its tributaries within the city, which demonstrate a bacteria impairment, and develop the best solution by looking at both our CSO and stormwater programs."

The consultants developed a complex sewer model, installing nine rain gauges and 72 flowmeters, while incorporating information on numerous pollutant sources, 1,700 pipelines and 129 drainage basins.

More than 2,800 water samples were taken from various streams and the James River during four events representing both dry and wet weather. These were used to characterize pollutants and build a complex hydrologic and hydraulic (H&H) model of the river and streams. The study also characterized and quantified non-CSO contributors to pollution, such as agricultural, residential and urban stormwater, which would still need to be addressed regardless of the city's approach.

More than 50 options were tested using both the H&H and sewer models and evaluated in terms of annual overflow frequency and volume, and water-quality impact as measured by potential pollutant concentrations in the James River and its tributaries. Each scenario was subjected to a cost-performance analysis.

"The consultants worked closely with city staff and the DEQ to ensure that proposed measures would be both feasible and acceptable to regulators," says Mitchell.

The approach recommended by the study will aim to reduce more than half of current annual overflow at an estimated cost of about $60 million — a savings of $220 million. Additionally, the State of Virginia awarded the city a $30 million grant for half of the remaining program, in part due to the new approach, further ensuring rapid completion of the program.

Major components of the plan include:

- Separating sewers at just five of the remaining overflow points and avoiding the most costly and disruptive downtown projects
- Eliminating two major overflow points in downtown Lynchburg
- Maximizing wet-weather treatment capacity at the wastewater treatment plant, including a new headworks designed to remove additional organics
- Creating an additional temporary flow storage facility at the wastewater treatment plant
- Installing flow regulators to handle combined sewer volumes more efficiently
- Continuing the downspout disconnection program; homeowners receive cash incentives to disconnect downspouts, while businesses are reimbursed based on the volume of stormwater they divert from rooftops (see sidebar)
- Utilizing cost-effective green infrastructure, such as rain gardens and pervious pavement

"By using this multi-pronged approach, we can achieve overall better water quality results in a fraction of the time — within the next decade — and at a significantly reduced cost," says Mitchell. "When the program is complete, the system may still experience overflows, but it will be overflowing less often, at lower volumes and represent a higher quality of overflow."

The plan, however, still requires public participation, State Water Control Board approval, and possible EPA approval.

Mitchell says he's not only confident that the city will move forward on the new plan, he believes the holistic approach to CSOs may be beneficial for many of the 700 U.S. cities facing CSO challenges.

"Undertaking the study that helped devise this solution presented us with some risk, but it's a risk that paid off," he says. "I'd advise other cities facing similar CSO and wet weather issues to explore a more holistic approach to achieving their pollution reduction goals." ✦

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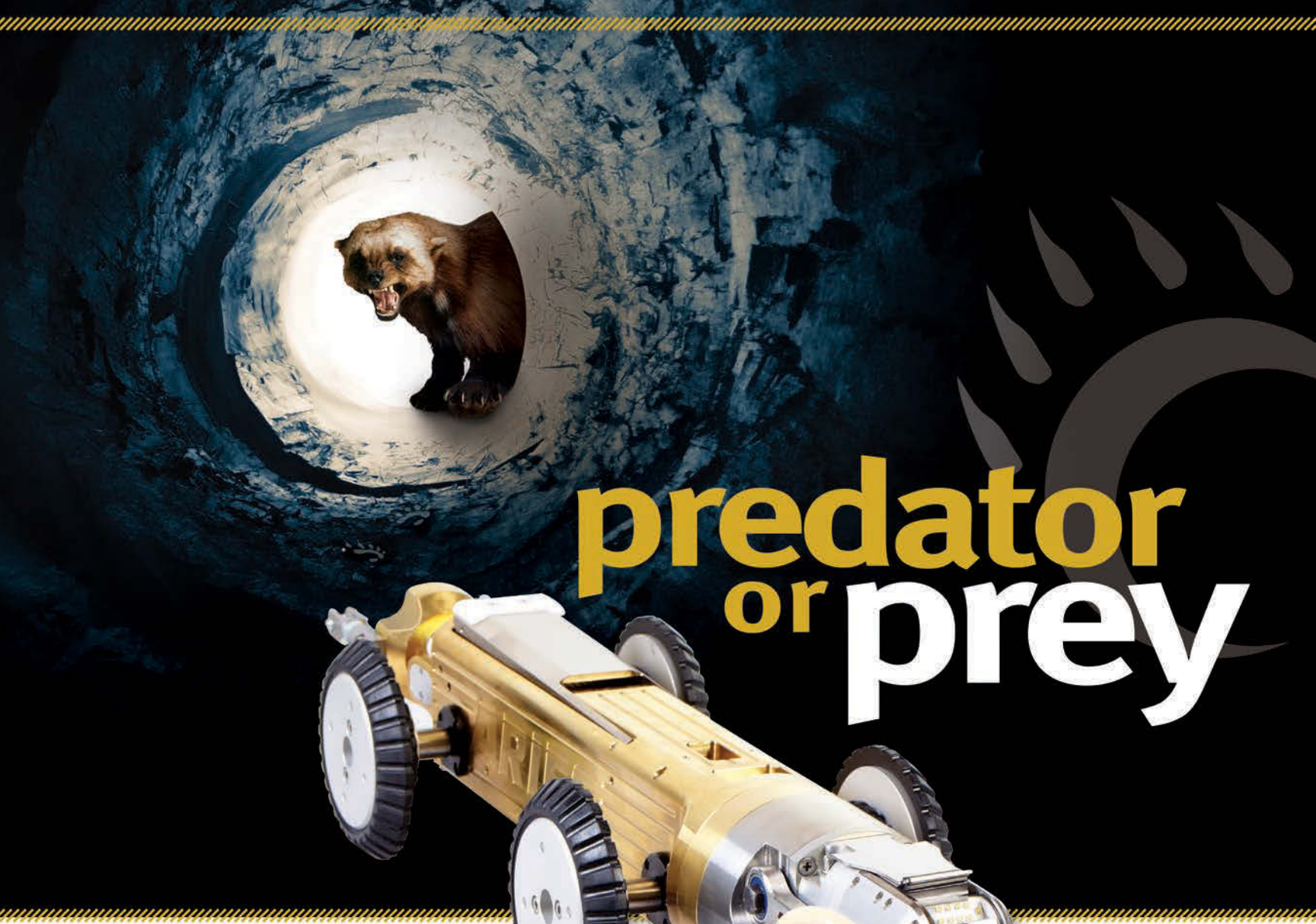

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# SHAKE FREE OF DEBRIS

## Enz USA's new vibrating nozzles draw attention at Pumper & Cleaner Expo

*By Ed Wodalski*

Good vibrations was the theme for Enz USA and its new Rotopuls nozzles at the Pumper & Cleaner Environmental Expo in Indianapolis this year, as they debuted a new line of nozzles capable of shaking stubborn debris free from the interior pipe walls.

A video playing in Enz's Expo booth showed how the Turbopuls water-recycling nozzle broke down debris at a corn processing plant in Dayton, Ohio.

"They actually bought two of them," said Dana Hicks, sales manager for Enz. "These are 42-inch (HDPE) lining pipes. If you look at the video, you'll notice the nozzle is actually vibrating the pipe and debris is just falling off. It's all self-contained and maintenance free. The tool is good for 16- to 80-inch pipes. We have different sizes that you can use with 1 1/4-inch hose, 1-inch hose, 3/4-inch hose; we even have one for 1/2-inch hose. It's good for hard debris in relined pipes or concrete pipe."

PHOTO BY ED WODALSKI

Curtis Craig, sales associate for Enz USA, explains how the company's new self-propelled, vibrating nozzle breaks down hard debris inside pipes.

An eccentrically supported rotor produces rapid vibrations and pulsating jets that can disintegrate deposits up to 4 inches thick in steel, cement and thick-walled polyethylene pipes (not recommended for use in clay, thin-walled plastic or PVC pipes).

> **"They had never seen anything like it. It looks prehistoric, but when you use it, it's pretty simple. It's an efficient tool for removing hard deposits."**
>
> **Dana Hicks**

Hicks says the vibrating nozzles drew a lot of interest from Expo visitors. "They had never seen anything like it. It looks prehistoric, but when you use it, it's pretty simple. It's an efficient tool for removing hard deposits."

The maintenance-free, self-propelled stainless steel nozzles have a working pressure of 2,900 psi. Model 410.080A has a 1/2-inch connecting thread and 410.080B has a 3/4-inch connecting thread. Both of the smaller models are designed for cleaning 6- to 12-inch pipe and deliver 32 gpm at 1,450 psi. The nozzles measure 3.1 by 8.3 inches and weigh 9.56 pounds.

Model 410.120A has a 1-inch connecting thread and model 410.120B has a 1 1/4-inch connecting thread. Both of the larger nozzles can be used with 1-inch hose. Designed for cleaning 8- to 40-inch pipes, the 4.7- by 12.6-inch nozzles weigh 32.22 pounds.

A holder for mounting two of the 410.120 nozzles is available for cleaning larger diameter pipes. In many cases, the nozzles can replace percussion milling cutters or rotating chain scrapers.

"It's designed to take out the real hard debris, everything from calcium deposits to concrete on the bottom of pipes," says Hicks, who had several sales at the show. "You can put a chisel point on it if you really need to bore through something. It's very good on landfill applications to clean out the Bio-Rock." **877/369-8721; www.enzusainc.com.** ✦

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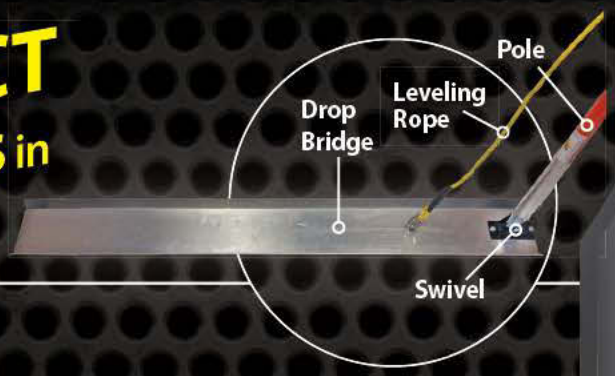


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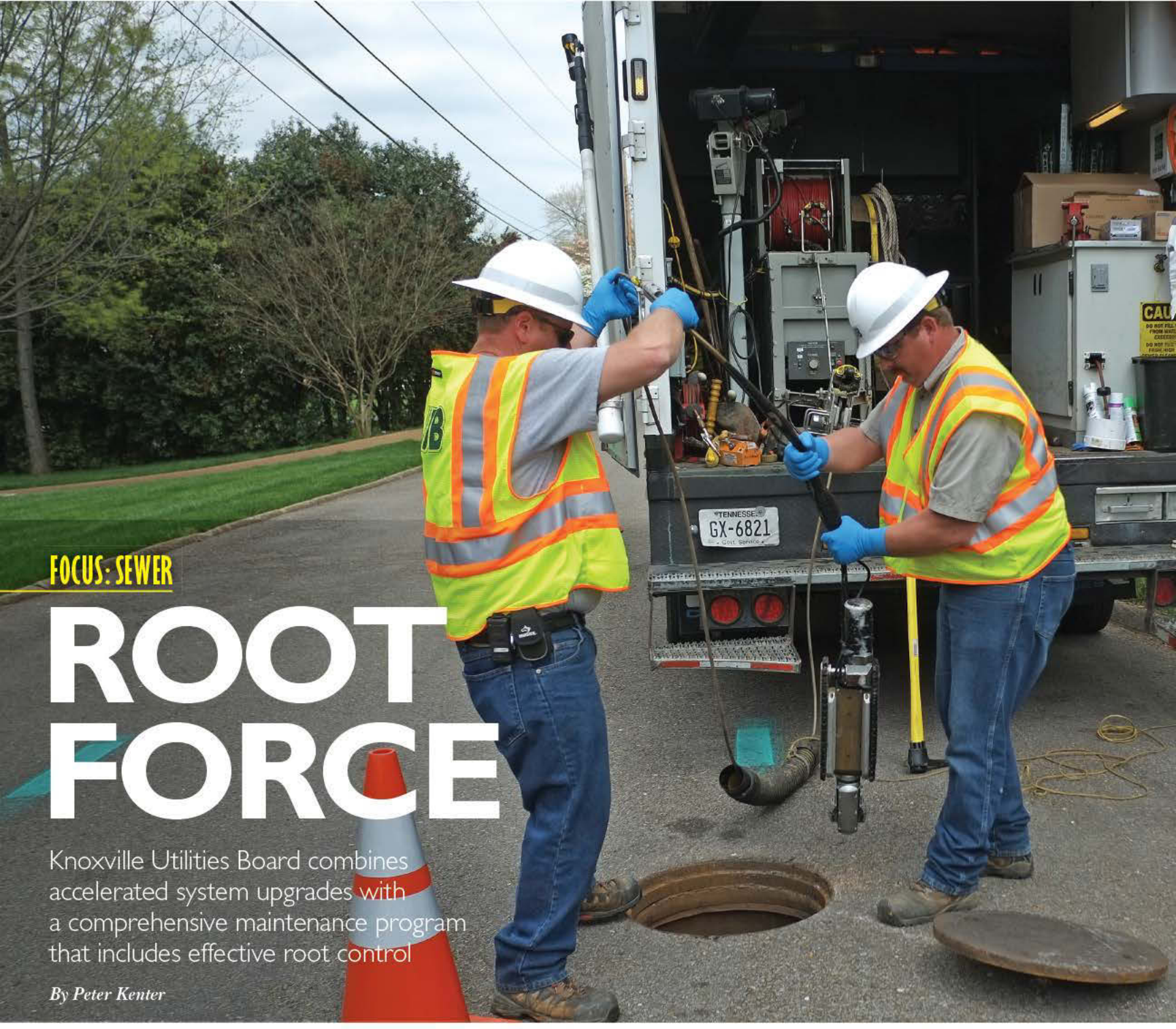



FOCUS: SEWER

# ROOT FORCE

Knoxville Utilities Board combines accelerated system upgrades with a comprehensive maintenance program that includes effective root control

*By Peter Kenter*

The Knoxville Utilities Board (KUB) of Knoxville, Tenn., is engaged in an assertive program to renew its wastewater infrastructure. The effort consists of a two-pronged attack. The first focuses on system enhancement, rehabilitation and replacement. The second concentrates on operating and maintaining the system, including an emphasis on effective root control.

The utility was founded in 1939 as a provider of water and electrical services. Gas service was added in 1945, and KUB assumed wastewater services from the City of Knoxville in 1987. KUB is an independent agency of the city and funds its operations through ratepayer revenues.

By the late 1990s, KUB was committed to system improvement through capital wastewater system replacements and a management, operation and maintenance (MOM) program. However, a consent decree signed with the US Environmental Protection Agency in early 2005 bound the utility to address chronic sanitary sewer overflows (SSOs).

The utility's first program designed specifically to address SSOs was Partners Acting for a Cleaner Environment, a 10-year, $530 million program launched in October 2004 in anticipation of the consent decree. Dubbed PACE10, the program is composed of more than 130 projects focusing primarily on infrastructure improvements.

The consent decree also prescribed a series of maintenance and capital programs and required the utility to establish a continuing sewer system assessment program (CSSAP).

KUB operates more than 1,300 miles of wastewater infrastructure, with pipes ranging between 6 and 84 inches in diameter. The older pipes date back as far as a century and are made of brick, clay and concrete. Newer pipes are made of PVC, HDPE, ductile iron and fiberglass-reinforced concrete.

"We don't have a problem with combined storm and sanitary sewer overflows, because the systems were designed with separated flows," says Mark Rauhuff, water systems engi-

Technicians Randall Atkins, left, and Danny Lewelling lift a self-propelled CUES camera into position to enter a manhole while James Horner takes a phone call from the office. (Photography by Chad Greene)

## PROFILE: Knoxville (Tenn.) Utilities Board

**YEAR UTILITY ESTABLISHED:**
1939

**CUSTOMERS SERVED:**
69,000 wastewater connections; 78,000 water connections

**AREA SERVED:**
242 sq. mi. wastewater; 187 sq. mi. water

**DEPARTMENT STAFF:**
179 wastewater; 170 water

**INFRASTRUCTURE:**
1,300 miles of wastewater mains; 1,300 miles of water mains

**ANNUAL DEPARTMENT BUDGET (2013):**
Wastewater $116.6 million; Water $56.4 million

**ASSOCIATIONS:**
American Water Works Association, Association of Metropolitan Water Agencies, Water Environment Federation, Kentucky-Tennessee Water Environment Association, National Association of Clean Water Agencies, National Biosolids Partnership

**WEBSITE:**
www.kub.org

neering manager with KUB. "One neighborhood that had combined flows was separated in 1995."

### Assessment cycle

The CSSAP has targeted a 12-year cycle for complete assessment of the system. The program achieves its goals through multiple approaches including CCTV camera inspection, smoke testing, manhole inspections and flow monitoring.

System modeling resulting from the CSSAP confirmed what earlier studies had already indicated.

"SSOs were largely related to a lack of system capacity and driven by inflow and infiltration (I&I) caused by heavy wet weather events," says Rauhuff. "However, a smaller number of dry weather SSOs often followed wet weather events as grease and solids were forced downstream to create new blockages. The primary approach of PACE10 regarding SSOs is to address the situation with a mixture of pipe replacement and rehabilitation, an increase in wastewater storage capacity and treatment plant upgrades."

Over the history of the wastewater system, the need for increases in collection system capacity and storage are a direct result of customer growth and an aging system that has resulted in increasing I&I.

"The original design featured trunk sewers sized for the needs of the community served," says Rauhuff. "As they're being replaced, we're increasing their capacity. We've also built six wet-weather wastewater storage basins with 33 million gallons of total storage."

Four of the units, totaling a 21-million-gallon capacity, serve the system during regular wet weather. Two others, with a combined capacity of 12 million gallons, serve two of the four wastewater treatment plants during extreme wet weather. A series of flow monitors inform the SCADA system when water levels rise, efficiently diverting flow to the storage tanks.

KUB is also upgrading its Kuwahee and Fourth Creek wastewater plants to optimize treatment capacity during peak wet-weather flows.

**"SSOs were largely related to a lack of system capacity and driven by inflow and infiltration (I&I) caused by heavy wet weather events. However, a smaller number of dry weather SSOs often followed wet weather events as grease and solids were forced downstream to create new blockages."**

**Mark Rauhuff**

### Replacing pipe

The ambitious goal of the pipe replacement program is 2 percent of the system per year, amounting to about 25 miles of sewer line annually and 218 miles to date.

Contractors perform most of the dig-and-replace pipe work, and also take on most of the rehabilitation contracts.

"From both a budgeting and scheduling perspective, it makes more sense for us to keep in-house

Danny Lewelling moves the boom of an Aquatech jet/vac combination truck toward a manhole (Hi-Vac Corporation).

**KUB Wastewater System Asset Management and Planning team leader James Koontz, left, and Water Systems engineering manager Mark Rauhuff are shown in front of a water KUB system map.**


## KUB WATER AND CENTURY II

The Knoxville Utilities Board's (KUB) Century II program represents a concerted effort to replace aging infrastructure. The infrastructure management program was launched in May 2007 and its goal is to establish a sustainable infrastructure replacement and maintenance program for all four utilities — water, wastewater, gas and electric.

KUB maintains a system of more than 1,300 miles of water pipes, ranging from 2 to 54 inches in diameter. The older parts of the system, dating as far back as the 1880s, are made of cast iron, cement and galvanized iron. Pipes installed from the 1970s on are largely ductile iron and PVC. However, while the older cast iron, galvanized and cement-lined pipes make up just 47 percent of the system, they account for almost 90 percent of repairs.

"With Century II, we're targeting a replacement level of 1 percent of the water system per year," says Mark Rauhuff, water systems engineering manager with KUB. "However, we're currently replacing the galvanized mains at 12 miles per year and the cast iron at 5 miles per year. Because it is past its useful life, the galvanized pipe is responsible for over half the leakage in the system and will be replaced by 2020."

crews for emergency work which they can give their uninterrupted priority," says James Koontz, KUB's wastewater system asset management and planning team leader.

The pipe rehabilitation program employs some trenchless technologies, including pipe bursting and epoxy cured-in-place-pipe lining.

"At one point we were also using a grout product," says Koontz. "It was a good application, but it required extreme precision in applying it in just the right location. However, we feel that we're often getting more value by putting in new pipe than using grout point repairs in most applications."

As more detailed system information is collected, KUB has become able to focus and prioritize its sewer maintenance efforts.

"Our MOM effort has switched from a reactive model to a proactive blockage abatement program based upon predictive condition assessment investigations," says Koontz. "If previous inspections or blockages have indicated a problem area, we may return there to inspect and clean as often as every month."

**KUB construction technicians, from left, Randall Atkins, Danny Lewelling and James Horner stand with James Koontz.**

### Emphasis on root control

Root control forms an important component of KUB's sewer maintenance program. The largest blockages are found in sewer easements, since the roots of native trees typically do not stretch underneath roadways.

"We've tried chemical and we've tried mechanical," says Koontz. "However, at this point we're doing far more mechanical than chemical."

> **"From both a budgeting and scheduling perspective, it makes more sense for us to keep in-house crews for emergency work which they can give their uninterrupted priority."**
>
> **James Koontz**

KUB contracted chemical root control services about 10 years ago, but found that the treatments offered diminishing returns. The foaming agents destroyed roots as promised and increased sewer capacity.

"However, to stay on top of the roots, you have to keep applying and reapplying the chemical treatment," says Koontz. "We found, through visual inspection, that once you begin to eliminate the section of root where it enters the pipe, you're pulling the finger out of the dam so to speak and increasing inflow from outside the pipe. Chemical treatment is still on the table, however it's been several years since we've opted to use it."

Most of the current root control program involves hydraulically propelled cutting equipment. In some cases, root cutting releases other blockages, such as debris and grease trapped in the roots. Hydraulic flushing and vacuuming is followed by a CCTV inspection to ensure that the debris has been cleared.

"Our KUB maintenance crews are equipped to perform root removal, but we don't typically put them on scheduled maintenance runs," says Koontz. "Routine root control is contracted, while our crews perform root removal as part of emergency blockage calls."

### Removing roots from laterals

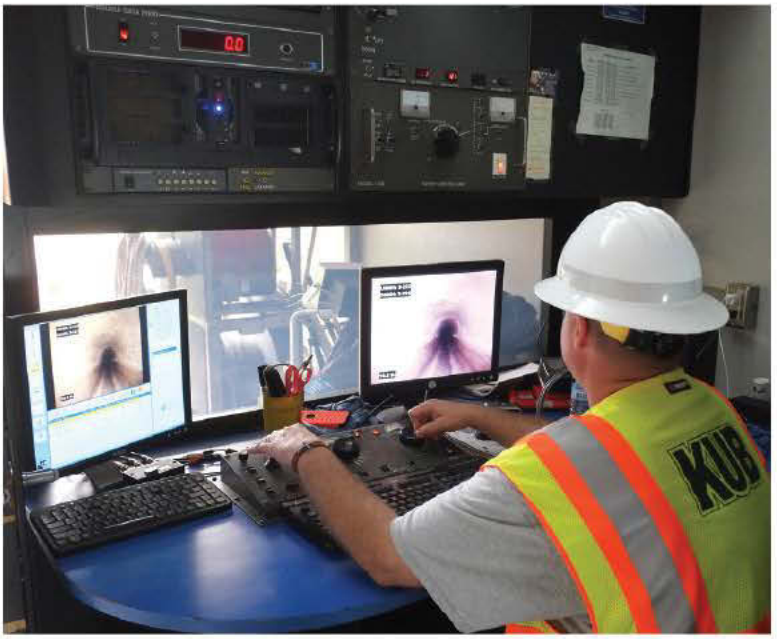
The root removal program includes chasing roots into lower laterals up to the customer's property line.

"Sometimes roots even grow into the mains from laterals," says Koontz. "If we find that roots continue to be a problem further down the lateral, or if smoke testing and CCTV inspection indicate structural defect, we have a policy to ensure the customer clears the pipe or replaces the lateral. In the early years of the program when a large number of lateral replacements were occurring, we assisted lower income customers with costs through a grant program."

The utility performs a cost-benefit analysis on any pipe segments that require frequent root removal.

*(continued)*

James Horner controls the team's camera from the CCTV truck (CUES).



**"Utilities sometimes forget to make an extra effort to communicate with their customers as various programs are initiated. In 2012 alone, we sent out 19,000, letters about construction projects, including 11,000 about PACE10 initiatives. Customers can understand and appreciate the need for rate increases when they're alerted to the work and can see KUB's success in reducing SSOs."**

**Mark Rauhuff**

"We'd rather use the capital budget to replace that length of pipe than to clear it repeatedly," says Rauhuff.

## Prevailing over SSOs

Applying both infrastructure improvements and diligent maintenance, KUB has reduced SSOs from more than 400 in 2004 to fewer than 100 in 2012, with most of the remaining events related to extreme rainfall. Detailed information about each incident is available 24/7 on the utility's website.

"Utilities sometimes forget to make an extra effort to communicate with their customers as various programs are initiated," says Rauhuff. "In 2012 alone, we sent out 19,000 letters about construction projects, including 11,000 about PACE10 initiatives. Customers can understand and appreciate the need for rate increases when they're alerted to the work and can see KUB's success in reducing SSOs."

PACE10 is being extended beyond its 10-year original scope to the conclusion of the wastewater treatment plant upgrades in 2021, at which point an expected $650 million will have been spent to meet its targets. The sewer infrastructure program will then join KUB's Century II program at a renewal rate of 2 percent annually (see sidebar).

"PACE10 is on time and on budget, and we continue to meet each of the terms and schedules of the consent decree," says Rauhuff. "Of the 126 projects that must be completed by June 2013, we've already completed 125. We're definitely on top of the program." ✦

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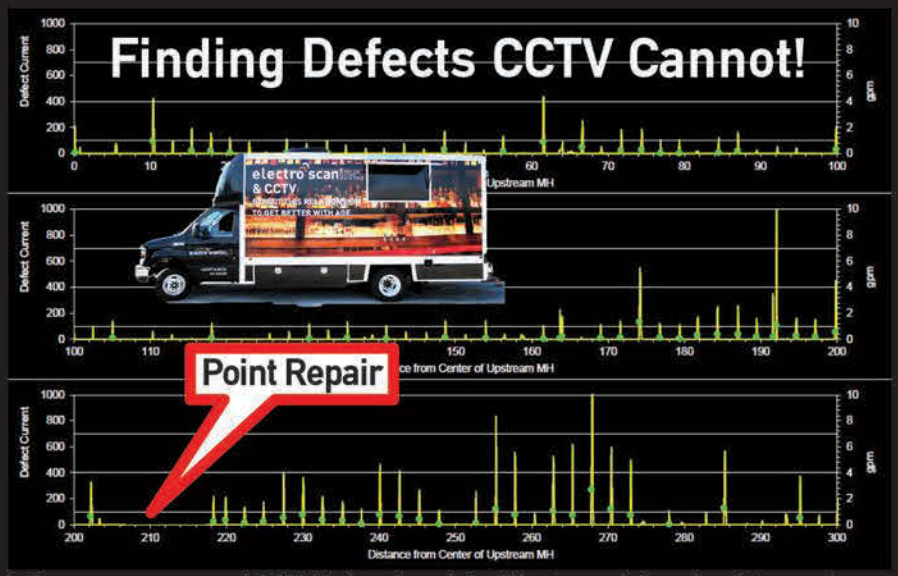
* NASTT No-Dig Joseph L. Abbott, Jr. Award Recipient.




(Above) Sewer agency used CCTV to locate a defect that was determined to require a Point Repair at 210 feet. A Point Repair was completed and the Contractor used CCTV to certify the repair. Then, the pipe was Electro Scanned.

***Good News***: The Point Repair was successful -- no electrical readings!

***Bad News:*** The Sewer Pipe had numerous other defects not seen by CCTV.

NOT SEEN ON CCTV

# If You Use CCTV to Find Infiltration, You Might Be Fixing The Wrong Pipe.

## INFILTRATION SCORECARD

| | How Do They Compare? | CCTV | Electro Scan |
|---|---|---|---|
| 1 | Automatically Finds Potential Sources of Infiltration | N | Y |
| 2 | Automatically Finds Leaks Inside Joints | N | Y |
| 3 | Automatically Finds Leaks at Service Connections | N | Y |
| 4 | Automatically Finds Sources of Infiltration at Cracks | N | Y |
| 5 | Automatically Finds Leak Locations (within 0.4 in or 1 cm) | N | Y |
| 6 | Automatically Measures Size of Leaks (Est. GPM or LPM) | N | Y |
| 7 | Automatically Finds Defects That Leak from Bad Couplings | N | Y |
| 8 | Automatically Finds Defects That May Still Leak After Repairs | N | Y |
| 9 | Automatically Finds Defects That Leak in Re-Lining Projects | N | Y |
| 10 | Automatically Finds Defects After Service Re-Connections | N | Y |
| 11 | Automatically Finds Leaks, If Silt or Debris on Bottom of Pipe | N | Y |
| 12 | Able to Conduct Inspections, If Sewer Pipe Is Full of Water | N | Y |
| 13 | Able to Determine Size of Potential Leak, If Roots Are Present | N | Y |
| 14 | Automatically Finds Leaks at Joints, If Grease Is Present | N | Y |
| 15 | Able to Determine Size of Leaks, If Pipe Has Encrustration | N | Y |
| 16 | Requires Active Infiltration to Identify Defect at Source | Y | N |
| 17 | Contains Moving Parts That Could Clog from Debris or Silt | Y | N |
| 18 | Requires Bypass During Inspection, If Pipe Full | Y | N |
| 19 | Requires Special Training and Certification to Identify Defects | Y | N |
| 20 | Relies on Visual Observations to Record Defects | Y | N |
| 21 | Ave. Speed of Inspection (6-20" Sewer Main) | 3ft / min | 50ft / min |

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**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.

# BUILD TEAM MORALE

## Engaging employees and fostering a sense of accomplishment will help them realize their full potential

*By Ken Wysocky*

When former U.S. Air Force pilot-turned-business-consultant/motivational speaker/author Danny Cox talks about the importance of good workplace morale, he often relates an anecdote from survival-training courses in which he participated years ago.

"We had a tough old sergeant who said that if we ever had to eject from our airplane, and ended up in the wilderness for three or four days, we'd be found dead — unless we could feel like we accomplished something every day, no matter how small it was," he says. "He said that if we can do that, we'd be found hale and hearty."

So what does that have to do with your organization? If you want good morale, the answer is everything, says Cox, who used to fly fighter jets for the renowned Thunderbirds air-demonstration squadron.

"The same principle applies in the business world," he explains. "Even achieving a small daily goal makes you feel like today is different from yesterday. If you're just repeating yesterday over and over, you'll have trouble getting out of bed in the morning, especially if yesterday wasn't all that great. Employees have to constantly get better at what they're doing."

Cox learned a lot about workplace morale after he became a civilian and got a job as a real-estate sales manager. By his own admission, Cox was much better at flying jets at supersonic speeds than managing his staff. When his employer threatened to fire him because his team went from number one to worst in sales performance, he knew that in terms of management style, it was time to straighten up and fly right.

"So I started taking people to lunch to find out how to get better," he recalls. "I laid out a plan to work better with the people who hated me. I based it on evaluating their weaknesses and strengths … I figured I needed to be aware of their weaknesses and talk to their strengths. And eventually, we got back to number one [in sales]."

Then Cox got transferred to another office where salesperson turnover was 147 percent. After five years, Cox got that number down to 20 percent. Figuring he was onto something, his third career — this time as a motivational consultant, coach and author — soon followed.

**"Even achieving a small daily goal makes you feel like today is different from yesterday. If you're just repeating yesterday over and over, you'll have trouble getting out of bed in the morning, especially if yesterday wasn't all that great."**

**Danny Cox**

### Heed the signs

Cox says there are 10 tell-tale signs of low morale: uncooperative employees; lack of enthusiasm; no commitment; constant fault-finding; tardiness and absenteeism; increased complaints; a deteriorating, sloppy workplace; breakdowns in discipline; zombie-like, unhappy workers; and constant talking about low morale.

"The low morale actually becomes a rallying point for employees," Cox says. "It's all people talk about, and it's very damaging … you can't let chickens roost over your well, because it ruins the water."

While the signs of low morale may be fairly apparent, the underlying causes can be more difficult to discern. Based on his years of experience, here's Cox's take on the nine most common reasons for low morale:

1. Workers don't fully understand their jobs
2. Unrealistic or constantly changing goals
3. Poor organizational communication
4. Absentee management
5. Over-inflated organizational structure; too many people in upper management that lose touch with what's going on in the field
6. Employees in unsuitable jobs (round-pegs-in-square-holes syndrome)
7. Non-people-oriented managers
8. Lack of constructive feedback
9. Inadequate training

As a manager, the solutions to some of these problems are obvious. Others, however, are as difficult to solve as repairing a jet engine at altitude. Nonetheless, Cox points out there are many things managers can do on their own to build a high-morale team.

**1. Keep jobs interesting.** "I call it the plate-spinning concept, like the guy at the circus who keeps all those plates spinning," Cox says. "A good manager takes a different person out for lunch or coffee each week and talks about how things are going. Or holds a meeting in a park. It's not hard to do and not very time-consuming. Or think about bringing in speakers who can talk about topics that benefit the company."

**2. Treat people fairly.** Few things damage morale more than holding some accountable for the same things others are not.

**3. Offer more responsibility.** If an employee has an aptitude for numbers, for instance, let them handle a task related to that. "It shows you have faith in them," he says.

**4. Welcome new ideas.** Then, when someone puts the idea into action, hold a staff meeting and talk about what did and didn't work and what the employee learned from the experience.

**5. Foster a sense of accomplishment.** Show employees how to use their strengths to accomplish something, then be sure to congratulate them when they succeed.

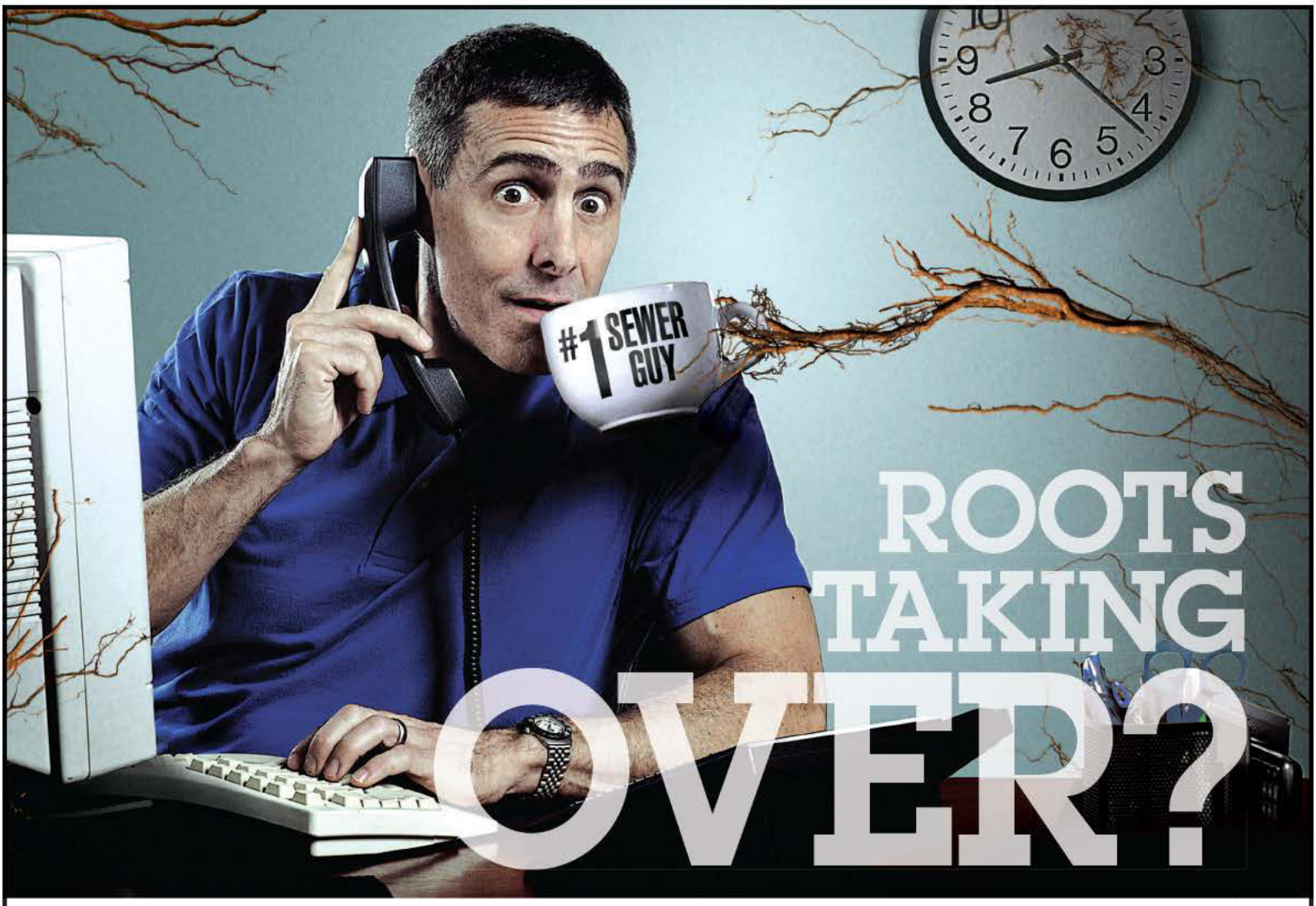
**6. Recognize effort.** Consider doing things such as sending a letter of recognition to an employee's home, calling them on a holiday to thank them for everything they do and recognizing their employment anniversaries, he recommends.

**7. Support personal growth.** "Praise, recognition and relationships are the very substance of motivation," he says.

**8. Provide new opportunities.** "Offering someone a new path in a company assures them they're not in a closed-in job," he notes.

But above all, be sure employees accomplish something on a daily basis, even if it's just a small task. Doing so makes the difference between high-morale, motivated employees and the another-day, another-dollar workers.

"The difference between those two attitudes can be a real sobering realization for a manager," Cox says. ✦

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# PAYING FOR FREE WATER

## Clean Water Act has led to significant infrastructure improvements, but the financial impact on communities must be considered

*By Ted DeBoda, P.E.*

A few years ago I had a conversation with a gentleman who thought water has always been and should always be free. Water is obviously not free, but we need to continue to emphasize this fact to the public ratepayers. More importantly, our elected officials need to understand the economic impacts on our communities from mandates imposed under the Clean Water Act.

We often consider the economic distress imposed on small- to medium-sized utilities, although large utilities have been feeling the heat for years. It is important that our utilities sustain reasonable increases to rates that can support the cost of providing these services, but sometimes these mandates require large-scale projects that are too expensive for local rates to fund them in the timeframe required to meet regulatory compliance.

As of the date of this writing, I am planning to participate in the Water Environment Federation and American Water Works Association Congressional Fly-In. Hopefully, by the time you read this, we will have heard the good news that the United States House and Senate have approved funding for state revolving fund (SRF) programs at the same, or increased, levels as the 2012 levels of nearly $1.47 billion for water, and $917.9 million for wastewater; and that the House and Senate both support a pilot program for the Water Infrastructure Finance and Innovation Authority.

### Support SRF

For several years, the SRF program has been a sustainable tool providing much-needed support to small- and medium-sized utilities. Larger municipalities are not immune to economic hardships just because of their size, and have also benefitted from the low interest loans that the SRF program makes available. Reducing this funding from 2012 levels will not only increase the economic stress that these utilities must impose on ratepayers, but will affect their ability to perform CWA mandates that are desperately needed in these communities.

### Support WIFIA

The SRF funding is designed to support compliance with mandated programs, so the highest priority is given to projects required for regulatory compliance. Many projects required to sustain our aging infrastructure that are not part of a mandated program go unfunded. The proposed WIFIA Pilot Program can provide tools to fund these projects at a low cost to the federal government. WIFIA, fashioned after the successful transportation version TIFIA, would access funds from the U.S. Treasury at long-term treasury rates. This funding would then be used to provide low-interest loans, loan guarantees and other support for infrastructure projects, while loan repayment would go back into the treasury.

How does this help? Consider that by decreasing the interest rates by 2.5 percent on a 30-year loan, a lifetime project cost can be reduced by 25 percent. These savings will support much-needed investments in our infrastructure that would cost us much more later. WIFIA would focus on very large projects — over $20 million — so it would truly supplement, but not replace, SRF.

### Support EPA

This industry should be aware that the Environmental Protection Agency has made great strides to review costs and economic impacts of enforcement actions. Last year, the EPA published the "Integrated Municipal Wastewater and Stormwater Planning Approach Framework" in which they reviewed median household income relative to wastewater bills, as well as the financial capability of the utility to help establish compliance periods. Their effort to look at affordability of mandated programs is commendable and I think we can expect more dynamic investigations into affordability of these important programs.

In a year where the EPA is increasing its budget for CWA enforcement while (hopefully) maintaining the same level of spending for the SRF program, we need to open our eyes to different and more creative funding mechanisms such as WIFIA to sustain our infrastructure. As always, we cannot forget the importance of increasing rates so that we can sustain these extremely valuable services.

Last year we celebrated the 40th anniversary of the Clean Water Act, and professionals in our industry would be hard pressed to dispute the good results it has generated. Our efforts are an investment in our future and we have already started to see the benefits. Let's keep up the good work. ✦

Ted DeBoda is executive director of NASSCO. He can be reached at director@nassco.org.

**NASSCO (National Association of Sewer Service Companies)** is located at 11521 Cronridge Drive, Suite J, Owings Mills, MD 21117; 410/486-3500; www.nassco.org

# CHEMICAL AND MECHANICAL ROOT CONTROL

*By Craig Mandli*

## Propane-powered jetter cart

Liquid propane (LP) powered **jetter carts** from **American Jetter** offer compact mobility, environmentally friendly fuel, user-friendly controls and wireless and foot valve operation for safety. They are safer than gasoline-powered units in lower-ventilation areas, use a standard 33-pound forklift-style tank, and are less prone to propane freeze in colder climates. The LP is converted from liquid to gas just before it enters the engine instead of pulled off the top of the tank. Each unit comes with a portable hose reel with up to 300 feet of 3/8-inch hose, a washdown gun kit and a jetting nozzle set. **866/944-3569; www.americanjetter.com.**

## Towable jetter nozzle

The **Cnt-r-KUT "TOW HOOK"** towable jetter nozzle from **Arthur Products** allows for pressurized water to be applied by the integration of a towing nozzle, which can be pulled through the line. The technician can also pull a line from point "A" to point "B" if required. It is flexible enough to conform to damaged or deformed lines and can easily be trimmed in the field to fit virtually any line from 2 to 8 inches in diameter by attaching a 3/8- or 1/2-inch taper hose to one end. It is available in a standard and mini size. **800/322-0510; www.arthurproducts.com.**

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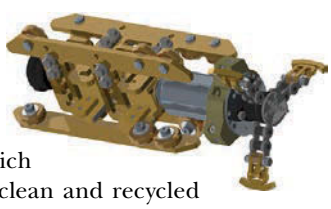
The **DM150** drain-cleaning machine from **Duracable Manufacturing** is equipped with a 1/6 hp motor that operates at 230 rpm. The machine has the ability to operate in five positions (from 0 to 90 degrees) that can be secured to keep the reel from slipping during operation. Equipped with a heavy-duty casted self-aligning head bearing, the reel maintains proper alignment while in operation. The head bearing also holds the reel in place and allows for a quick-change reel. The pivot machine can be run with three different sized reels, including an 8-inch reel for 1/4-inch cable, a 14-inch reel for 3/8-inch cable, and a 14-inch oversized reel for running 1/2-inch cable. A mini power cable feed and return helps run cable at a steady pace. It can also be transported easily with an additional machine cart. **800/247-4081; www.duracable.com.**

## Hydrostatic sewer cleaner

The **Model 800** hydrostatic sewer cleaner from **Electric Eel** is engineered to clean 4- to 24-inch-diameter pipelines at distances up to 650 feet. It features variable drive speeds and an automatic transmission. A hand lever controls the cleaning speeds at full torque from 50 to 1,000 rpm. The unit runs 8-foot sectional heavy-duty self-feeding municipal cables that require no handling by the operator and allow for faster cleaning. Right-hand wound outer coils and 11/16-inch-diameter left-hand wound inner coil, both anchored to the coupling, reduce helixing and loss of cable in pipeline. An open space outer coil design helps loosen deposits and auger them back. **800/833-1212; www.electriceel.com.**

## Root cutters



**Root cutters** from **Enz USA** can effectively clean pipes from as small as 3 inches up to 48 inches in diameter. Turbine units come complete with sealed bearings, which allow the unit to be operated with both clean and recycled

water, while being relatively maintenance free. They are also effective for removing grease, solids, mineral deposits, concrete and grout. Protruding laterals can also be removed using the company's "Diamond Tap Cutters." **877/369-8721; www.enzusainc.com.**

## Tank-cleaning machine

The **EZ-8** tank-cleaning machine from **Gamajet** features a fluid-driven, versatile and durable design and is lightweight for easy handling and maneuverability. It can be customized to meet specific needs, with options that include directional nozzles enabling usage in various tanks and vessels in a number of applications. It eliminates the need for confined-space entry, reducing time spent cleaning. It combines pressure and flow to create high-impact cleaning jets that deliver impingement force by rotating in a repeatable and reliable 360-degree pattern. It has a flow rate of 25 to 130 gpm and a pressure range of 20 to 1,000 psi. **877/426-2538; www.gamajet.com.**

## Combination jetvac

The **MC Advanced Series** combination jetvac from **GapVax** includes a monitoring system, allowing the operator to observe and troubleshoot the entire system. The display screen (one inside cab/one outside) will control hydraulics, blower and water pump operations with a complete compliment of gauges. All body functions, boom and hose reel functions, vacuum break, throttle, area and safety lighting are wirelessly controlled, while still maintaining proportional boom and hose reel control. The heavy-duty, double-acting, single-lift cylinder provides a stable 50-degree dump angle. The boom is an 8-foot front-mounted, telescopic design with dual lift cylinders, reaching 26 feet with a 270-degree rotation. **888/442-7829; www.gapvax.com.**

## Cutting blades

**Clog Chopper** cutting blades from **General Pipe Cleaners** are multifunction tools with six self-sharpening blades that break through encrusted debris, root masses, scale, crystallized urine and other stoppages without damaging the pipe. The spherical design maneuvers around tight ends and traps to clean metal, plastic and clay pipes. The tools clean stacks, downspouts, mainlines and drainpipes. They come in 1-, 1 1/2-, 2-, 2 1/2-, 3- and 4-inch sizes and a variety of connector options for General and other major brands of cable machines. **800/245-6200; www.drainbrain.com.**

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## Heavy-duty drain-cleaning machine

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

## Hot/cold water jetter

The **Model HJTA853600** hot/cold water drain and sewer jetter from **Hot Jet USA** has the additional capability of being used as a high-powered power washer. The hot water option is proven in heavy grease applications and in specialty applications such as pipelining and manhole rehabilitation. The unit is rated at 8.5 gpm at 3,600 psi, and is an ideal-sized jetter to clean 2- to 8-inch lines. **800/624-8186; www.hotjetusa.com.**

## Robot milling system

The **HydroCut 150** from **IBG Hydro-Tech** is a small self-propelled robot that offers high-powered milling. It is equipped with a bracing unit, CCD swivel, zoom camera and fixed CCD camera with high-performance LED lighting. It is driven by high water pressure and applicable to both circular and egg-shaped pipes. It is easy to handle with a mobile control unit or integrated vehicle control panel. An all-purpose tool holder makes changing of cutting heads fast and easy. It has a working range of 6 to 14 feet and a milling force of 4 kW and 20,000 to 30,000 rpm. **www.ibg-hydro-tech.de.**

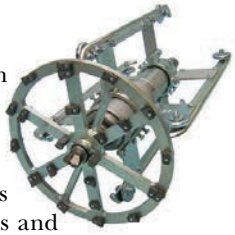
## Lateral cleaner

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

## Mainline cable machine

The **M81 Big Workhorse** (and the upright version, the **M888**) from **MyTana Mfg. Company** is a mainline cable machine for root cutting. It is equipped with a quiet capacitor start motor that allows the operator to listen and feel the cable as it works its way down the pipe, helping the operator react quickly when cable torque starts to build. It uses a gearbox drive mechanism that is capable of driving up to 400 feet of cable. Reels can be added or changed in seconds. The automatic feed retriever saves wear and tear on the operator's arms and shoulders. It comes with a full set of blades (2- to 6-inch) as well as a set of replacement blades. Either an open-spoke steel reel or reinforced hard plastic molded reel is available. **800/328-8170; www.mytana.com.**

## Sewer and storm cutter nozzle



The **Paikert** sewer and storm cutter nozzle from **NozzTeq** is a low speed, hydro-torque impact cutter designed for severe root blockages, concrete, grease, protruding laterals and any substance up to 5,000 psi. It features an impact drill motor, is designed to work in combination with most jetters and does not require any type of lubrication. It uses double-root saw blades along with single hardened bits to remove thick, heavy root growth. It is available in sizes from 4 to 24 inches. A variety of customizable cutting accessories, as well as technical assistance, is available. **866/620-5915; www.nozzteq.com.**

## Foaming root control

**Oblitiroot,** a foaming sewer line root control product from **Olvidium,** has been formulated to use the maximum amount of the active ingredient, Dichlobenil, currently allowed by the EPA. It comes in two pouches which, when combined, can be applied through the clean-out or in the toilet bowl. Because it begins to foam only after the two parts are stirred or agitated together, the rooter-plumber applying the product can flush when desired so as to prevent toilet bowl overflow. **855/782-4531; www.olvidium.com.**

## Portable water jetter

The **KJ-3100** portable water jetter from **RIDGID** clears blockages in 2- to 10-inch drainlines with 3,000 psi working pressure and 5.5 gpm flow rate. Powered by a 16 hp gasoline engine, it is mounted on a heavy-duty, two-wheeled cart that fits through standard-sized doors and negotiates tight turns. The hose reel quickly detaches from the cart for easy loading into service vehicles, and permits easy access to hard-to-reach drains. The 3/8-inch jetter hose is 200 feet long. The unit includes pulse action, which allows the cleaning head and hose to maneuver through traps and bends. The high-pressure pump is a triplex design with a corrosion-resistant brass head. The unit comes with both propulsion and penetrating nozzles. **800/769-7743; www.ridgid.com.**

## Root intrusion formula

**RootX** uses a foaming herbicidal formula to clear sewer lines, drains and septic systems blocked by roots. It kills roots on contact and inhibits regrowth, even at the top of the pipe, where 90 percent of intrusion occurs. Root debris begins to decay within 12 weeks, and nine months later the roots are virtually gone. RootX doesn't contain copper sulfate or metam sodium, and it's EPA accepted for use in all 50 states. **800/844-4974; www.rootx.com.**

## Root and grease cutter

The **Patriot I** root and grease cutter from **Sewer Equipment Company of America** is capable of cleaning pipes ranging from 4 to 20 inches in diameter. It combines both rollers and skids to stabilize the cutter, allowing it to travel through the pipe with minimal friction. This enables reduced water consumption and more efficient cleaning. The rollers guide the skid assembly over offsets, joints and misaligned pipe, minimizing the possibility of getting hung up in the sewer line. Additionally, the skids are adjustable, which eliminates the need to change skids for different size pipes. They are available in 3/4- and 1-inch configurations, pressures up to 3,000 psi, and flows up to 80 gpm. Accessories include tap cutters, root saws and blades. **800/323-1604; www.sewerequipment.com.**

## Root cutter kit

The **Puma Hi-Torque Hydraulic Root Cutter Kit** from **Southland Tool** includes a heavy-duty cutter that produces 235 ft-lbs of torque at low speed. The kit includes four EZ skids that bolt on the front plate. Skids are marked with the size for easy identification. It includes four saw blades, flat or concave in 6-, 8-, 10- and 12-inch sizes. The kit includes the saw hub, motor turning tool, Allen wrench, instructions and toolbox. The EZ skids are available up to 24 inches with high stability to keep the cutter centered. **714/632-8198; www.southlandtool.com.**

## Hydro-jet root cutter

The **O'Brien Root Cutter** from **Spartan Tool** uses the flow from a hydrojet to propel itself down sewer lines all the way to root intrusions and blockages, where the case-hardened, high RPM rotation of its cutting saws rip, tear and shred roots. It comes in an impact-resistant toolbox with quick-change skids to center the unit in sewer lines of 6,

*(continued)*

8, 10, 12 and 15 inches. The circular, compressible spring-like saws are sized to stay just under the pipe's diameter, and have cutting teeth on both sides. It operates on 3/4- or 1-inch hoses, and has a maximum working pressure of 2,000 psi and flows between 35 and 60 gpm. **800/435-3866; www.spartantool.com.**

## Root-cutting nozzle

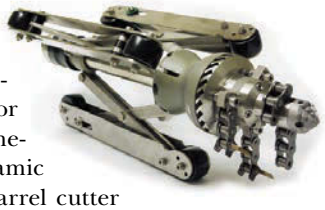
The **Warthog WG-1 Classic** root-cutting nozzle from **StoneAge** is effective in cleaning pipes from 8 to 36 inches. Since each jet in a nozzle head takes a percentage of pump capacity, fewer jets mean each one gets a larger portion of the pump's power. Rotating too fast destroys jet quality. Slower rotation (300 to 500 rpm) equals longer dwell time for the jets to do their job. Rotation allows the powerful rear jets to cover the entire inside of the pipe to cut the roots. It can cut roots from 3/16 to 1/2 inch in diameter. **866/795-1586; www.sewernozzles.com.**

## Truck-mounted jetter

The **Camel Jet 1600** from **Super Products** is a truck-mounted, high-pressure waterjetting system that is ideal for keeping municipal sewers, sanitary and storm sewer lines, laterals, and drainlines clean and free flowing. It utilizes three modular tanks to carry up to 1,600 gallons of water. The tanks are made of rotationally molded polyethylene with ultraviolet stabilizers. Its Lexan containment system means that users have additional safety protection from hose rupture or high-pressure water. It utilizes a heavy-duty Triplex continuous-flow water pump to provide up to 80 gpm and pressure up to 2,000 psi. Its single-engine design translates to lower fuel costs, and it offers a front- or rear-mounted 180-degree rotating hose reel with a 1,000-foot capacity. **800/837-9711; www.cameleasy.com.**

## Chain cutters

The **Turbo S400** chain cutter from **USB-Sewer Equipment Corporation** is made of tempered stainless steel and offers continuously adjustable guide skids. The chain retainer is driven by a high-performance turbine to remove roots, grease and mineral deposits from 4- to 48-inch sewer lines. It uses recycled or clean water with an optimized 3-D hydromechanics design in conjunction with ceramic nozzle inserts. It can also be used as a barrel cutter with diamond bits for smooth removal of protruding laterals. Heavy mineral deposits can also be removed with carbide bits attached to the specialized chain. **866/408-2814; www.usbsec.com.**





## High-pressure jet machine

The **Hot Shot** high-pressure water jet machine from **Vac-Con** is ideal for removing stones, bottles, cans, grease, sludge and other debris from sanitary sewer and storm lines through the flushing action of high-pressure water. It is equipped with a self-contained, non-corrosive, non-metallic water tank and can be operated by one man, with all operating controls for high-pressure water and the hose reel located at the front of the machine for ease of operation and safety. Its front-mounted hose reel can carry 600 feet of 1-inch hose, and it has a polyethylene water tank and a 30-gpm, 3,000-psi pump system. Its two-engine design uses the chassis engine to drive the vacuum. **904/493-4969; www.vac-con.com.**

## Combination sewer cleaner

The truck-mounted **Ramjet** combination sewer cleaner from **Vactor Manufacturing** is equipped with a Jet Rodder water pump to effectively break up blockages in sanitary lines and flush out debris. Armed with up to 2,500 gallons of water in a stainless steel tank, it delivers flows of 60 to 100 gpm at 2,000 or 2,500 psi. The water pump is a single-piston, hydraulically driven, dual-acting pump that delivers a jackhammer action water flow, breaking through line blockages and scouring caked-on debris from pipe walls. It can be configured with either a front- or rear-mounted hose reel. The auto-wind hose guide allows hands-free operation from the control panel for a clean, tight wrap. **800/627-3171; www.vactor.com.**

## Root control system

The **Vaporooter** root control system uses a combination of metam sodium and dichlobenil to eliminate roots. Metam sodium penetrates root cells, destroying roots on contact, while dichlobenil bonds to pipe walls, joints and cracks, preventing new root growth from blocking pipes. The company's Jet Set Commander allows operators to go from jetting to foaming with the push of a touch-screen button, and then retrieve the hose while filling the pipe with foam that kills roots on contact. The system can be added to most jet trucks. **800/223-3684; www.vaporooter.com.** ✦

*By Scottie Dayton*

# Lining system restores pipes

**Problem**

Bad joints, cracks, root intrusion and corrosion caused blockages and failures in the asbestos concrete, cast iron, clay, and orangeburg sewers of the Regional Municipality of Durham in Whitby, Ontario.

**Solution**

Technicians cleaned the 4- to 6-inch mains and lined more than 10,000 feet with the **Nu Drain System from Nu Flow.**

**RESULT**

The liners stopped root intrusion, inflow and infiltration, and blockages, while renewing the life of the pipes with limited disruption to residents and utilities. **905/433-5510; www.nuflowtech.com.** ✦

# Product Spotlight

## Polston combination truck pumps and separates submerged debris

*By Ed Wodalski*

**PAT 949 combination vacuum pump/separation truck from Polston Applied Technologies**

The PAT 949 combination vacuum pump/separation truck from Polston Applied Technologies provides a standalone cleaning system for large-diameter lines, digesters, grit chambers, lift stations, water treatment plants, ponds, lagoons and other difficult-to-clean environments.

In addition to performing as a vacuum truck, the combination unit features a down-hole pump that pushes submerged material into a pressurized system that separates it from the water.

"The Polston Process leaves sand and grit paint-filter dry for normal disposal," says Denver Stutler, chief executive officer for Polston Technologies. "It's basically separating sand from water as it runs through our proprietary process."

Debris dumps into the truck's 9-yard steel tank or a roll-off container. Biosolids are emulsified in the pumping process for easier microbe digestion.

"I tell people it's like finding a clump of fish food at the bottom of the tank and bringing it to the top and crumbling it," Stutler says.

The debris tank has a full-opening rear door (power up/down) and 45-degree dumping angle with manual door locks, level indicator and internal float shutoff. A 1,000-gallon, fully baffled tank provides water for the front-mounted jetting system (Hammelmann 146 triplex pump, 120 gpm and 2,300 psi) with 500 feet of 1 1/4-inch, 2,500 psi hose and 800-foot reel.

"We have a proprietary pump (hydrostatically driven, boom mounted, 6-inch submersible with six-blade impeller) that Mr. (Henry B.) Polston designed. It sits in the water, grabbing material and pushing it into the truck," Stutler says. "The vacuum side of the truck is not used when we're using our down-hole pump."

Powered by a 425 hp Cummins diesel engine, the unit can pump and separate sand from water at depths of 27 feet and more.

"We see a lot of opportunity wherever sand and grit accumulate," Stutler says. "Wastewater treatment plants are an area where we focused our efforts because a large majority of them in the United States cannot be shut off. Throughout the plant we can remove the sand while it continues to operate."

The truck has a 49-foot hydraulic articulating knuckle-boom crane with an 8-inch intake hose, wireless remote control and 180-degree rotation.

Mounted on a Peterbilt 367 chassis, the truck has a front PTO, 22,000-pound front axle, 46,000-pound rear axle and Roots 824 RCS positive displacement, hydrostatic-drive vacuum system that delivers 16-inch Hg at 3,600 cfm. Added features include a CDF-10 silencer, 3-inch vacuum relief valve and micro filter/centrifugal separator. A control panel is located at the front of the truck.

"It's quiet enough where you can stand touching the truck and talk on a cellphone," Stutler says. "It sounds like busy traffic near you."

Options include cold weather circulation, increased water capacity and remote controls. **866/862-7271; www.polstonprocess.com.**

### Water Cannon jetter, hot pressure washers

Jetters and hot water pressure washers from Water Cannon are available with flow rates of 8 gpm and up to 7,000 psi, based on model and accessories. Trailer models have 200-gallon onboard water tanks and require no external power. Available with Honda or Kohler engines, the units come with direct drive or V-belt and a choice of Annovi Reverberi, Cat or General pumps. Standard trailer packages include 250-foot hose reels, trigger gun, wand and nozzle. **321/800-5744; www.watercannon.com.**

### Iwaki America slurry bearing

The SB slurry bearing from Iwaki America is designed for pumping slurry liquids with concentrations up to 10 percent by volume and particle sizes up to 100 microns, including diatomaceous earth, metal oxides and other abrasive liquids. **508/429-1440; www.iwakiamerica.com.**

### Aries side scan video camera

The dual-viewing Side Scanning Inspection System from Aries Industries is designed for pipeline maintenance, inspection and rehabilitation in 6- to 48-inch pipe. The system allows synchronized playback, presentation of live video (MPEG format) and a flat, unfolded view for quick pinpoint of pipeline discrepancies without having to stop and play to report each observation. **800/234-7205; www.ariesindustries.com.**

### Spire electromagnetic Btu meter

The T-MAG electromagnetic Btu meter from Spire Metering Technology, formerly Shenitech, is designed for accurate, efficient thermal energy measurement. Two factory-calibrated temperature sensors measure supply and return temperatures. The unit integrates into any meter reading, PLC or BMS system. **888/738-0188; www.spiremt.com.**

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## Mainline extendible backwater valve

The Straight-Fit extendible backwater valve series from Mainline Backflow Products is available in 4- and 6-inch diameters. Made of PVC and ABS, the valve body can be extended to any depth by gluing a riser pipe into the valve body. The gate is glued to a 3/4-inch PVC pipe to form a key and cut the required length to extract the gate from the valve body. A curved gate allows a sewer snake to feed and retract without catching on the gate. A cleat insert in the body eases and guides the retrieval of the snake without hang-up. An optional test gate can be used to pressure test the system or to isolate property. **877/734-8691; www.backwatervalve.com.**

## Bingham valve box sealed system

The Buffalo brand No Vac valve box sealed system from Bingham & Taylor includes valve box stabilizer and debris trap (available together or separately) for use with cast iron or plastic valve boxes. Designed to prevent the intrusion of dirt, backfill or sand from below, the unit assures proper valve box alignment and valve protection. It also assures that all down force is transferred to the backfilled area, rather than to the buried valve or pipe, eliminating the need to block up the valve box. The debris trap component is engineered to eliminate maintenance and service issues caused by debris intrusion through and around the valve box top. **540/825-8334; www.binghamandtaylor.com**

## Tideflex inline check valve

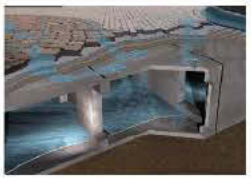
The CheckMate inline check valve from Tideflex Technologies, a division of Red Valve Company, is designed for backflow prevention and odor mitigation in outfalls, stormwater, CSO and SSO applications. The custom-engineered, all-rubber unibody design eliminates backflow from oceans, rivers and interceptors. The valve is made of 100 percent fabric and elastomer to eliminate corrosion. It opens to a near-full pipe diameter for maximum flow capacity. Valves are available in 4- to 72-inch sizes. **412/279-0044; www.redvalve.com.**

## Itron meter data management

The Itron Enterprise Edition data management system for smart metering of gas and water from Itron supports Microsoft's SQL Server 2012 database and Oracle 11g platforms. **866/374-8766; www.itron.com.**



## Oldcastle stormwater management system



The PermeCapture low impact development stormwater management system from Oldcastle Precast and Oldcastle Architectural is an all-inclusive runoff control system that manages water volume in addition to protecting water quality by providing integrated pretreatment. The system combines the versatility of structural precast concrete modules (vaults) with the aesthetics and performance of permeable interlocking concrete pavers for stormwater retention, detention, reuse, groundwater recharge and flood management. **888/965-3227; www.oldcastleprecast.com/wastewater.**

## Envirosight large pipe crawler inspection system

The RX400 crawler body from Envirosight has a built-in, remotely operated camera lift with 17.5 inches of vertical travel for center viewing in a 60-inch line and inspecting pipe up to 10 feet in diameter. The crawler integrates with any ROVVER X system. Features include selectable 412/640 Hz sonde, illuminated rear-view camera, expansion port for an elevated rear-view camera, clutch, sensors for tilt, roll, pressure, temperature, pressure and lift height. **866/936-8476; www.envirosight.com.**

## KNIPEX Tools adjusting pump pliers

Cobra Quick Set pliers from KNIPEX Tools combines the features of automatic adjusting pliers with traditional push-button pump pliers. The 10-inch-long pliers have a 2-inch gripping capacity. The self-locking tool is designed for repetitive work in confined areas. It has a thin head that fits into tight spaces and a serrated gripping surface that can hold round, square, hex or flat objects. **www.knipex.com.**

## Dialight stainless steel linear LED fitting

The stainless steel linear LED fitting from Dialight is designed to reduce maintenance in hazardous areas as a replacement for conventional Ex fluorescent fittings. Available in both 32-watt and 64-watt versions (2 x 18W and 2 x 36W fluorescent equivalents), the fitting is resistant to shock, vibration and corrosion. **732/919-3119; www.dialight.com.**

## Vermeer rubber-tracked pedestrian trencher

The RTX250 rubber-tracked, steerable pedestrian trencher from Vermeer has a 27 hp Kohler electronic fuel-injected gasoline engine and can dig 8-inch-wide trenches up to 48 inches deep. Features include a two-handlebar VZ steering system and dedicated platform. The trencher is 35.5 inches wide for maneuvering in tight locations. **888/837-6337; www.vermeer.com.** ✦

## California American Water president named to board

Robert MacLean, president of California American, was appointed to the California Chamber of Commerce Board of Directors. The not-for-profit organization promotes international trade and investment as well as job growth in California.

## IMT names customer support manager

Laurie Johnson

Iowa Mold Tooling Co., an Oshkosh Corp. company, promoted Laurie Johnson to customer support manager from manager of global procurement and supply chain.

## Stormwater Maintenance and Consulting hires manager

Stormwater Maintenance and Consulting, specializing in the design, inspection, maintenance and construction of stormwater infrastructure, hired Roberto Tapia as operations manager for Northern Virginia. He will be responsible for marketing, proposal development and growth initiatives as well as overseeing field operations and project management.

## Electro Scan receives product innovation award

Electro Scan received the Joseph L. Abbott Jr. Award for product innovation from the North American Society of Trenchless Technologies. The company was recognized for its contribution to the sewer rehabilitation industry.

## Singer Valve adds sales managers

Carlos Garcia

Clinton Smith

Singer Valve named Carlos Garcia and Clinton Smith account sales managers. Garcia has 20 years of water works experience and will be based in San Diego, Calif. Smith will be working out of Surrey, British Columbia.

## FCI flowmeter receives approvals

The ST100 Series thermal mass air/gas flowmeter from Fluid Components International received ATEX and IECEx approvals for safe operation in potentially hazardous environments. The enclosure is flame proof and protected from dust ignition.

## RIDGID sponsors science and technology center

**RIDGID representative Brian Shanahan autographs a support beam at the new Zane State College (ZSC) facility in Cambridge, Ohio.**

RIDGID is a sponsor of Zane State College's new 46,000-square-foot advanced science and technology center. Located in Cambridge, Ohio, home of RIDGID's North American Distribution Center, the facility is scheduled to open in 2014.

## Congressman tours Advanced Drainage Systems

**Rep. Robert E. Latta, left, takes a look at a section of pipe at the Advanced Drainage Systems manufacturing plant in Findlay, Ohio.**

Rep. Robert E. Latta toured the Advanced Drainage Systems manufacturing plant in Findlay, Ohio. ADS designs and manufactures pipe and other products used in municipal storm and sanitary sewers. Latta's visit included a tour of the plant as it was producing a large diameter, corrugated high-density polyethylene pipe used in stormwater management systems.

## RapidView introduces Get Fit summer program

RapidView IBAK North America is challenging the industry to become healthier this year by sponsoring a series of fitness events. The Get Fit with RapidView Summer Program includes sprint triathlons, half marathons, half-century cycling rides and 5K running events. Participants can register at www.rapidview/getfit and receive a free pedometer to track their progress.

## Pipe Restoration Technologies receives patent

Pipe Restoration Technologies received a U.S. patent for a portable heating device used for in-place restoration of smaller pipes as part of the ePIPE process.

## InduSoft releases SCADA software service pack

InduSoft released a service pack for its SCADA software Web Studio v7.1. The free software is available for download at www.indusoft.com/blog/?p=1934. Available for InduSoft Web Studio v7.1 users, the service pack adds multi-touch development capabilities for touch-screen enabled devices. Without a keyboard or point device, users can navigate screens and issue commands for an entire system.

## Brown and Caldwell names vice president, project finalist

Jeff Theerman

Brown and Caldwell named Jeff Theerman vice president. He is the former executive director of the Metropolitan St. Louis Sewer District. The consulting company also is a finalist for the Outstanding Civil Engineering Achievement Award from the American Society of Civil Engineers for its Lake Oswego interceptor sewer project and Brightwater treatment plant in Woodinville, Wash.

## SJE-Rhombus named Silver ESOP award winner

SJE-Rhombus was named a Silver ESOP award winner by The ESOP (Employee Stock Ownership Plan) Association. The award recognizes companies for their work in sustaining an ESOP for 25 years. SJE-Rhombus was one of 26 corporate members to be honored by the association in 2013.

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## Rain for Rent, Portadam form partnership

Rain for Rent and Portadam have formed a partnership, offering temporary cofferdam dewatering for construction, remediation, rehabilitation, flood protection and in-water inspection.

## Hydraulic Institute names directors, officers

The Hydraulic Institute named its officers for 2013 and new board of directors. Dean Douglas, Dover Pump Solutions Group, remains chairman of the board and Dennis Wierzbicki, Grundfos, remains president. New board members include Michael S. Cropper, Sulzer Pumps; John Miersma, Iwaki America; and Andrew Warrington, Peerless Pump Co. Cropper also was elected vice president, technical affairs; Miersma will remain vice president, member services; and Warrington will remain vice president, knowledge and education. Additional board members include Suellen Torregrosa, Milton Roy; Tom Grove, AESSEAL; George Harris, Hydro; Bob Hendricks, Flowserve Corp.; Rich Heppe, Nidec Motor Co.; Robert Pagano Jr., ITT-Industrial Process; Gary Witt, Pentair; John White Jr., TACCO, and Jeff Wiemelt, Sundyne. Al Huber, Dennis Ziegler and Ken Napolitano, past presidents of the institute, will remain ex-officio members of the board. The institute also recognized David McKinstry, Colfax Fluid Handling, as its Lifetime Achievement Award recipient.

## Sauereisen names controller, regional manager

Sauereisen promoted Maureen E. Bankert to controller and Pete J. Jansen to Midwest regional manager. He will be responsible for Michigan, Wisconsin, Minnesota, Indiana, Illinois, Kentucky, Tennessee, Missouri, Arkansas, Kansas, Oklahoma, Texas, North Dakota, South Dakota and Nebraska.

Maureen E. Bankert

Pete J. Jansen

## VAC2GO moves to new location

VAC2GO vacuum truck rental company relocated its Kentucky office to 2112 Button Lane, LaGrange, Ky. The new location rents air movers, liquid vacuum trucks and combination units. The location serves Kentucky, Tennessee, Ohio, West Virginia and Indiana. The company also named JC Spalding business development manager. He will oversee Midwest regional sales and day-to-day operations.

## Logiball celebrates 30th anniversary

Logiball celebrates its 30th anniversary this year. Founded in 1983, the company provides test and seal packers, reinforced multisized plugs and carrier packers for sectional liners, lateral cleaning equipment and specialized tools for the rehabilitation and maintenance of collection systems. ✦

MUNICIPAL SEWER & WATER

# Marketplace Advertising

# classifieds

see photos in color at www.mswmag.com

## PIPELINE REHABILITATION

**2006 Eaton rinv-24-6:** 6-24 inch trailer-mounted repipe inversion shooter. Hook ups for all sizes, assorted lip seals, steam cap and funnel. All gauges and fittings included. Ready to work.
.....$18,000 cdn.
**arussell@cwwcanada.com** M07

## SEPTIC SYSTEM COMPONENTS

**Two (2) Blue Water Technologies Centra-flo backwash sand filters** - Model CF-50-60-AG w/tower, walkway, misc. pipe & valves. Like new. FOB Aztec, NM. $38,500. Delivery available. sjwiner@kwentllc.com
**970-247-0886** M07

## SERVICE/REPAIR

**Dynamic Repairs - Inspection Camera Repairs:** 48 hour turn-around time. General Wire, Ratech, RIDGID, Electric Eel Mfg., Gator Cams, Insight Vision, Vision Intruders. Quality service on all brands. **Rental equipment available.** For more info call Jack at 973-478-0893. Lodi, New Jersey. (CMPBM)

## TV INSPECTION

**2006 RST Mainline TV Inspection:** Complete 2006 RST mainline camera system with lateral launcher. Equipment was removed from old truck for a retrofit. Everything in working order. Go to www.BrownEquipment.net and click on Inventory for complete listing and pictures. ..... $35,000
**Call Scott at 800-747-2312** M07

**2003 Ford E350** TV inspection van with 24" full height bubble top. 5.4 liter V-8 Gas, 4X4 conversion, 55,650 miles. Auto trans., factory and roof mount air. CUES TV inspection components: 6,000-watt Honda 6310ev generator, computer, video monitor(s), 1,000' multiconductor cable/reel, color camera/transporter, 8"-24" wheel spacers, lateral inspection system. ..... $20,000
**435-649-7993**
**Inquiries @ sbwrd.org** M07

CUES K2 SYSTEM: Steerable Compact Pipe Ranger (CPR), OZ3 camera, 1000' gold cable, auto cable reel, CPU, CCU, wireless controllers, six different wheel sets, two different wheel spacer sets, tool and manual. Like new (app. 40 hours) at 20% off list. Call 866-936-8476 or email office@envirosight.com. (MBM)

IBAK TV Van. Please go to www.cctvvan.com. (C08)

Aries CCTV equipment: TR3000 Crawler, 360° pan and tilt camera with inclinometer, VL2001 data logger, power head for lights and tractor all, multi-conductor reel with 1200' of cable, Onan 33.3 amp 4.0 kw generator complete system, Western Mule fold away crane M-5AI. Complete system ready for work. $7,500. 925-625-2279 ext.3019, solana@isd.us.com (C07)

# WORTH NOTING

## PEOPLE/AWARDS

The **Timber Lake Stormwater Enhancement Project** in Tallahassee, Fla., received the Environmental Project of the Year Award for projects under $5 million from the American Public Works Association Florida Chapter. Atkins senior engineer **Bill Johnson** devised and implemented the solution for this stormwater pond.

**AMT Consulting Engineers** and the **Town of Ashland** received the 2013 Dave Pearson Watershed Excellence Award from the Virginia Lakes and Watersheds Association. The town decided to create a stormwater demonstration project as an example of environmental stewardship, and AMT designed a parking lot with permeable, interlocking concrete pavers to detain and reduce discharges.

The **Lake County Stormwater Management Commission** received the 2013 Floodplain Management of the Year Award from the Illinois Association of Floodplain and Stormwater Managers for its Lake County Watershed Development Ordinance.

The American Public Works Association announced the three recipients of its 2013 Excellence in Snow and Ice Control Award. They include the **Ohio Department of Transportation,** the **City of Green Bay (Wis.) Department of Public Works** and the **City of Novi (Mich.) Department of Public Services.**

The Infill Philadelphia: Soak It Up! design competition was created by the Philadelphia Water Department, U.S. Environmental Protection Agency and Community Design Collaborative to inspire innovation in green stormwater infrastructure in Philadelphia. The winners include:

- **Industrial-Warehouse Watershed: Leveraging Plants + Water on Zero Lot Sites**
- **Commercial-Retail Retrofit: Stormwater reStore**
- **Neighborhood-Greening the Grid: Meeting Green**

MSW *welcomes your contribution to this listing. Please send notices of new hires, promotions, service milestones, certifications or achievements to editor@mswmag.com.*



## CALENDAR

**July 21-24**
American Society of Agricultural and Biological Engineers Annual International Meeting, Kansas City, Mo. Visit www.asabe.org.

**Aug. 18-22**
StormCon: North American Surface Water Quality Conference and Exposition, Myrtle Beach Convention Center, Myrtle Beach, S.C. Visit www.stormcon.com.

**Aug. 25-28**
American Public Works Association International Public Works Congress & Exposition, McCormick Place, Chicago. Call 816/595-5241 or visit www.apwa.net.

**Oct. 1-3**
National Rural Water Association H2O-XPO, Louisville, Ky. Visit www.h2o-expo.org.

**Oct. 5-9**
Water Environment Federation's Technical Exhibition and Conference, McCormick Place South, Chicago. Visit www.wef.org.

**Nov. 4-7**
American Water Resources Association Annual Conference, Red Lion Hotel, Portland, Ore. Visit www.awra.org.

## LEARNING OPPORTUNITIES

### American Society of Civil Engineers

The ASCE has these courses:

- July 11-12 – Pumping Systems Design for Civil Engineers, San Diego
- July 11 – Preparing and Implementing Construction Site Stormwater Pollution Prevention Plans, online
- July 16 – Sustainable Stormwater Hydrology: Concepts to Reduce Hydrologic Footprint, online
- July 25-26 – Storm-Sewer System Design Using SWMM, Baltimore
- July 26 – Permeable Pavement Design-Elements and Case Studies, online
- July 29 – Pier and Beam Foundation Design for Wind and Flood Loads, online
- Aug. 1-2 – Pumping Systems Design for Civil Engineers, Hyannis, Mass.
- Aug. 6 – Cold-Weather Stormwater BMPs That Work, online
- Aug. 12 – Aging Infrastructure, Risks and Making Tough Decisions, online
- Sept. 19 – Stormwater BMPs: What Works, What Doesn't and What About Maintenance, online
- Sept. 23 – Creating Design Storms for Rainfall-Runoff Models, online
- Sept. 26-27 – Pumping Systems Design for Civil Engineers, Austin, Texas

Visit www.asce.org.

### American Water Works Association

The AWWA has a Dam Safety 2013 seminar on Sept. 8-12 in Providence, R.I. Visit www.awwa.org.

### Wisconsin

The University of Wisconsin Department of Engineering-Professional Development has a Using WinSLAMM v. 10: Meeting Urban Stormwater Goals P010 seminar on Oct. 14-15 in Madison. Visit http://epdweb.engr.wisc.edu. ✦

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