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SERVICE VEHICLES

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FROM ENVIROSIGHT

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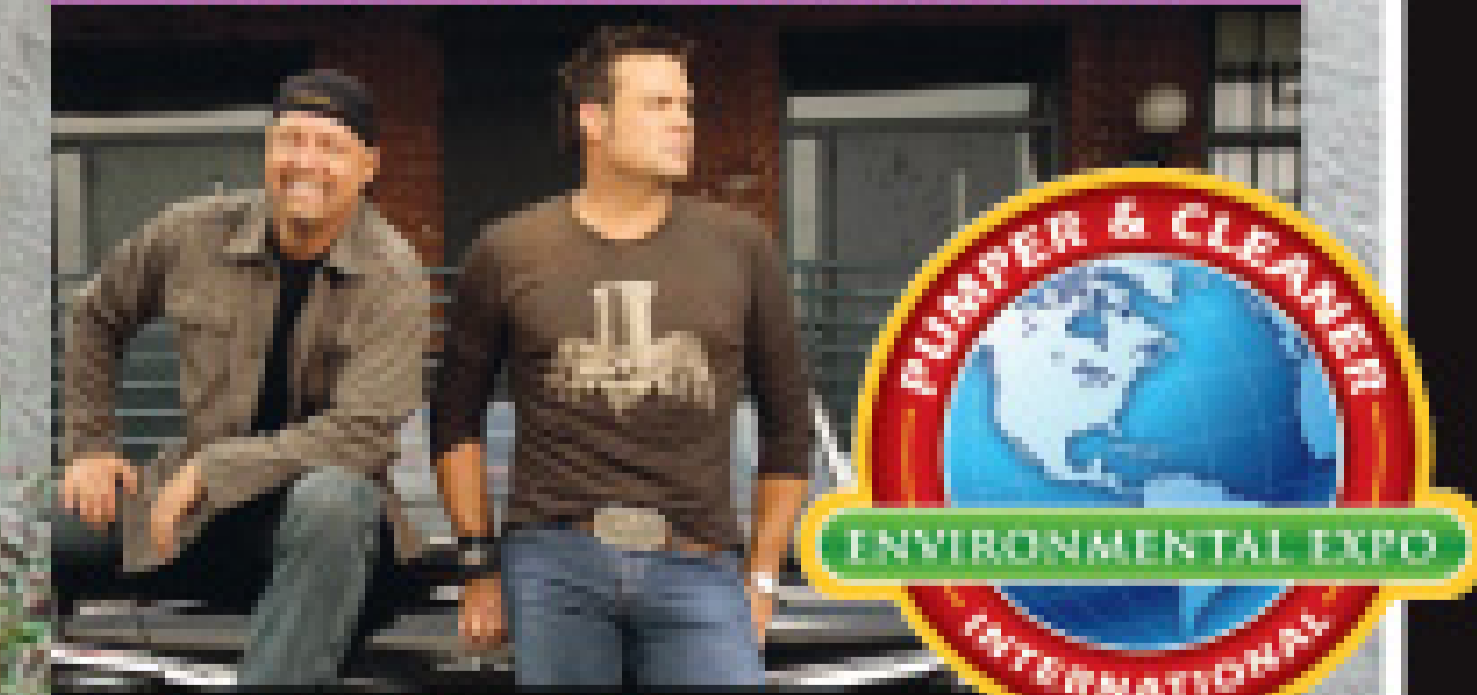
# OLD MEETS NEW

Historic Charleston  
modernizes and rehabs its  
water distribution system

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PAGE 36

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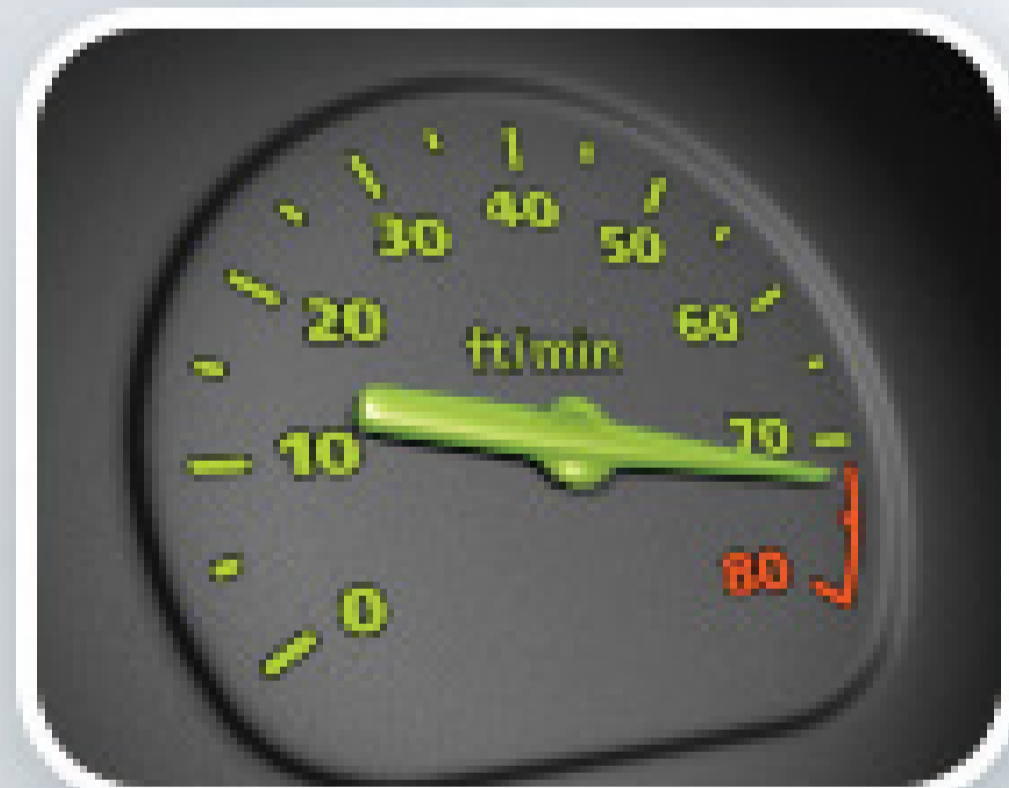
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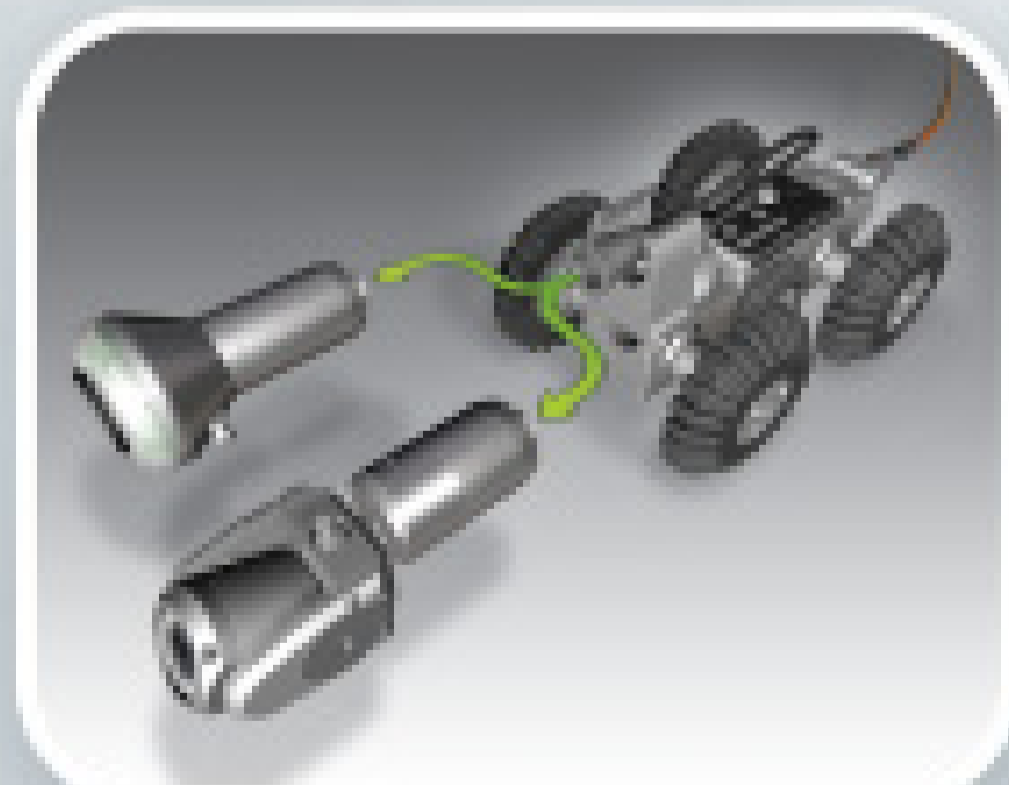
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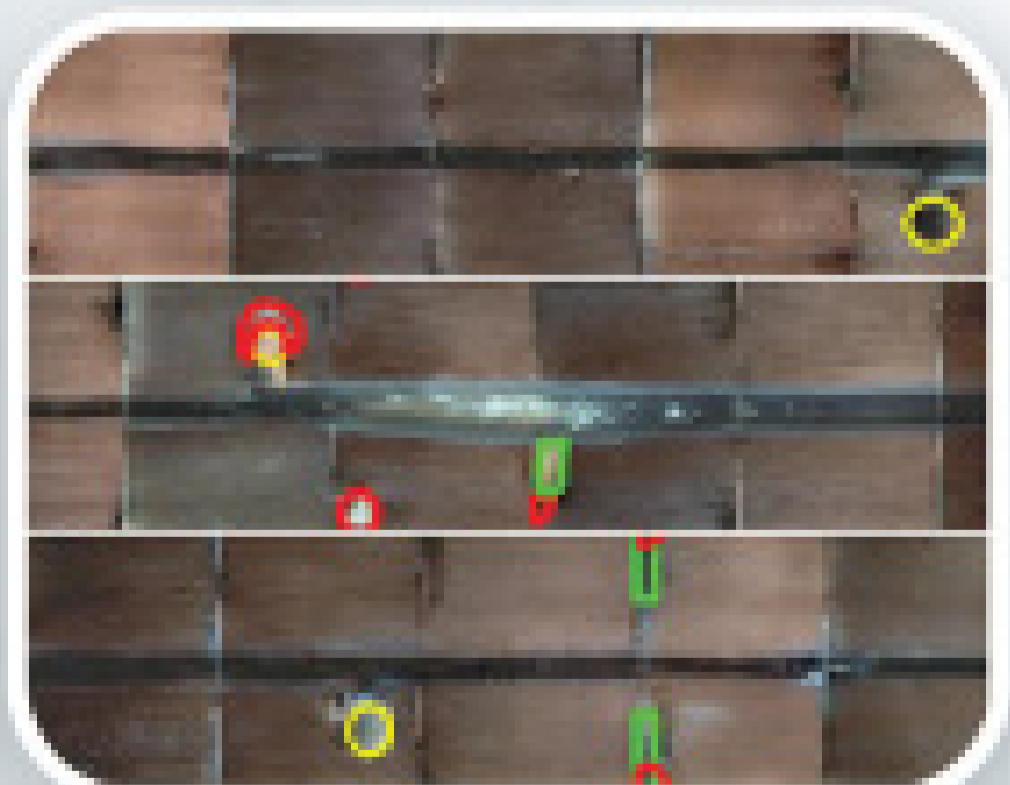
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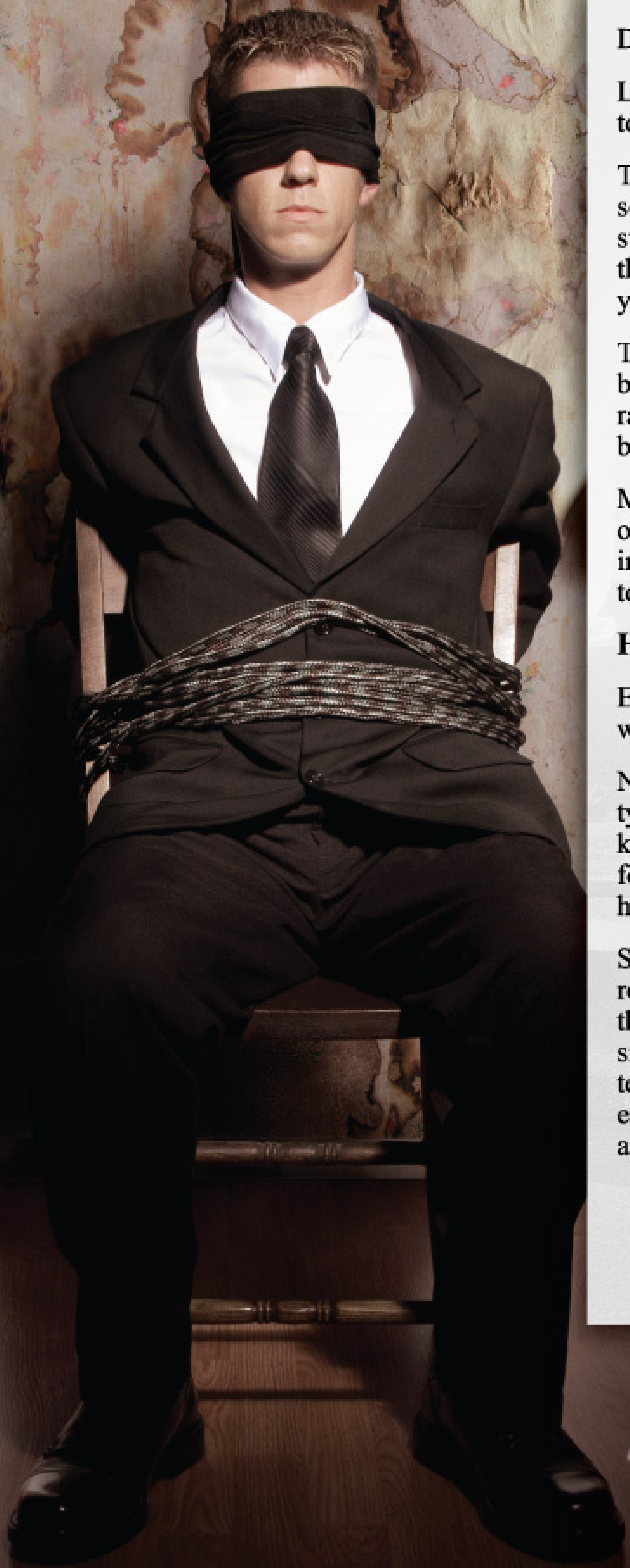
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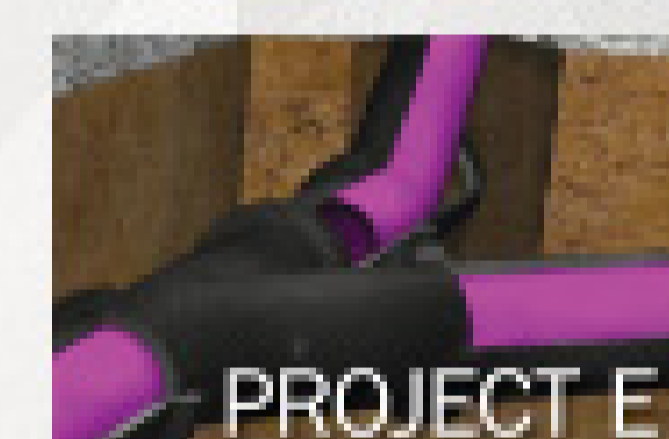
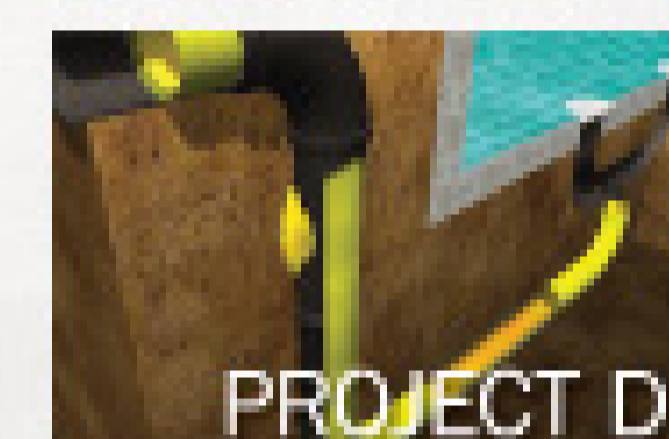
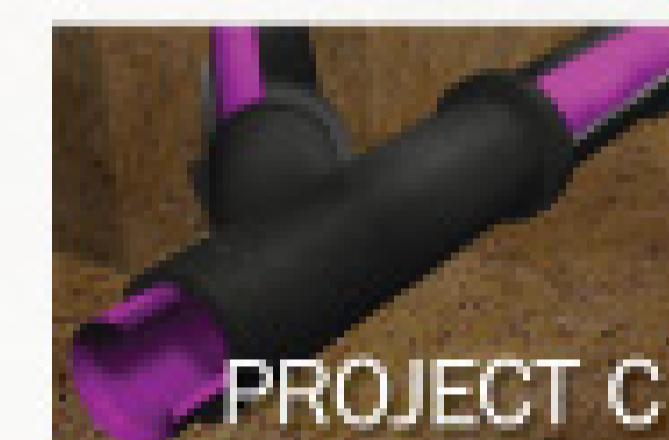
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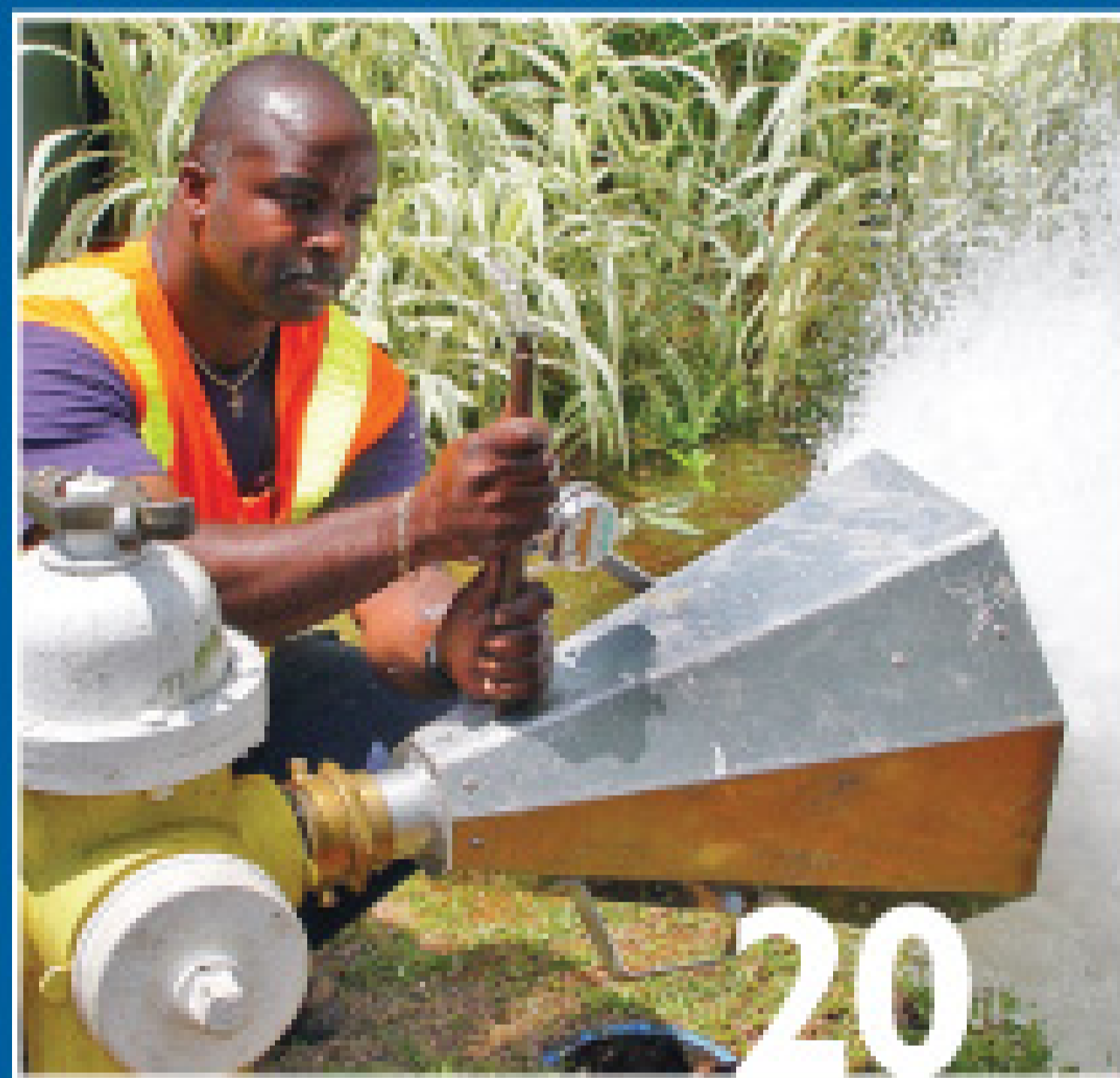
# INSIDE:

## SERVICE VEHICLES AND EQUIPMENT



### COVER:

The City of Charleston (S.C.) Water System aggressively searches out leaks and keeps mains on a regular maintenance program. Trenchless technology helps in low-impact repairs in historic areas. Here, Terrance Linyard performs unidirectional flushing with a test diffuser. (Photos courtesy of Charleston Water System)



## COMING IN FEBRUARY 2009

### Special Issue: Expo Pre-Show Issue/Exhibit Preview

- ◆ Storm: Infrastructure initiatives in Oakland, Calif.
- ◆ Sewer: Emergency and spill response in Los Angeles County
- ◆ Water: Five-point maintenance program in Mankato, Minn.
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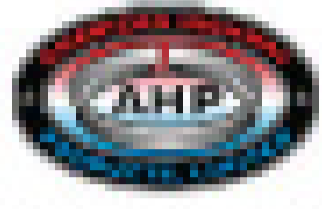














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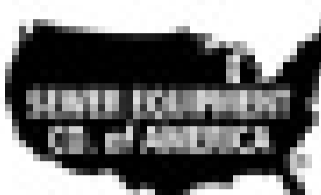






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FOR SANITARY, STORM AND WATER SYSTEM MAINTENANCE PROFESSIONALS

Published monthly by:

 COLE Publishing

1720 Maple Lake Dam Rd., PO Box 220  
Three Lakes WI 54562

[www.mswmag.com](http://www.mswmag.com)

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**EDITORIAL CORRESPONDENCE:** Address all editorial correspondence to Editor, *Municipal Sewer & Water*, PO. Box 220, Three Lakes, WI, 54562.

**CIRCULATION:** 2008 average circulation was 35,769 copies per month (U.S. and international distribution).



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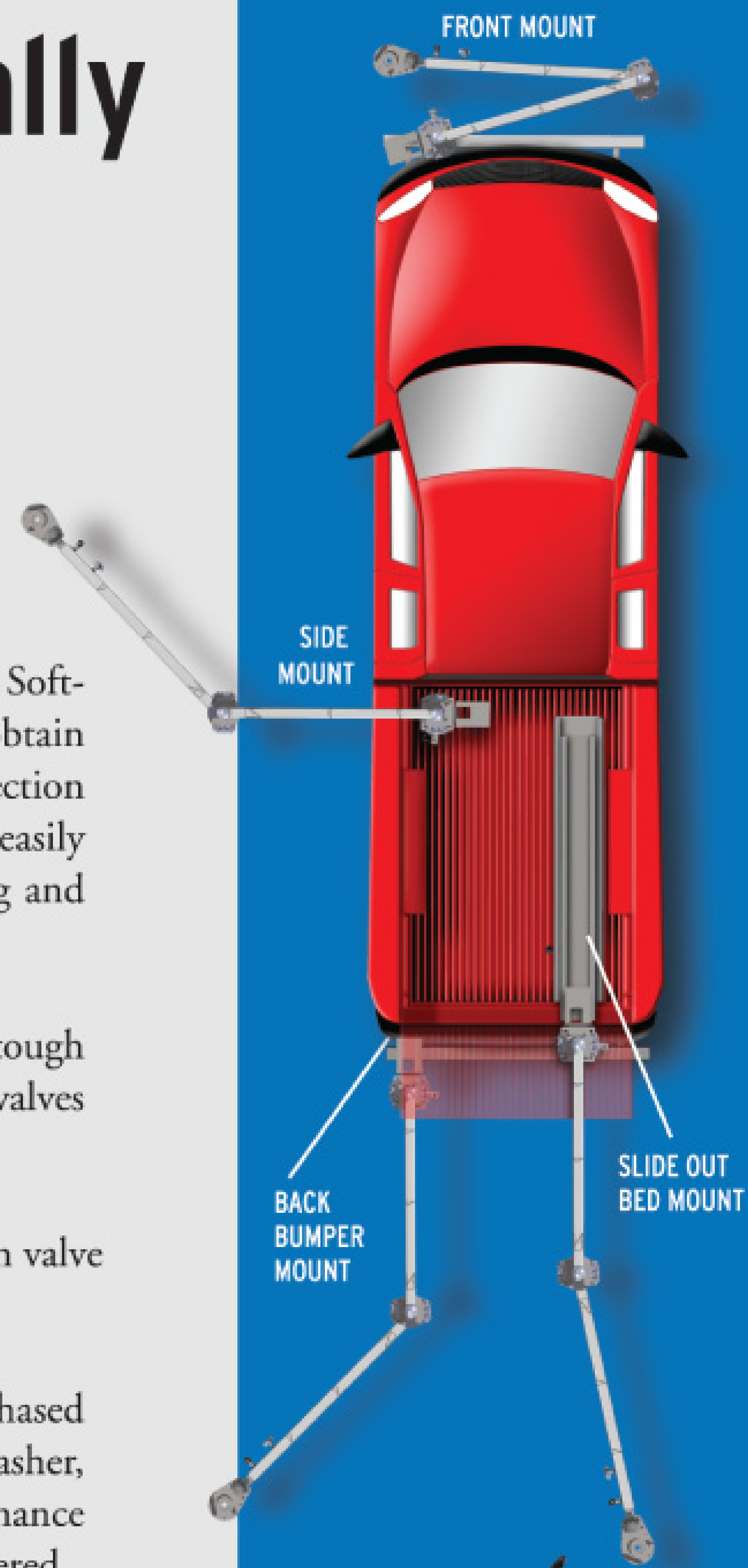
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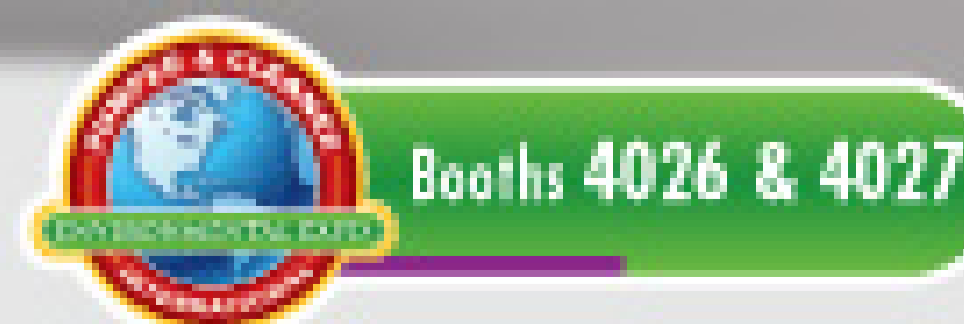


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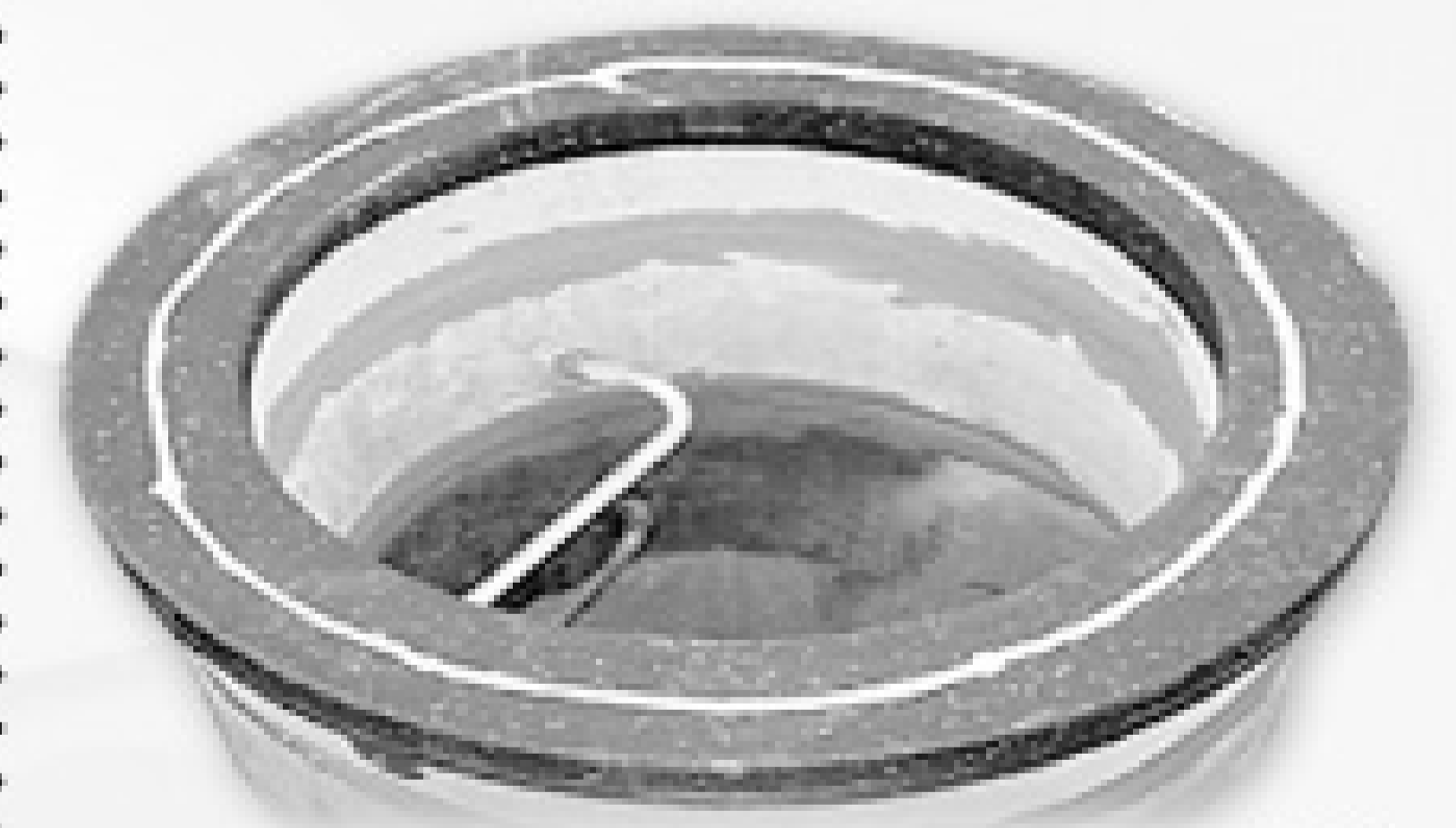
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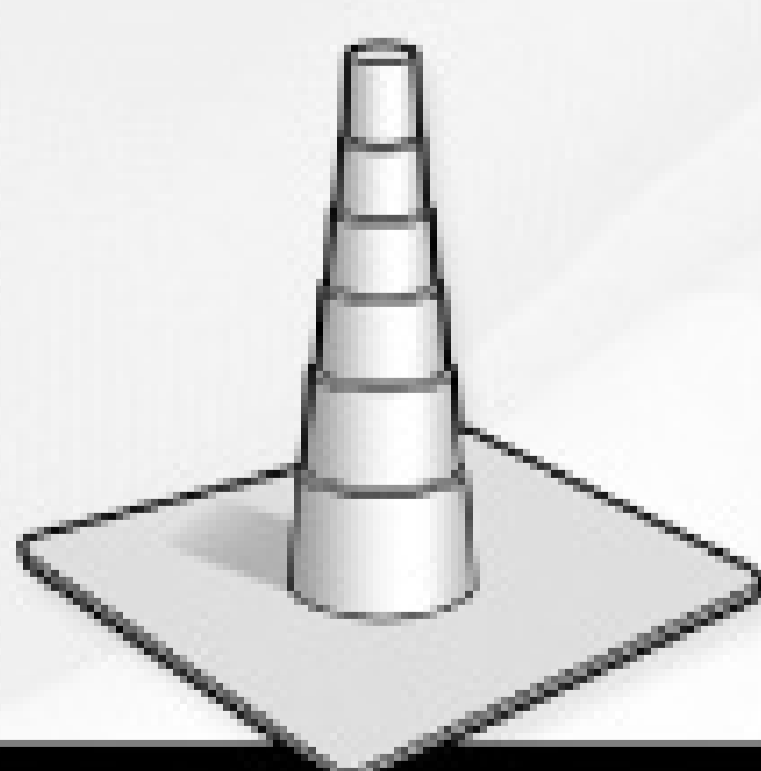
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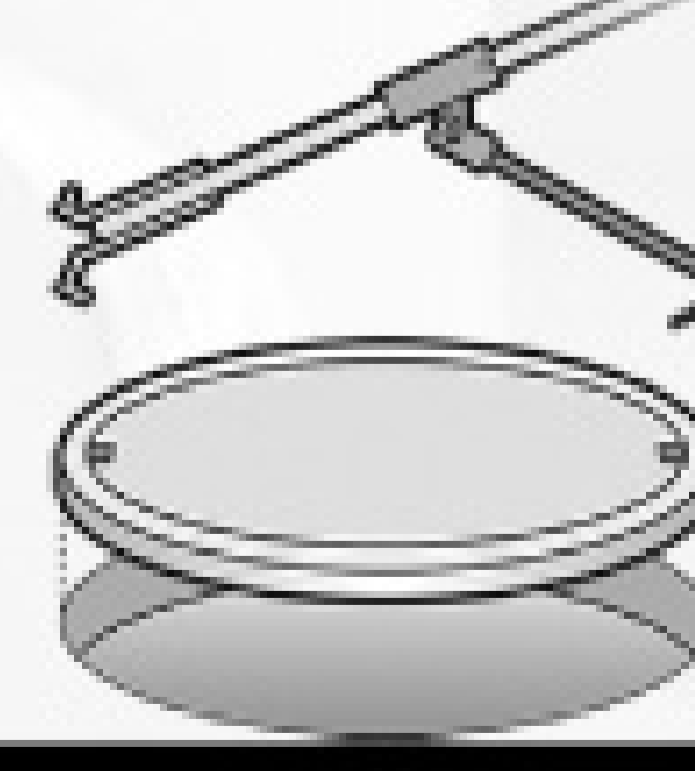
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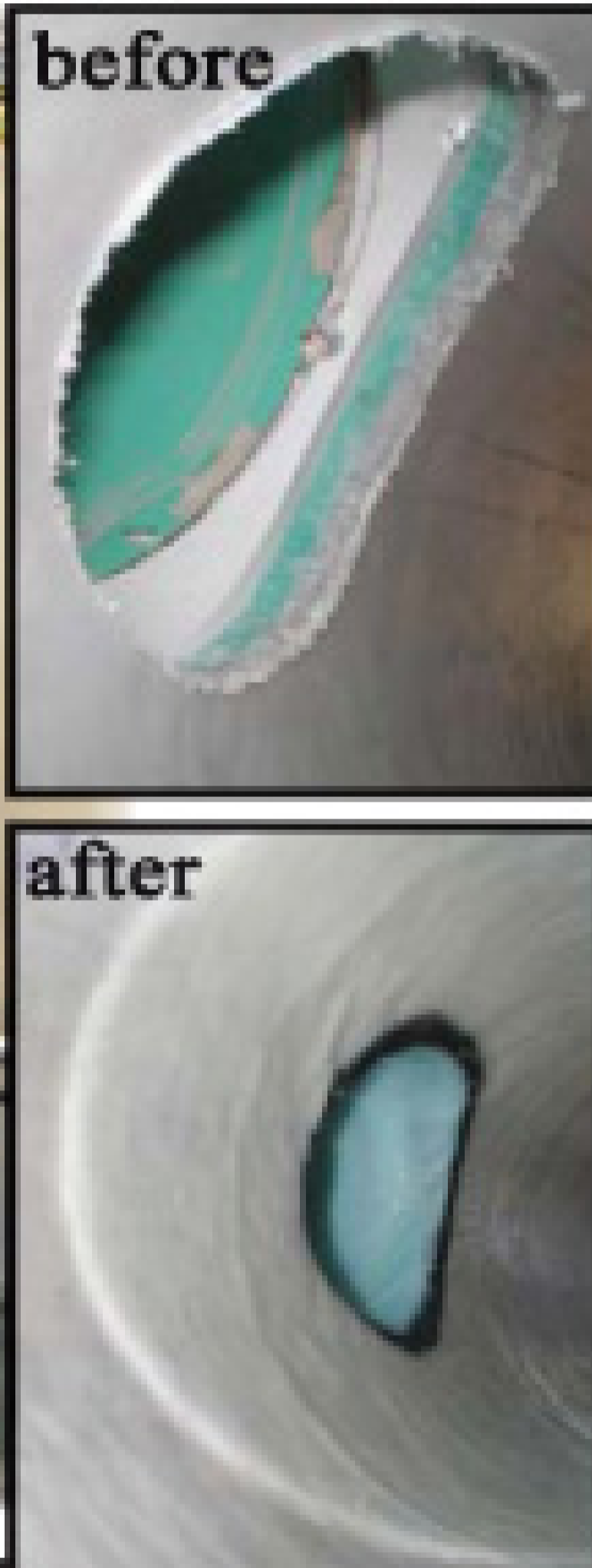
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# MAKING THE CASE

The “Liquid Assets” public television documentary conveys the need for infrastructure investment. Now the trick is to get people to watch it.

**“P**ublic opinion is everything. With public sentiment, nothing can fail. Without it, nothing can succeed. Consequently, he who moulds public opinion goes deeper than he who enacts statutes or pronounces decisions.”  
**Abraham Lincoln**

The “Liquid Assets” TV documentary produced by Penn State Public Broadcasting came out on October 1. It makes a compelling case for the need to invest in water infrastructure.

The question now becomes: Who will watch it? Because if those who watch are mainly the same people whose job it is to maintain infrastructure, then the program is an exercise in “preaching to the choir.”

The program’s producers and financial supporters have created a guide to community outreach. Has your municipality or agency used advice from that guide to take the program into the schools, to public meetings and into other community forums? If the answer is, “Not yet,” the next question needs to be: When, where and how often will you do so?

## A compelling case

Only strong public outreach will help turn this documentary into support for infrastructure repairs. Remember, the country is in an economic upheaval, and large segments of the public have been persuaded that any increases in public spending and taxes are an abomination.

What “Liquid Assets” does well is the one thing that can get people past their jaundiced view of raising taxes or fees. And that is to show what they get for the money, or how they and society may suffer if the money is not spent.

The program contains lots of shocking images of badly corroded pipes, cars fallen into sinkholes, man-made floods caused by breaks in water mains, even a huge geyser caused by a rupture in a major water transmission pipe. It makes the connection between those images and the failure to maintain underground facilities.

There are some 2 million miles of piping

beneath our streets, much of it paid for by our grandparents, and some of it seldom or never touched since. It’s old, it’s wearing out, and it needs attention.

The program looks at the experiences of 10 cities. Jerry N. Johnson, general manager of the Washington D.C. Water and Sewer Authority, talks about his city’s all-too-common experience. “In the mid-1990s, our water system had just about collapsed,” he says. “The district had just run into some very dire financial circumstances, and when those kinds of things happen, the very first thing that goes is maintenance of those things that one does not see.”

## At all levels

The total cost to upgrade the water and sewer infrastructure exceeds \$500 billion. Meanwhile, observes Donald Schwartz, district

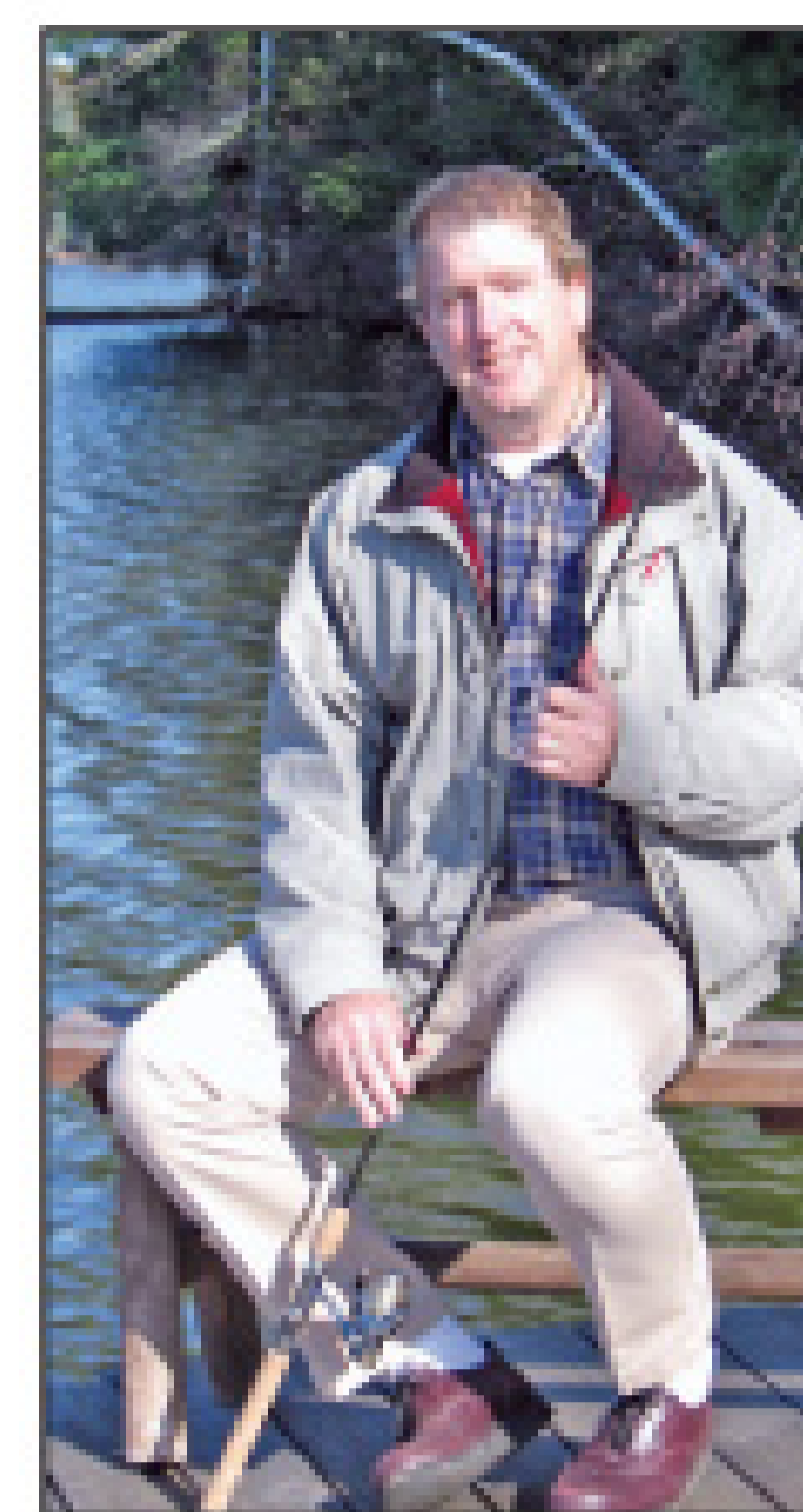
**“It’s a question of who is going to pay, and how much we’re going to be willing to pay, in order to ensure that your children live the kind of life we as Americans have promised them.”**

**Shirley Franklin, Mayor, City of Atlanta**

director with RCAP Solutions, a nonprofit community development agency, “Government is choosing to spend its money elsewhere. Right now, there’s very limited money for communities to install adequate drinking, waste and wastewater systems. I think it’s criminal. This country has to get its priorities right, and they’re wrong right now.”

The most inspiring part of the program tells of Atlanta’s self-described “sewer mayor,” Shirley Franklin, and the outreach campaign she led to get her community behind a massive wastewater system renovation.

Atlanta residents voted three to one to — *horrors!* — raise the local sales tax by one percentage point to help pay for the program. Atlanta’s experience shows what is possible when public leaders have the energy, creativity and courage to talk honestly to their citizens



## FROM THE EDITOR

**Ted J. Rulseh**

about infrastructure and why it needs attention.

“It’s a question of who is going to pay, and how much we’re going to be willing to pay, in order to ensure that your children live the kind of life we as Americans have promised them,” Franklin states.

## Reaching out

In their wisdom, those behind “Liquid Assets” didn’t just put it on TV. They developed a 16-minute summary from the 90-minute program that’s suitable for playing at community meetings.

They created an Outreach Guide to help municipalities and utilities build public events around the program. It’s extremely well done, and it includes such tools as a community discussion guide, an event-planning checklist, moderator guidelines, and discussion questions. You can find the guide at <http://liquidassets.psu.edu>.

The brains behind this documentary clearly know that just putting the program on public TV doesn’t do even half the job. The battle will be won in thousands of county, city, village and town halls all over the country. And it will be won by public officials willing to take the time — and summon the nerve — to get out and engage the public.

It is encouraging that the prospect of economic stimulus through infrastructure renewal came up in the presidential campaign. Perhaps a consensus is building that we delay infrastructure investment at our peril. That should make the argument easier. Still, it’s going to take commitment across the board, and the stakes could hardly be higher.

In the words of U.S. Representative Jim Oberstar, who chairs the House Committee on Transportation and Infrastructure, “All the water there ever was or ever will be is here on earth today, and it’s our responsibility now, at this time, in this generation, to protect it. That must be our legacy to the future.” ♦

Comments on this column or about any article in this publication may be directed to editor Ted J. Rulseh, 800/257-7222 or [editor@mswmag.com](mailto:editor@mswmag.com).

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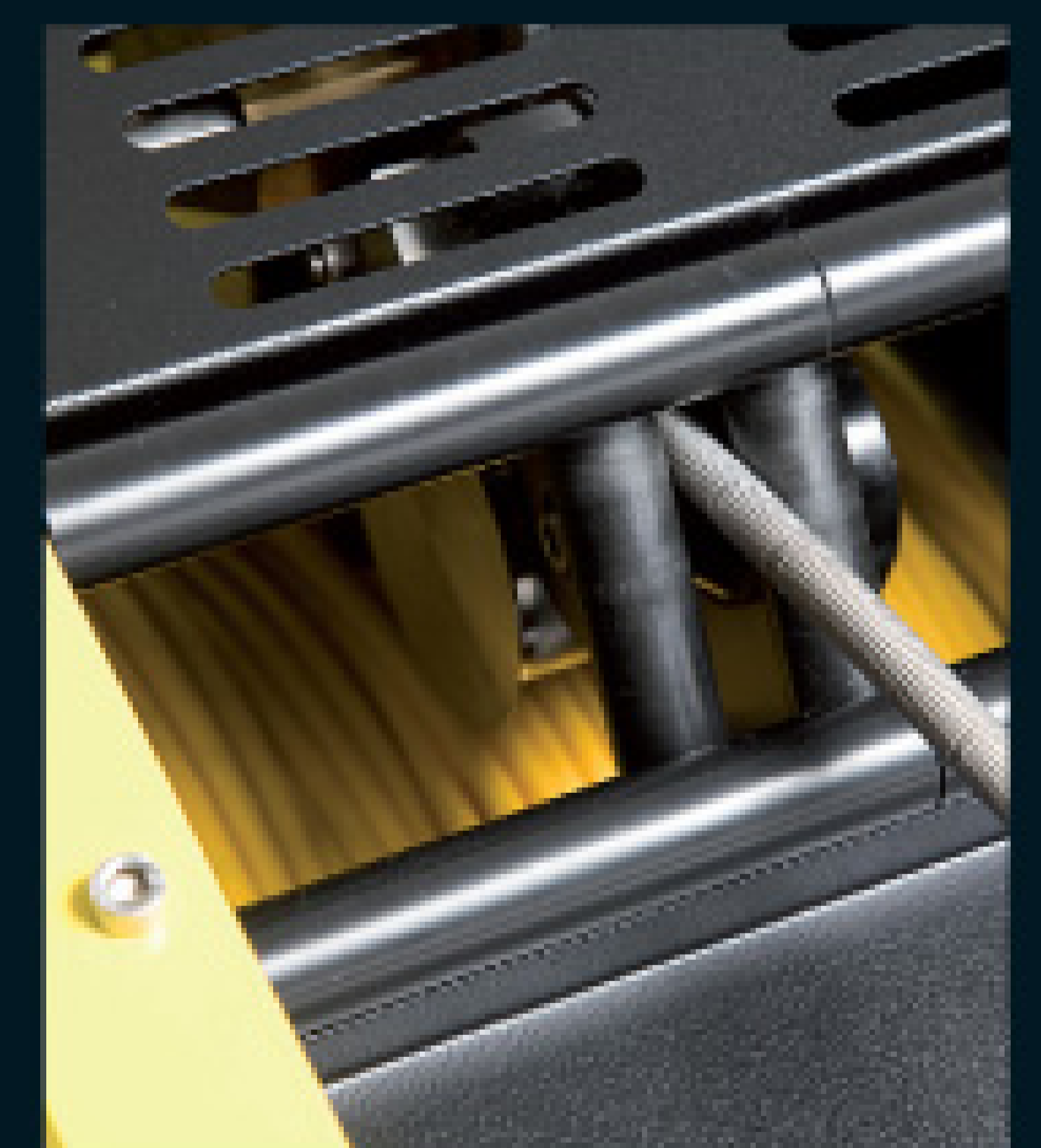
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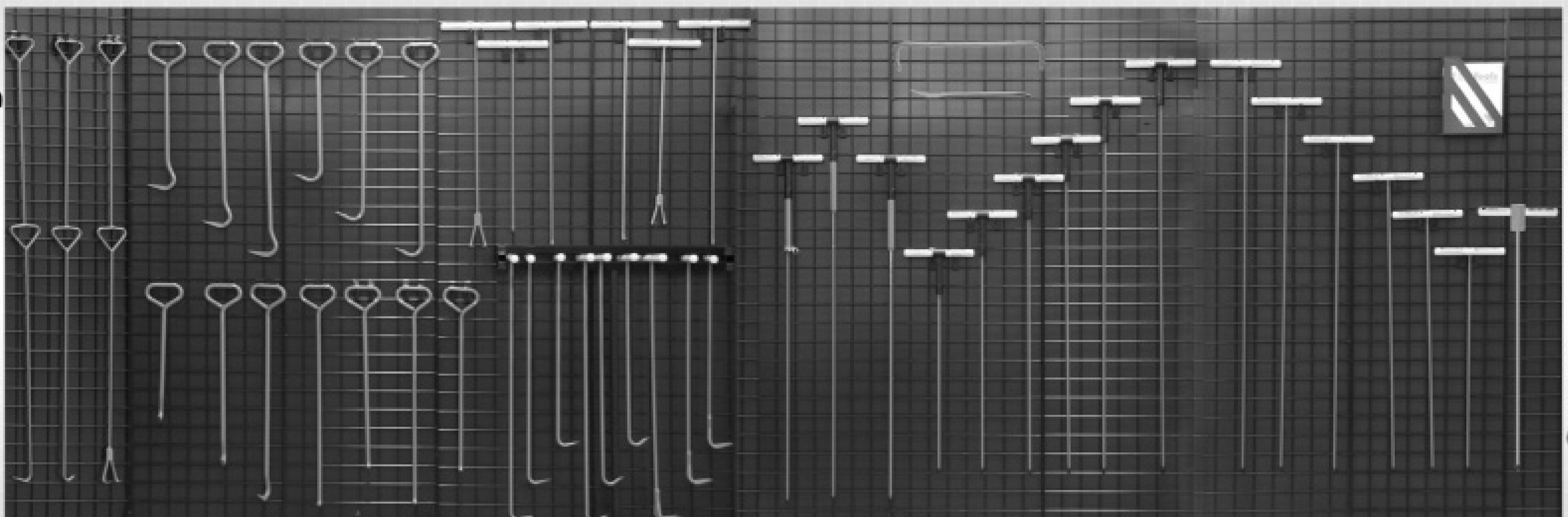


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# QUIET HEROES

A dedicated Pumps and Controls Group takes a methodical approach to keep the infrastructure functioning smoothly and reliably in Salem, Ore.

By Lou Dzierzak

**F**aucets run and toilets flush. For the public, those events are so commonplace that it causes real amazement when the expected doesn't happen.

Scott Branch, supervisor of the Pumps and Controls Group for the City of Salem, Ore., manages a team of technicians who quietly and efficiently meet the expectations of 180,000 residents, 24 hours a day, seven days a week, month by month, year by year.

The Pumps and Controls Group

consists of five systems technicians, three instrumentation technicians, a grounds maintenance technician and a seasonal grounds maintenance technician. Branch steps in when and wherever needed.

This close-knit group has created a routine that maintains the city's water and sewer systems and keeps the members' ever-expanding skill sets polished. "We've got it down," says Branch. "We have one guy who visits all the pump sites each week. He's got enough time when he gets there to look at everything — touch



**Gerald Arredondo (left) and Shane Wallen of the Salem Pumps and Controls Group pull an impeller off of a water pump. When plugged impellers on sewage pumps at some locations required almost daily repairs, the Salem team decided to try a new style of pump that's more efficient — dry pit submersible pumps from ITT Flygt Corp. (Photography by Caryl Young)**



**PROFILE:**

**City of Salem, Ore. (Pumps and Controls Group)**

**FOUNDED:**  
1842

**POPULATION:**  
183,000

**AREA SERVED:**  
43 square miles

**EMPLOYEES:**  
11 (Pumps and Controls)

**BUDGET:**  
\$2.5 million

**WEB SITE:**  
[www.cityofsalem.net](http://www.cityofsalem.net)

the motors, hear things that may be going wrong and run the pumps that may not be working at the time. If we can't fix it immediately, a job order is created to track the job."

Five systems technicians rotate through the pump site inspection responsibilities. "We rotate the inspections so it's a fresh set of eyes every week," says Branch. "If one guy does it for a month, by the end of the month he'll be so sick of looking at the equipment that he may overlook certain things. If it's a new person each week, little things change and catch your eye. That approach has caught a lot of problems."

**Avoiding breakdowns**

"Our goal is to catch it before it becomes a breakdown," Branch says. "We want zero breakdowns. Nobody can ever have that — something is going to go, you can never stop that. But when you walk into a station, if you turn on a motor and hear the bearings clicking, or if you can see that the valves

aren't opening quite the way they should be when a pump starts, if you can notice something before it becomes a problem, you've prevented a multiple-hour breakdown that could be costing us overtime."

Pumps and Controls Group members bring varied backgrounds and life experiences to the job. Stints in the Marine Corps, lumber mills, fabrication shops, paper mills, microtechnology service, silicone wafer plants, food processing maintenance and construction combine to create a highly qualified team. "Our expe-



**Larry Frazier (left) and Gerald Arredondo lift a check valve out of a truck. At one of the Salem sites, the pumps and valves date to 1936.**

rience level plays into reading the trends, knowing what to look for, and knowing how to identify problems," says Branch.

Day-to-day tools of the trade run from old standbys like multi-meters for electronics to the state-of-the-art. The technicians use vibration monitors, three-phase power monitors, portable flow meters, and thermal guns. They use laptop computers on site to download information and run diagnostic programs.

The city uses a SCADA program to monitor the system. "We're able to see 98 percent of our facilities at one central site through that system," Branch says. "We can see if pumps are on or off, what the flow is out of the pumps, and the depth of the wells. That actually contributes to 75 percent of what we catch that's going wrong."

#### Art and science

Technology certainly plays a role, but Branch believes there's a

mix of art and science to the work. The sense of smell is a powerful diagnostic tool. "A layman would walk in and say, 'What is that smell? There's definitely a smell in the air that I'm not used to,'" Branch says. "These guys have done it long enough to recognize that it's either a heater that has gone bad and is cooking its enamel, or a motor has gone bad and it's burning the varnish inside."

Training is a key component of the Pumps and Controls work life

but the members still encounter new situations. "We still see things we've never seen before," Branch says. "We sit down as a group, analyze it, go out to the station and find the problem. Now everybody understands when you see this symptom, this more than likely is the problem we are looking at."

The group set goals and standards to measure performance. Since Branch became supervisor in 2003, overtime costs have been reduced by 40 percent. "That's not

**"When you look forward to coming to work and being with the guys, it's a good feeling. Not a lot of people are able to do that. I feel pretty lucky."**

Scott Branch

**Members of the Pumps and Controls Group: Front row, left to right, Matthew Starbuck, Sheila Dougal, Gerald Arredondo. Back row, Bill Lehner, Charles Wulfers, Brandon Oakes, Larry Frazier, Donald Jarvis, Shane Wallen, Nathan Murray and Scott Branch. Dougal now works in another City department. Not pictured: James Deffenbaugh.**



## LOTS TO DO

The Pumps and Controls Group in Salem takes care of a large network of water and sewer facilities. Salem, the capital of Oregon and the state's second largest city, covers more than 47 square miles.

The water system supplies drinking water to some 183,000 people. In 2007, the maximum day demand was 53.3 mgd, with an average day demand of 27.8 mgd. The system includes 23 pump stations, 18 reservoirs and five active wells with a total pumping capacity of 93.6 mgd. Total above-ground storage capacity is 139 million gallons. Some 3,800 SCADA data points are monitored and logged.

The sanitary sewer system includes 29 sewer pump stations containing 74 pumps and total pumping capacity of 116.9 mgd. About 3,400 SCADA data points are monitored and logged. The Pumps and Controls Group is also responsible for one stormwater pump station. The group's year-round team

members are listed below. (A seasonal grounds maintenance technician, Brandon Oakes, brings brings total staff to 11.)

- Scott Branch, field supervisor, 14 years
- Charles Wulfers, systems technician, 20 years of service
- Gerald Arredondo, systems technician, 15 years
- Larry Frazier, systems technician, 15 years
- Shane Wallen, systems technician, 12 years
- James Deffenbaugh, systems technician, 5 years
- Nathan Murray, instrumentation technician, 10 years
- Donald Jarvis, instrumentation technician, 2 years
- Matthew Starbuck, instrumentation technician, 1 year
- William Lehner, grounds maintenance technician, 7 years.



**Gerald Arredondo, a 15-year veteran of the Pumps and Controls Group, sets up a power monitor for preventive maintenance. The goal of the group is to avoid breakdowns by maintaining, repairing or replacing equipment before it fails.**



**Shane Wallen uses vibration sensing technology for predictive maintenance on motors.**

due to the supervisor but to the crews taking ownership of the facilities," he says. "It's made a huge difference in how they maintain and keep those facilities operating."

Branch notes that an extremely aggressive approach to preventive and predictive maintenance has kept the group's reactive maintenance work to no more than 10 percent overall for water and sewer for the last three years.

### Care for the aging

Part of the group's work plan is to rebuild existing facilities that are not to standard or are creating overtime issues because of incorrect programming, bad wiring, and operational problems. Reaching that objective gets a little more

complicated when working with Salem's existing facilities.

"Our oldest site was a reservoir built in 1936," Branch says. "The pump station was installed in 1964. Some of that equipment has been upgraded, but some of the pump parts and valves have been there since 1936. It's pretty neat to dig up some of that history and work on it and try and keep it there. That's pretty interesting."

Even more modern facilities can bring unique situations. In the past, pump stations were built on one-off standards. "One station can be comprised of certain pumps and equipment," Branch says. "You can go to another three blocks down the street and it's completely different pumps and

different control panels needing different operational skills. That has to be learned. It's not something that you can say is easy. Everyone in our group has to learn."

Moving forward, the group is completing new standards for the design, construction and maintenance of new and existing facilities to ensure that reactive maintenance stays at a minimum and that the stations are built to last 75-100 years without structural modifications when adapting to future demands.

### Beyond maintenance

Branch's team offers much more than diligent maintenance and repair services. They actively look for ways to make the system function more effectively. When plugged impellers on existing sewer pumps at some locations required almost daily repairs, Branch and his team discussed the challenge and found a solution.

"There were some stations that we had to send someone out to pull a pump every night," Branch says. "We were pulling pumps during the day. That's a lot of man-hours and overtime. Our group decided to try a new style of pump that's more efficient. We installed new dry pit submersible pumps from ITT Flygt Corp. in Portland."

Now installed at seven locations, the new technology has eliminated overtime costs at those sites. Reducing late night repair calls is certainly good for the team's sleep but they didn't stop there. Another faulty pump led to a systemwide fix and, most importantly, cost savings for the city.

"We figured out the most efficient and cost-effective solutions and provided the summary as a proposal for a project," says Branch. The initial engineer's estimate for the project was \$250,000. Since the money was not budgeted, the project was to be placed on a project list and prioritized with others.

The response from management was that it would be three years before the project could be

included in the budget. The group took it upon themselves to verify the as-built drawings, redraw and edit them, then reconfigure the wiring and reprogram the station. The task took less than three months.

The crew completed all but the reprogramming at a cost of \$35,000. All other equipment, parts and labor were supplied from in-house sources. "We calculate that the savings to the city are well over \$300,000 if you figure in the overtime costs that were eliminated," Branch says. "The problem would have persisted for at least three years."

### Getting noticed

The Pumps and Controls Group's contributions are being noticed by the city's engineering and planning departments. "It is awesome to see our requests, comments and designs put into use and work successfully," Branch says. "It's a huge sense of pride and accomplishment."

Branch refuses to take credit without acknowledging the other members of his team. "I am very proud of this group and all that they have, can and will accomplish," he says. "My job with this group is to give them the support and tools they need to accomplish their goals and work needs without having to deal with roadblocks.

"We are quiet heroes," he says. "Public works in every city is the only group that touches inside somebody's home. If your toilet doesn't flush, all of a sudden you remember who needs to be called. Other than that, it's almost a given. People become comfortable turning on the tap and flushing the toilet and it works. It's always going to work."

In Salem, that's because Scott Branch and his Pumps and Controls Group are always on the job. "It's like an extended family," Branch says. "When you look forward to coming to work and being with the guys, it's a good feeling. Not a lot of people are able to do that. I feel pretty lucky." ♦

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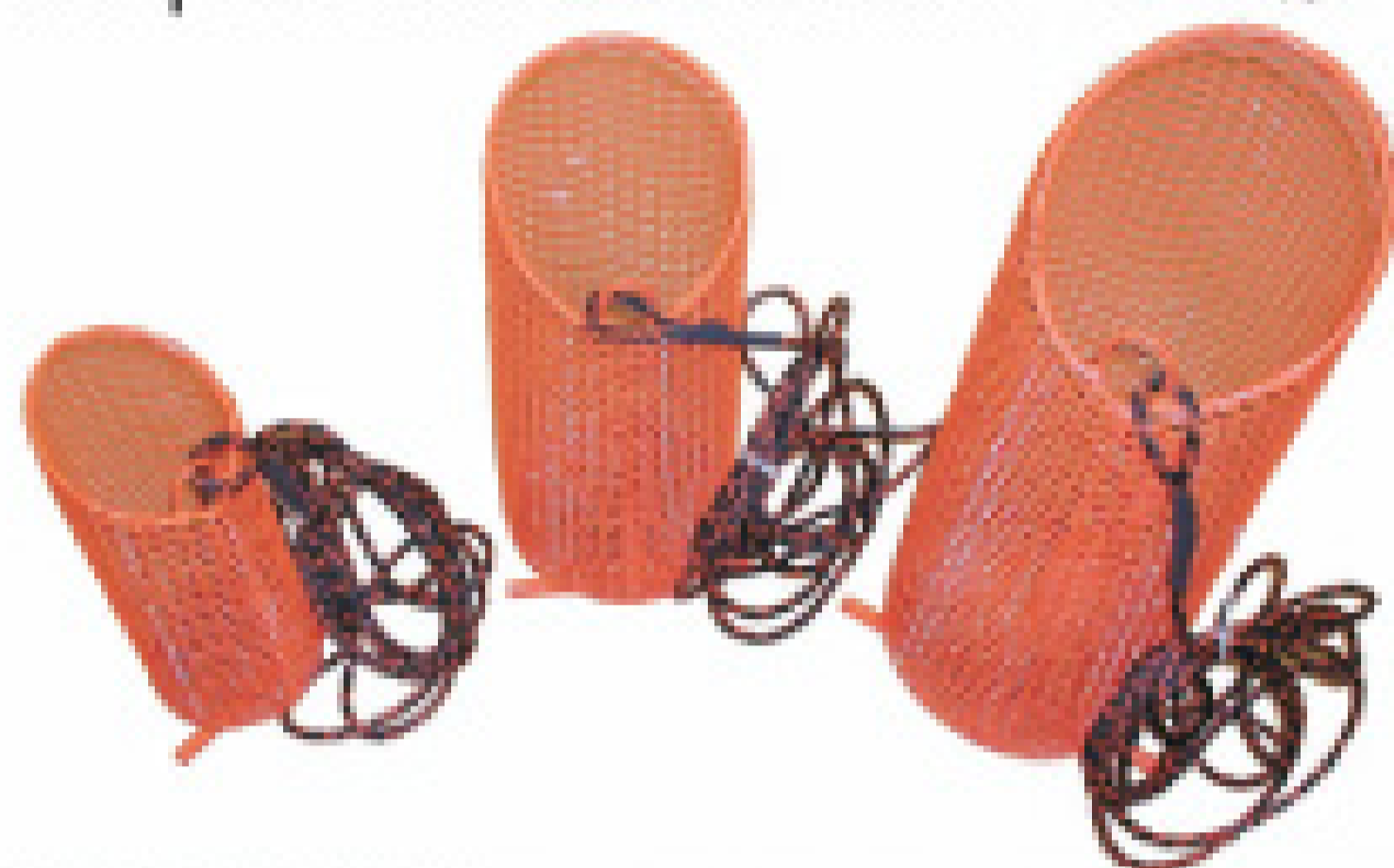
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# MAX-LIFE Manhole Tools

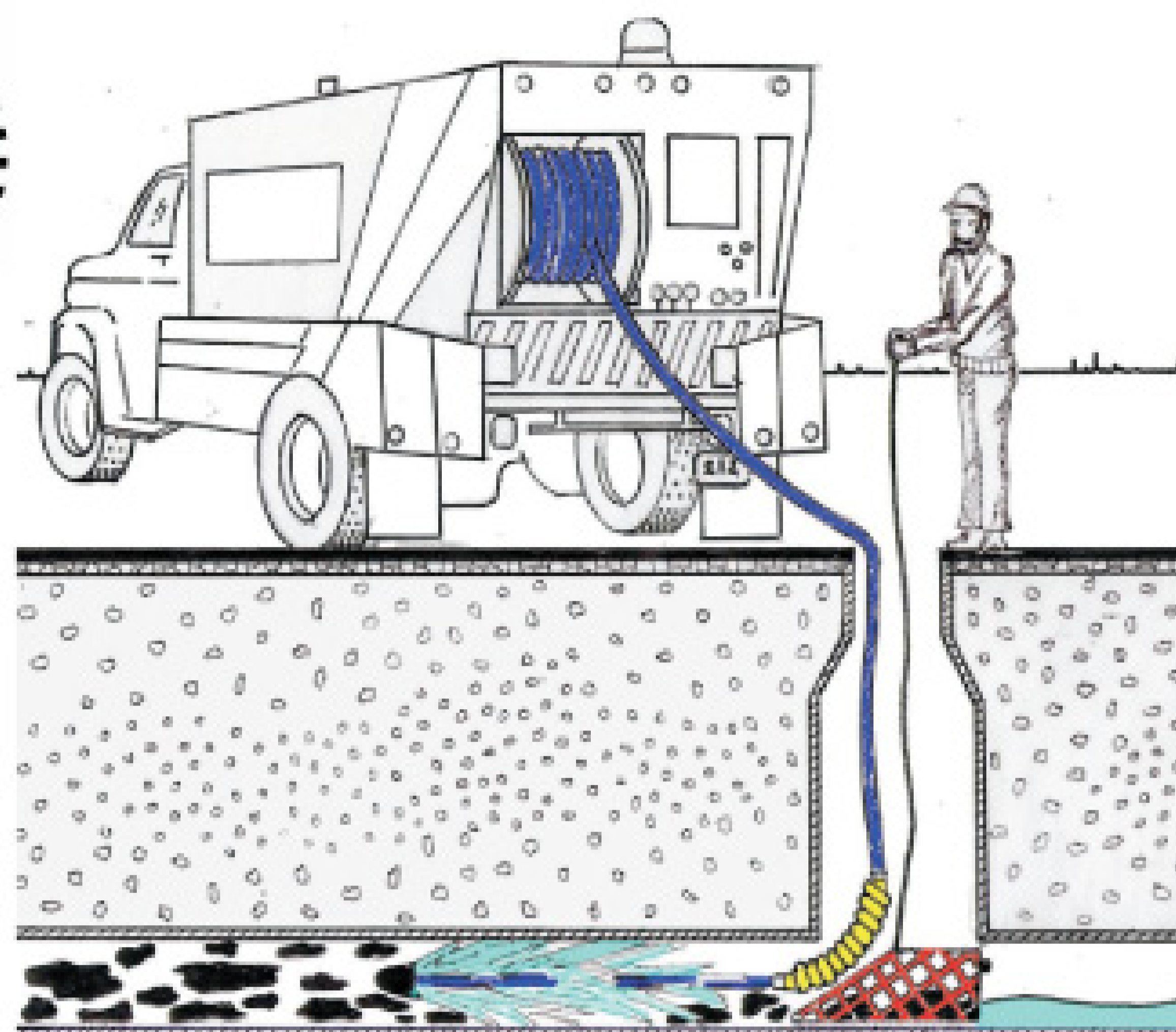
## Debris Catchers

Use Debris Catchers with Jet instead of Combo. Ideal where small amounts of debris are expected. Standard **MDC-6** model Comes with 20' of Poly Rope. Available from 6" to 24".



## Grit Catchers

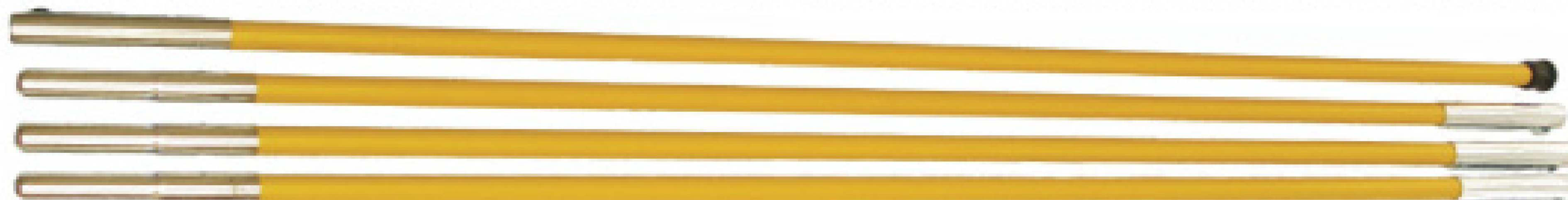
**MDC-6CW** are similar but have half moon bottom around sides and back to stop finer grit and black sand from Flowing thru. Fills with material faster.



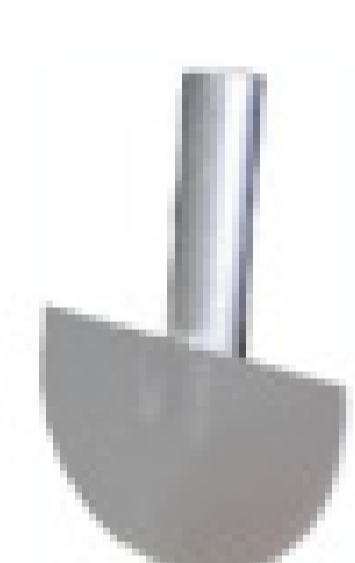
Booth 14026 & 14027

## MPF-24 Quick Connect Fiberglass Poles

24' pole set used with above Tools and Debris Catchers. Each set Includes 3 ea. 6' male x female and 1 x 6' end pole. These are Light, Strong durable poles with positive lock Aluminum quick couplings. Other lengths available. Use with Debris and Grit Catchers and assortment of tools below.



Debris Catchers and Grit Catchers both can be used with any length of Fiberglass Poles. Provides for positive action of positioning, raising and/or lowering these catchers in manholes.



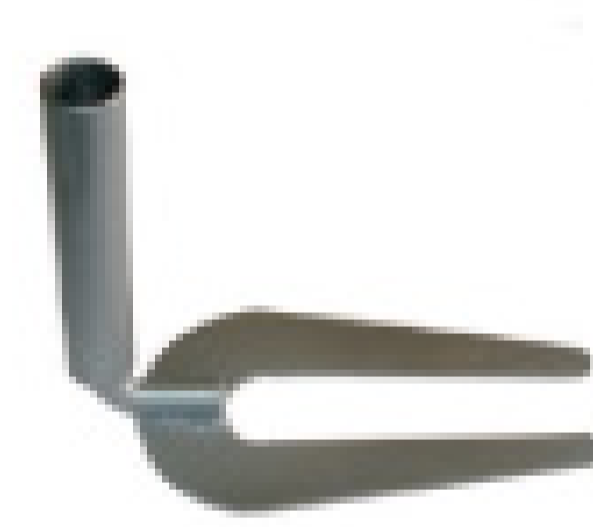
### MGLC-1

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Three Prong Grabber. Great for Rocks and Roots.



### MHG-2

Horse-Shoe Grabber. Great guiding hose in and out of sewer lines.



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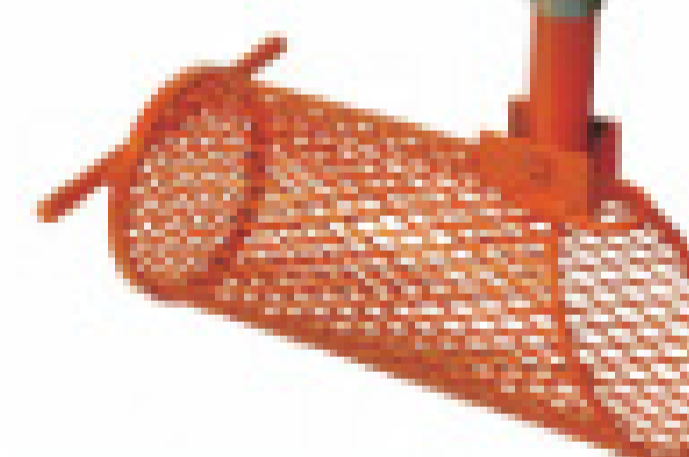
Debris Scoopers Heavy duty construction For 6", 8" and 10" Pipe sizes.



### MCG-6

Grit Basket. For use with poles or rope. In sizes from 6" to 24".

Debris Catcher



Grit Catcher



## Catch-Basin Spoons

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A Charleston public works crew inspects a 48-inch water pipe and prepares to install restraints. Inset: Jason Anderson (on the backhoe), Preston Pendergrass and Kevin Thompson set a valve for an 8-inch main installation in downtown Charleston. (Photos courtesy of Charleston Water System)



FOCUS: WATER

# OLD MEETS NEW

**W**hile the City of Charleston, S.C., has about 118,000 citizens, the Charleston Water System distributes water to almost 400,000 customers in and around the city.

The system is blessed with more than ample surface water to meet its needs for decades. Its greatest challenge is to maintain 1,400 miles of water mains through a diverse terrain that includes a sensitive downtown historic district, tidal flats, corrosive salt water marshes, a harbor, and the beds of Elliot Creek and the Ashley and

Cooper Rivers. A program of extensive leak and corrosion detection and aggressive preventive maintenance initiatives helps the system meet those challenges.

When Kanwal Oberoi became director of water distribution in 1996, he found a water department that practiced little routine maintenance, and a repair schedule that made ineffective use of staff.

Today, the department aggressively searches out leaks with a regular detection program and keeps mains, hydrants and valves on a regular program of preventive maintenance. Trenchless technol-



As the historic City of Charleston, S.C., modernizes its water distribution system, an aggressive leak detection and preventive maintenance program leads the effort

*By Peter Kenter*

ogy helps crews repair lines in the city's historic district with minimal disruption.

## First order of business

The first order of business was to get a handle on exactly which functions were being performed and to write procedures that incorporated best practices. Rather than bring in a consultant, Oberoi had the staff write the manuals themselves, in plain English, so that they could take ownership.

"Right now, I have a procedures manual 4 inches thick, and it's been written almost entirely by the

staff," says Oberoi. "Each employee who contributed to a procedure has his or her name inscribed beside that procedure permanently, so that they retain ownership of that idea forever. It doesn't just disappear into a group exercise."

Part of the effort to modernize the department involved the creation of an aggressive leak detection and main repair program that achieved more while saving labor and reducing cost.

"In the 12 years I've been here, we have cut the size of repair crews from six people to three, including a supervisor, and cut the average



A Megalug is installed after repairs to a section of pipe.

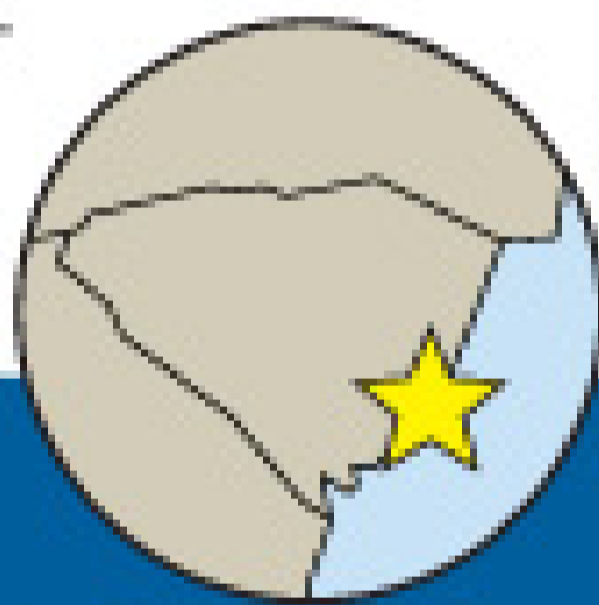
**“Between the information we’ve collected and the work of a consultant, we’ve developed our own proprietary matrix to determine which pipes are due for routine repair or replacement.”**

**Kanwal Oberoi**

price of a repair from \$500 to \$400, despite rising wages and material costs,” says Oberoi. “After making the repair crew more efficient, the biggest challenge has been to keep material costs down as well.”

#### Repair and testing

The main repair and testing regimen involves a



#### PROFILE:

**City of Charleston, S.C., Charleston Water System**

**INCORPORATED:**  
1783

**POPULATION SERVED:**  
400,000

**SERVICE AREA:**  
337.9 square miles

**EMPLOYEES:**  
83

**INFRASTRUCTURE:**  
1,400 miles of water mains

**ANNUAL BUDGET:**  
\$4,885,500 (operations and maintenance)

**WEB SITE:**  
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combination of preemptive-leak detection and extensive analysis of the condition of mains. The distribution mains are largely made of cast or ductile iron lined with cement, ranging 2 to 48 inches. A few high-service mains coming from the city’s Hanahan Water Plant are as large as 54 inches.

“We have some HDPE pipe and plastic pipe as well, running underneath the river beds,” says Oberoi. Some of the pipe dates back to the 1800s. The leak detection program operates on a five-year cycle. The program is so efficient that it requires only one worker on shift to perform the scans.

The major tool in the leak detection arsenal is a Fuji LC-2500 Leak Noise Correlator, purchased in 1998. It is the only one of its kind in the state. “It has proved its worth by serving us through two full scans of the water main distribution system,” says Oberoi. “It has proved extremely accurate in pinpointing hidden leaks to help us get to problems without false starts and over-digging.”

Because Charleston is on the Atlantic Ocean, much of the distribution system runs through corrosive soils, especially salt marshes. The department has mapped potentially corrosive soils in high-profile areas and performs solid sampling electric potential surveys

to find soils that have higher moisture content attributable to leaks. When potential leaks are discovered, a city engineer evaluates the data and prescribes remedies.

Some leaks can be difficult to detect. For example, a leak that affected water supplies to Sullivan’s Island and the Isle of Palms in September 2008 was traced to a break in a main at the bottom of Charleston Harbor.

The entire system has been scanned twice since the purchase of the leak detector. The second full scan showed an overall improvement in the condition of the mains. That’s not entirely the result of the leak detection program.

#### Proactive maintenance

“Between the information we’ve collected and the work of a consultant, we’ve developed our own proprietary matrix to determine which pipes are due for routine repair or replacement,” says Oberoi.

The matrix considers such factors as pipe size, age, composition, flow rates, the number of breaks and leaks previously detected, and the corrosiveness of the soil.

The information is correlated to maintenance cost of the existing pipe, the loss of effective pipe size, and the criticality of the pipes, including their location and proximity to other construction projects. A final score determines whether the pipe will be replaced or repaired.

The staff also performs preventive maintenance on some 7,200 fire hydrants and 40,000 in-line valves. Valves are designated critical and non-critical, and larger valves receive special attention. About 70 percent of the department’s budget goes toward preventive maintenance, including an aggressive pre-emptive program to clear mains of mineral deposits through routine flushing of fire hydrants.

## FROM THE TOP TO THE TRENCHES

When he became director of water distribution for the City of Charleston, S.C., a dozen years ago, Kanwal Oberoi knew he’d have to work hard to gain acceptance with the crew. “I wasn’t even a northerner in the south — I was a Canadian,” he says.

As part of his orientation, Oberoi insisted on learning the ropes by spending some time working at each job in the water department. “I came here from Alberta, and suddenly I was digging ditches in 110-degree heat,” he says. “It was killing me. I did every job from bottom to top as a crew worker, with a wrench in my hand and as a guy filling a road with asphalt blacktop. I couldn’t expect them to do a good job on anything that I wouldn’t try myself. I didn’t do a very good job, but I put all of my effort into it.”

His philosophy involves attracting the loyalty of staff members, not trying to push them from behind. To help upgrade staff skills, and bolster professionalism and self-worth, the department offered all workers a chance to earn their operator’s licenses. That was a requirement for all new hires, but not a condition of employment for existing staff.

Oberoi followed along with them, writing his exams and earning his operator’s license at the same time. “We promote a team philosophy in which everybody is equal in terms of the job they need to do for the boss — the customer,” he says. Getting down into the trenches helped him earn the respect of fellow workers, at least most of the time.

“One day when I was working on a crew, the supervisor told me that the digging equipment was out of service and that I had to use a shovel to dig a trench 4 feet deep and 3 feet wide to access a pipe underneath the ground,” he says. “There was no pipe underneath there and I suspected that from the moment I started digging, but when the supervisor orders you to dig, you dig!”

Two-person crews perform maintenance according to the system's standard operating procedures. Like all employees, these crews are monitored according to productivity markers calculated each month that translate into incentives, such as lunch vouchers.

"Crews in every category compete with each other to reach or exceed productivity targets," says Oberoi. "No matter what type of work is performed in the department, we have a productivity standard that's expected to be maintained. We also have productivity targets for the entire department. Everyone is rewarded at month's end if targets are met."

When a repair is required, the department most often chooses dig-and-replace. "Most of our mains are located only about 4 or 5 feet below the surface of the soil, which obviously never freezes," says Oberoi. "It's simply cheaper for us to dig a shallow trench to make water main repairs."

Cast and ductile iron pipe is usually replaced with more of the same, except for pipes running under the city's rivers, where some HDPE and plastic is used. In 1998, the department lined 2,600 feet of century-old 6-inch cast iron main with epoxy.

While the relining improved flows, the cost totaled about 55 percent of the cost of a new ductile iron main. "Because of the graphitization of the cast iron main, and because the epoxy did not provide any structural support, the life expectancy of the relined pipe was



Robert Lindenberg poly wraps a 6-inch pipe for a main installation.

**"In an open area, it's still cheaper to excavate, but our department bears the full cost of rehabilitating the area after a dig. ... Anything we remove [in the historic district], we're responsible for putting back exactly as we found it. If we remove a cobblestone, we have to number it, and we have to return it to its original location. ... If we can eliminate the cost of historic restoration, trenchless technology makes economic sense here."**

**Kanwal Oberoi**

estimated at only 20 to 40 years," says Oberoi. "Installation of a new cement-lined ductile iron main has a life expectancy of 100 years, so the math favored replacement."

#### Historical challenges

The city's historic district, where cobblestone streets and period architecture date back to the 18th century, requires special attention. The downtown area carries the highest traffic densities and contains the oldest mains in the system.

"Over the past 10 years, we've located and repaired or replaced a lot of the problem mains in that area," says Oberoi. "When we began to concentrate on the area, we ran the water at 40 psi to make sure that we didn't rupture any mains that were already compromised. Since we've focused our attention here, we've been confident enough to increase the pressure to 50 psi."

The work in the historic district is exacting. Repair crews are required to call in an archaeological expert each time they excavate. "Anything we remove, we're responsible for putting back exactly as we found it," says Oberoi. "If we remove a cobblestone, we have to number it, and we have to return it to its original location."

In one case, an archaeologist helped repair crews identify a large, spherical metal object they unearthed. "It turned out to be a bomb — a live bomb — from the Confederate era," says Oberoi. "We had to call in the military to dispose of it."

It's in the historic district that the department is aggressively exploring trenchless technology, particularly since the cost of relining has decreased since the 1998 pilot project. "In an open area, it's

still cheaper to excavate, but our department bears the full cost of rehabilitating the area after a dig," Oberoi says. "If we can eliminate the cost of historic restoration, trenchless technology makes economic sense here."

Charleston is looking at two products. Insituform Blue Thermo-pipe by Insituform Technologies Inc. is a polyester-reinforced polyethylene structural liner for severely deteriorated pipes. Another product under investigation is Aqua-Pipe by Sanexen Environmental Services Inc., a structural liner impregnated with thermoset epoxy resin.

"Whatever we choose, the product needs to provide structural support to the mains, or the investment won't pay off," says Oberoi.

#### System continues to grow

Charleston continues to grow, and the water system will grow with it. Oberoi is proud of the recognition the system has garnered so far, including ISO 14001 certification for environmental management, one of the country's first departments so recognized. The system was also awarded the state's 2006 Area Wide Optimization Program Excellence Award for treating drinking water beyond what's required by regulation.

"This type of recognition, in addition to meeting or exceeding our own productivity targets, shows us that we're on the right track," says Oberoi. "We received a Governor's Award for being the best-run utility in the state."

"In the next five years we want to be considered for the President's Award for the best-run corporation in the country, and we want to achieve that while providing quality water at a fair price. Our customers will let us know if our efforts at continuous improvement are taking us there." ♦



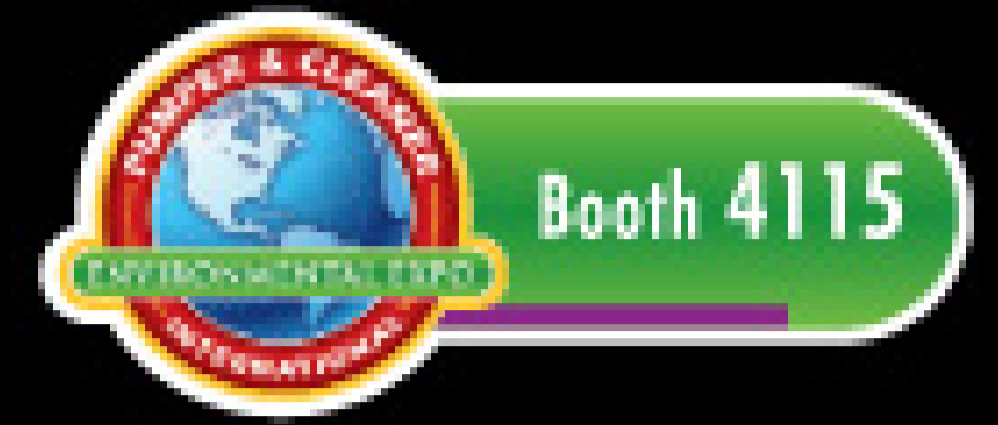
Jerome Brooks uses a diffuser to perform unidirectional flushing.

#### MORE INFO:

**410 Insituform Technologies Inc.**  
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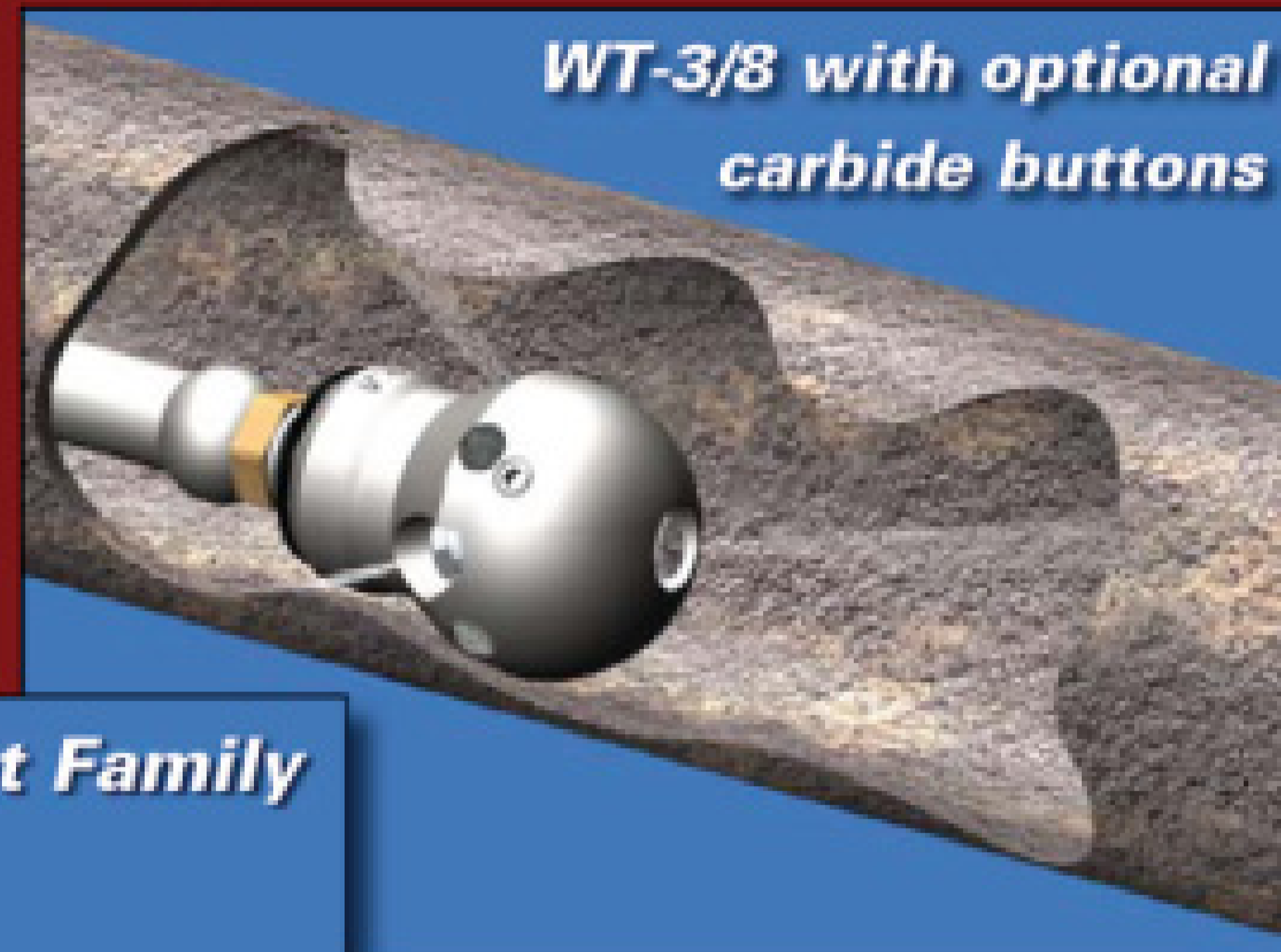
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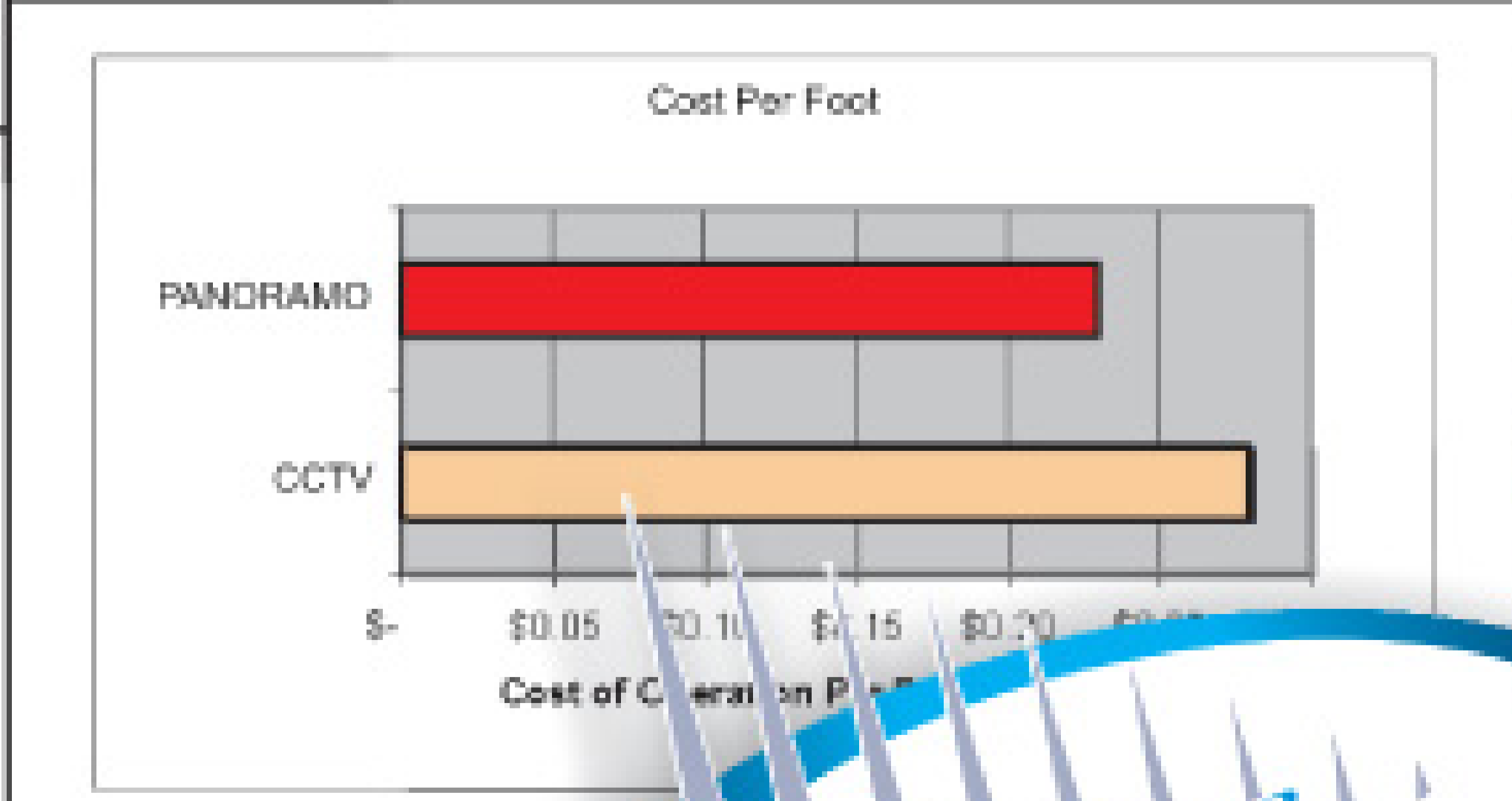
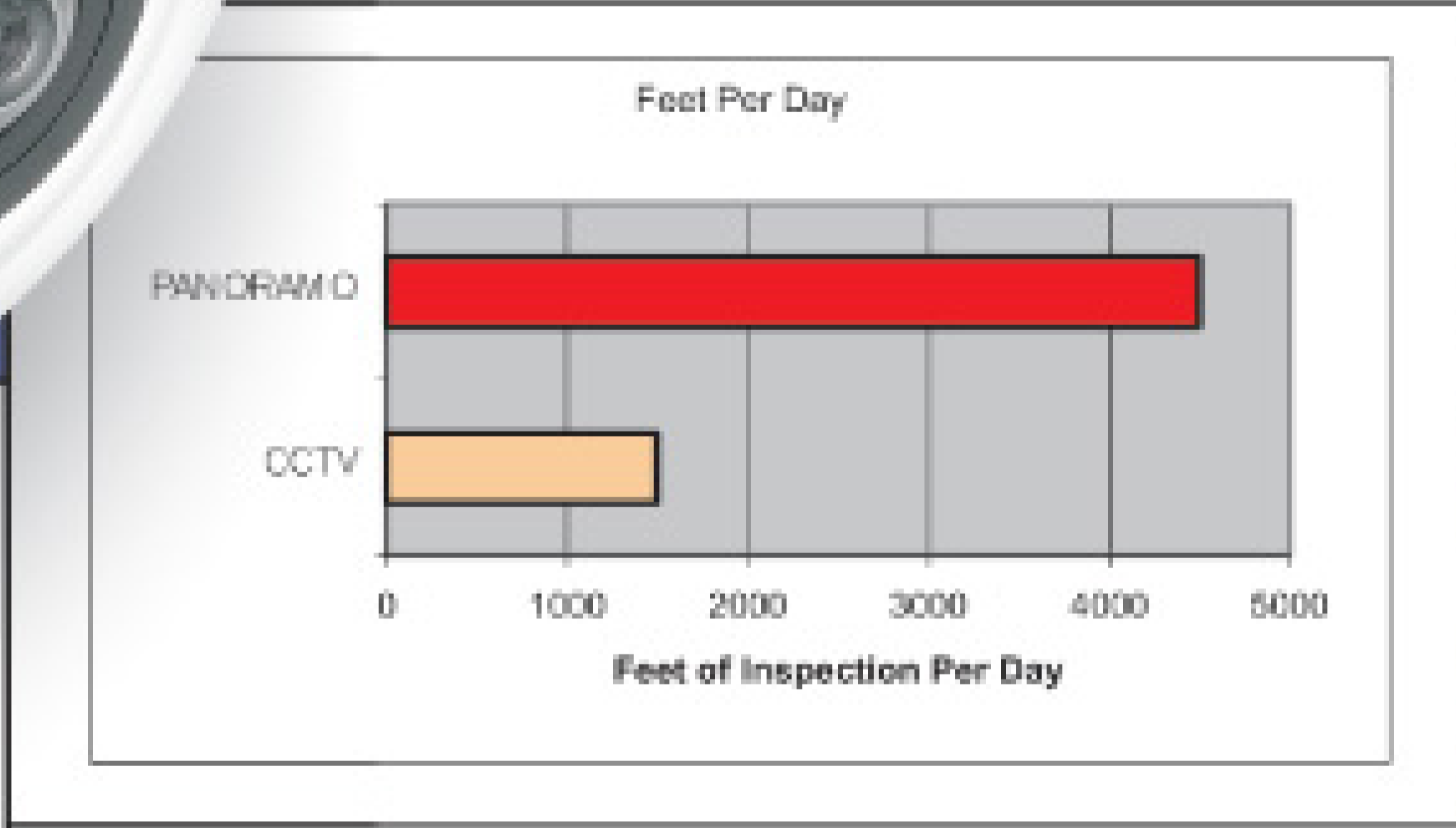
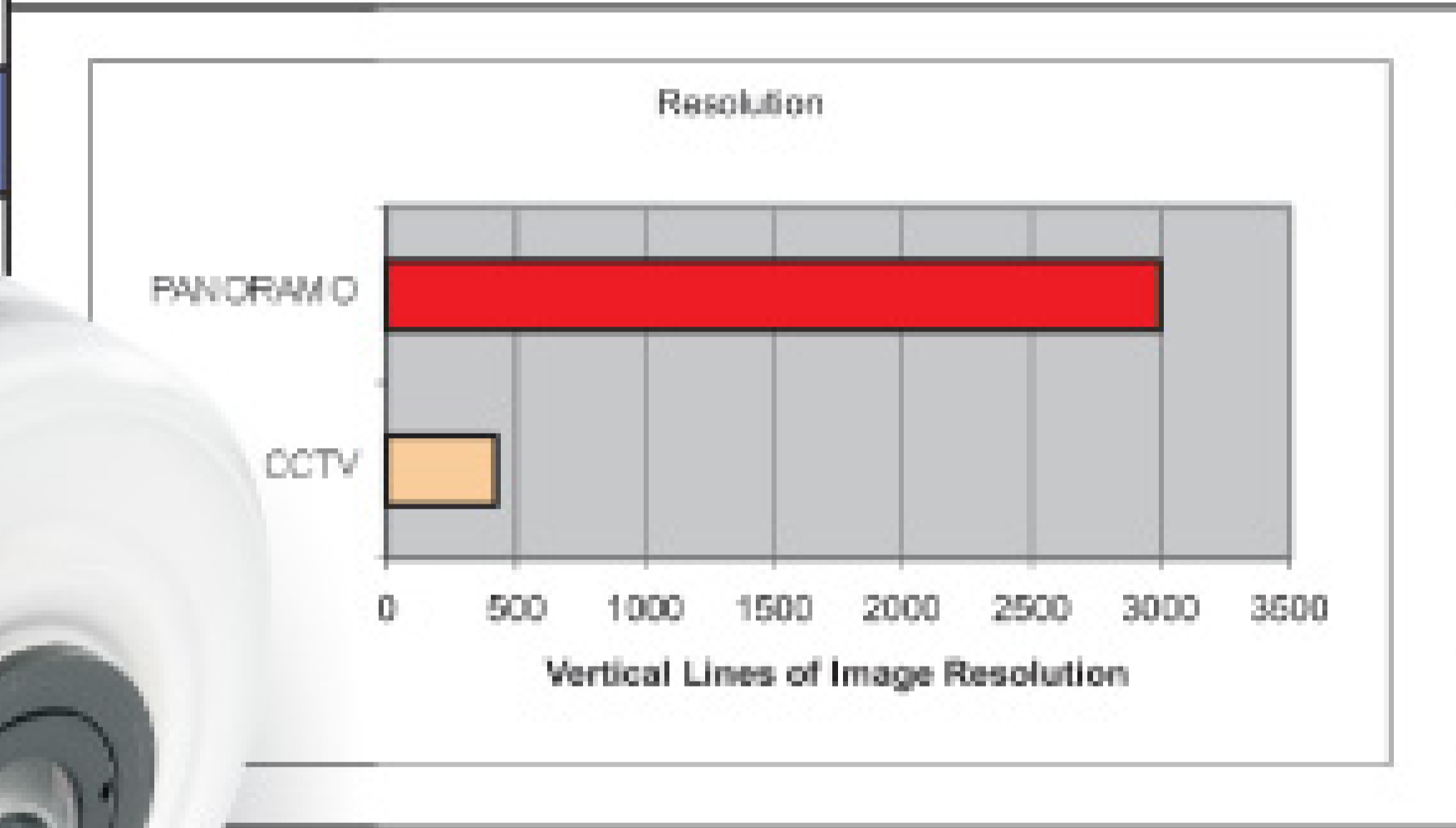
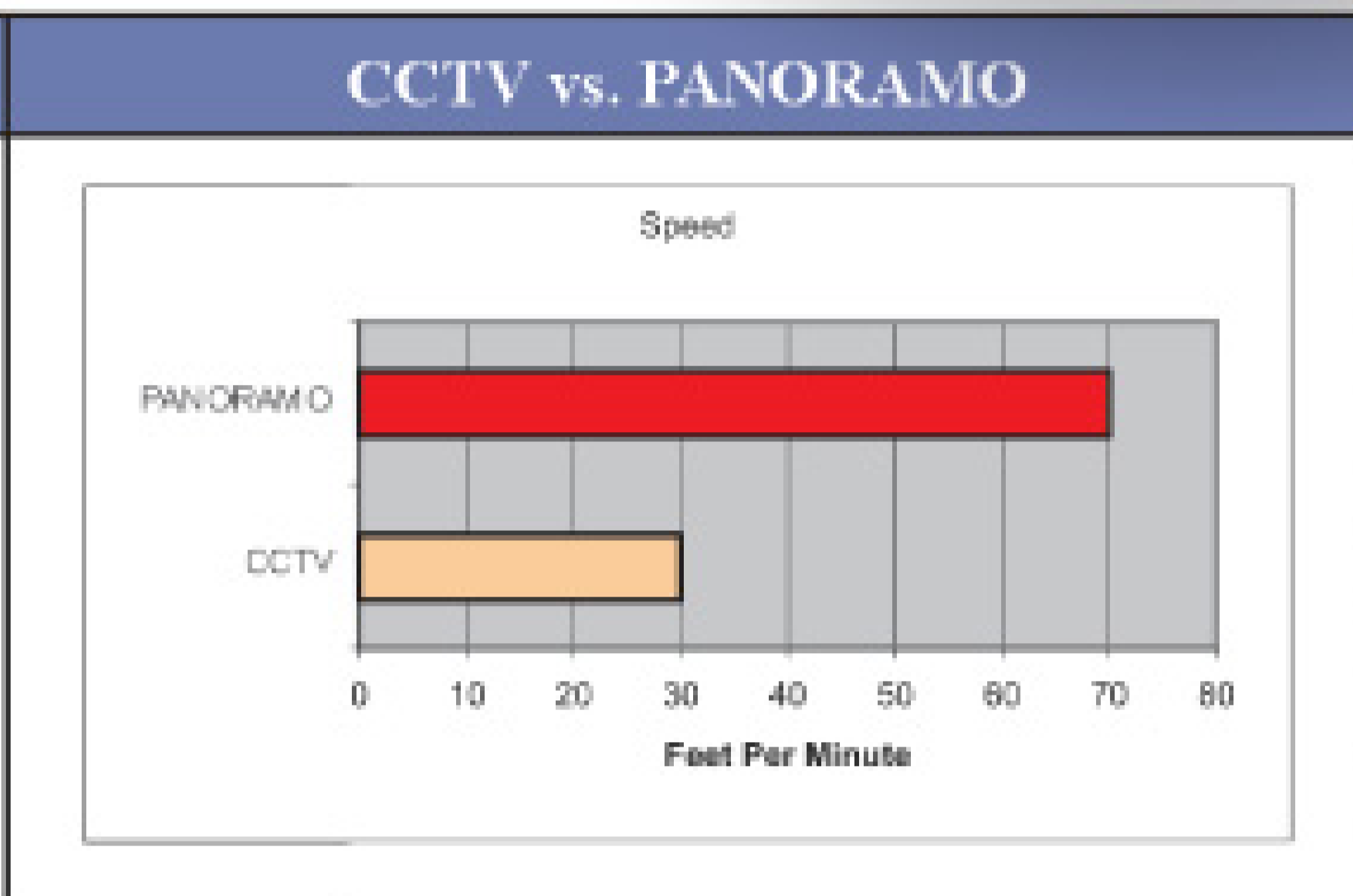
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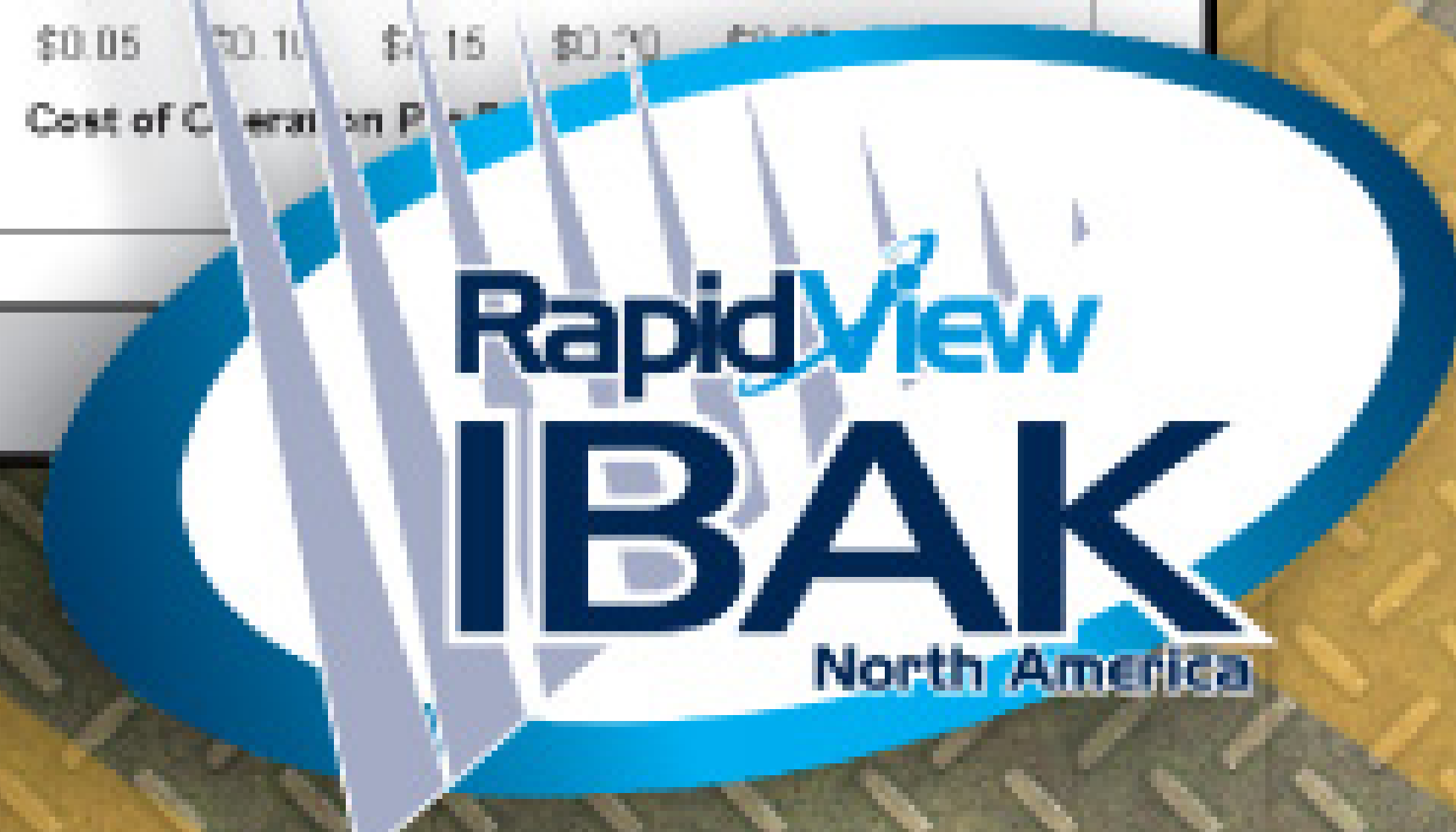
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DEFECT DETECTION





Chris Lopez cut the 36- by 30-inch Boogie board to fit a 12-inch PVC pipe and tested it on the district's recycled water detention basin. (Photos courtesy of Rancho California Water District)

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# SURF'S UP

A camera inspection using a modified Boogie board float helps a California city locate and remove a blockage before sewage backs up in a school yard

By *Scottie Dayton*

**“Surfers use Boogie boards to paddle from beach to beach, and I had an old one in my garage. I strapped the camera to the board with a bungee cord, then took the unit to our detention basin for recycled water to see how it would react.”**

Chris Lopez

Chris Lopez and David Holguin, collection system operators for the Rancho California Water District in Temecula, Calif., noticed a high level in a manhole on an easement near Calvary Chapel complex. An overflow here meant sewage encroaching on an elementary school playground.

A low level in the downstream manhole 300 feet away confirmed a blockage. An attempt to jet-rod the 12-inch line using a 2100 series Vactor combination truck failed, as did snagging the material with a continuous rodder and corkscrew blade.

The district doesn't own a main-line camera, so the men attached their Jet Cam from RS Technical

Services Inc. to the truck's rodder. No matter which skid they used, the 25-feet-per-second flow in the three-quarters-full pipe sank the camera.

With time running out before a significant problem erupted, Lopez drew on his surfing experience to build a flotation platform based on one of the fastest growing extreme water sports in the world — Boogie boarding. The modified Boogie board kept the camera upright, enabling Lopez and Holguin to identify and remove the blockage within 14 hours of its discovery.

**Test tank**

Lopez first tried sending a tag line downstream to attach a nylon rope to both ends of the camera.

“We figured that enough tension on the line would keep the Jet Cam above water,” he says. “Watching the bobbing line made me wonder why we just couldn't float the camera toward the blockage to see what was down there.”

To maintain buoyancy, Lopez and Holguin strapped the camera to a minimally inflated sewer test plug with a bungee cord, but the assembly rolled over in the sewer. Sandwiching the camera between two pigs enhanced stability somewhat, but the craft capsized with the least amount of turbulence.

“We needed something more stable,” says Lopez. “Surfers use Boogie boards to paddle from beach to beach, and I had an old

one in my garage. I strapped the camera to the board with a bungee cord, then took the unit to our detention basin for recycled water to see how it would react." The raft was stable and reliable.

The 36- by 30-inch, plastic-encased, rigid-foam board was too large for the sewer, so Lopez used a hacksaw and file to cut down the sides until they just fit inside a scrap piece of 12-inch PVC pipe. The snug fit increased stability. Lopez inserted an eyebolt in the front and back of the board, then mounted the camera with heavy-duty bungee cords and Velcro, a redundancy should the cords fail.

#### Time bomb

The next morning, Lopez lowered a high-strength nylon tag line down the 9-foot-deep manhole. "We gambled that it would float past the obstruction, and it did," he says. "David gave me the high sign when it arrived." Holguin secured that end of the tag line to the eyebolt in the front of the Boogie board, then tied 400 feet of nylon rope to the eyebolt at the back of the board.

Positioning the camera was a coordinated effort. As Holguin lowered the unit, Lopez main-

tained tension on the line to keep the board facing forward and the nose level. "If the nose tilted down the slightest amount, the rushing current would sink it," says Lopez. The camera launched successfully on the first attempt.

The men maintained two-way radio contact as Holguin fed out the line and watched the CCTV monitor. At 247 feet, the camera televised a length of PVC pipe jammed across the sewer and collecting paper.

"It probably was a piece of lateral from an upstream construction site," says Lopez. "We had no other choice than reverse rodding to remove it. I felt comfortable doing it because we had no service connections between the manholes and wouldn't risk sucking water out of toilet bowls and p-traps." Nevertheless, Lopez inserted vacuum hoses in the upstream manhole just in case jetting downstream created complications.

#### Mopping up

Holguin maintained video contact as Lopez jetted away paper and debris using 60 gpm/500 psi. He then increased the pressure to 1,100 psi and began rocking the nozzle toward the obstructing pipe and back again. After 10 minutes, the fragment shifted enough for the flow behind it to dislodge one end. The battle ended when Holguin caught it in a trap set in the downstream manhole.

The team inspected 757 additional feet of the sewer using the Boogie board as a stable flotation platform for the camera. They also installed Smart Cover hydraulic sensors from HydroNex, San Diego, in the two manholes. The devices will notify Lopez and Holguin via cell phone and e-mail of high-water events. ♦

**After efforts to remove the unseen blockage failed, the Boogie board camera float was sent down the pipe. At 247 feet, the camera televised a length of PVC pipe jammed across the sewer and collecting paper.**



#### MORE INFO:

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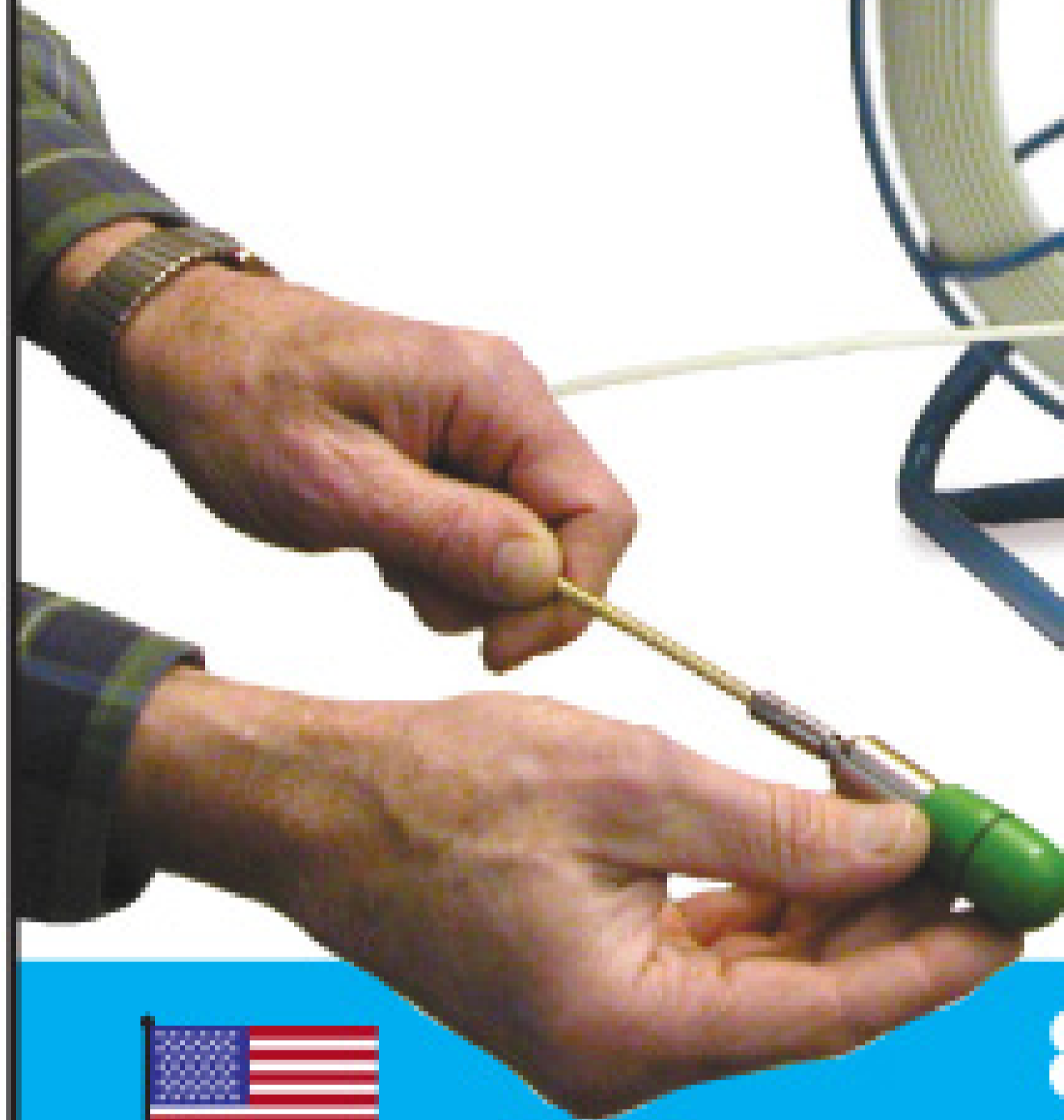
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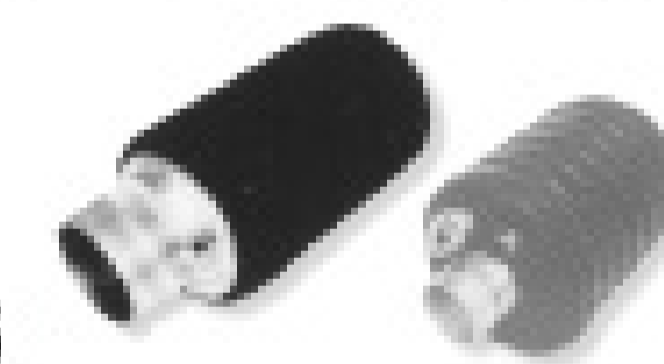
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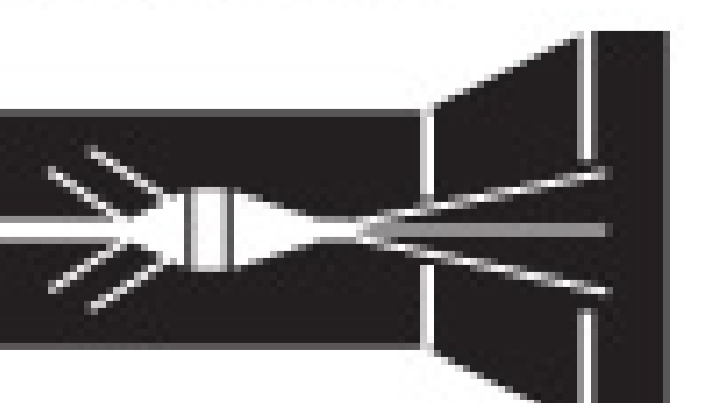
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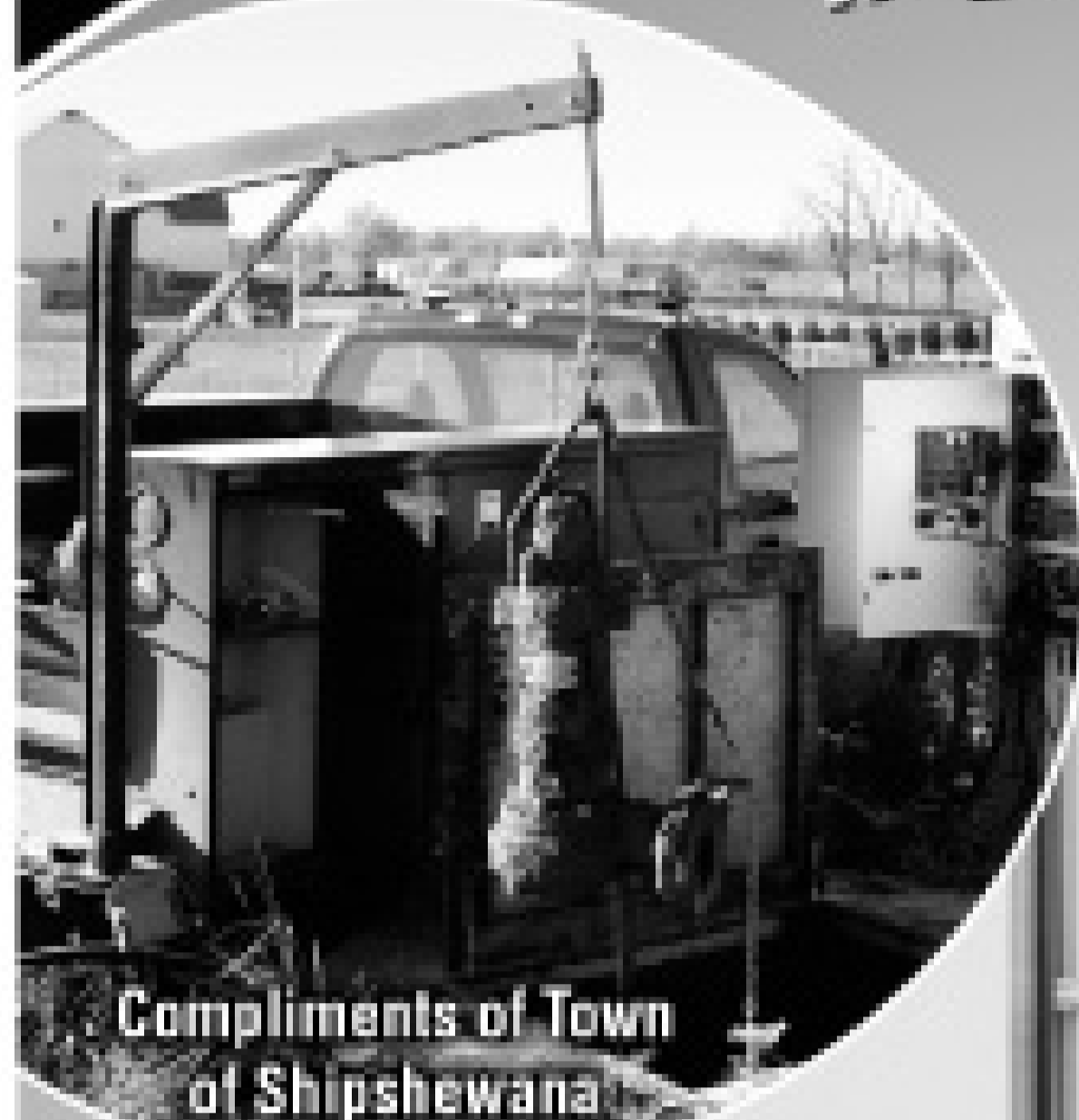
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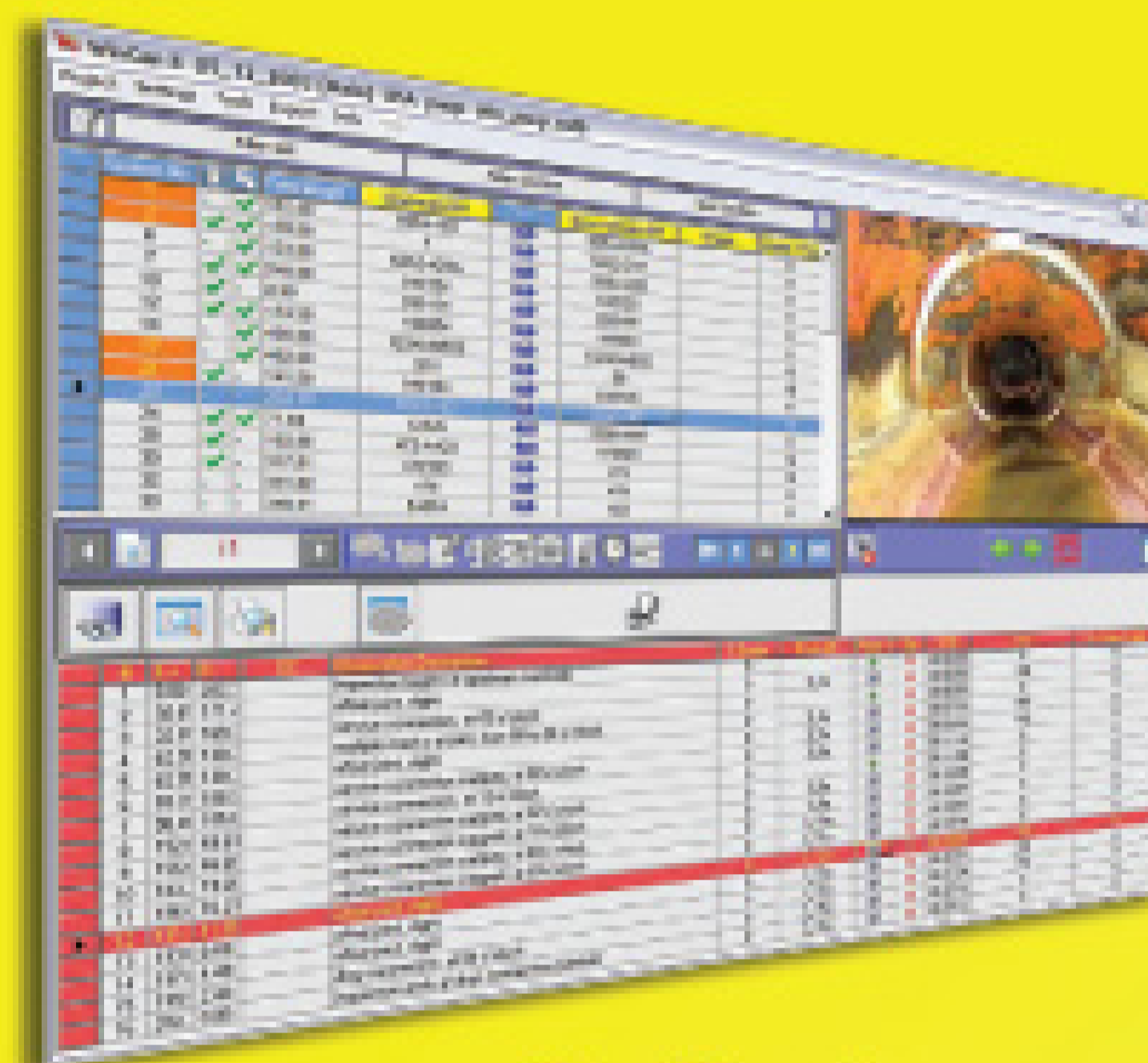
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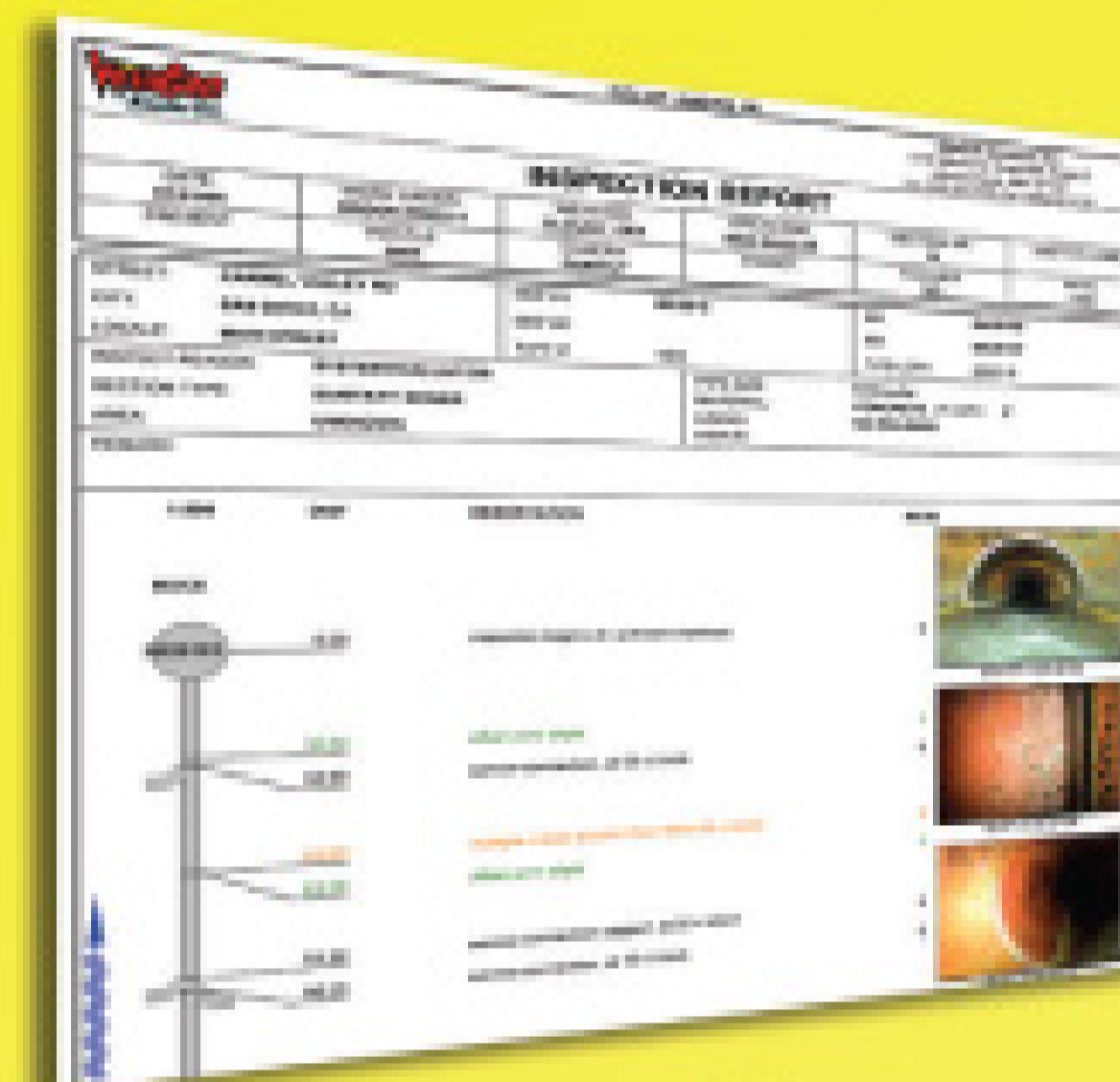
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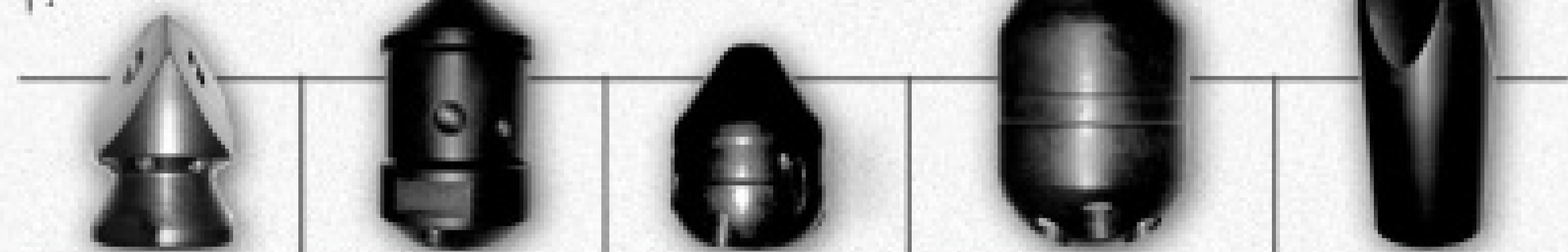
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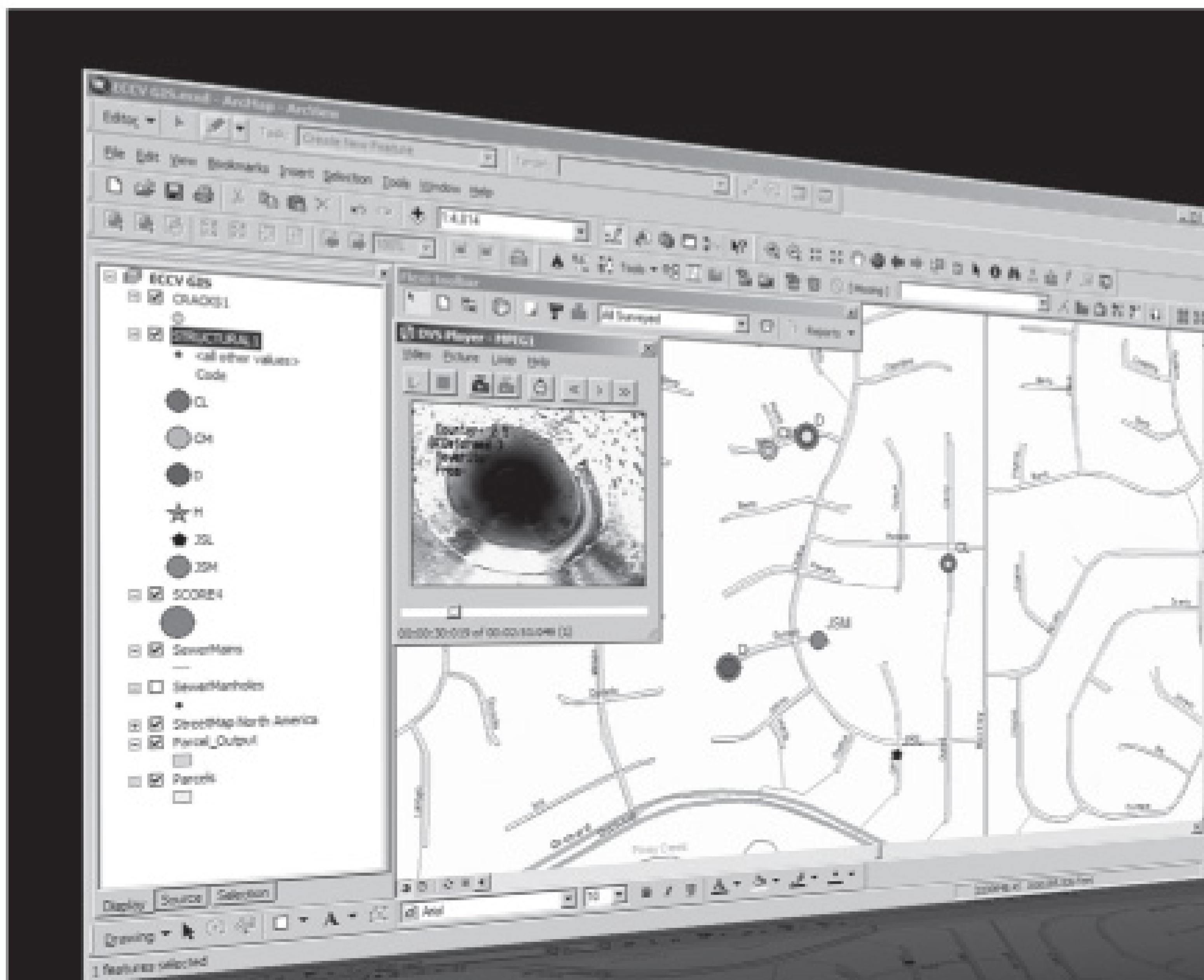
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# SLIPPERY SLOPE

Proactive management helps Renewable Water Resources, the regional sewer authority, stay ahead of grease in upstate South Carolina

By Mary Shafer

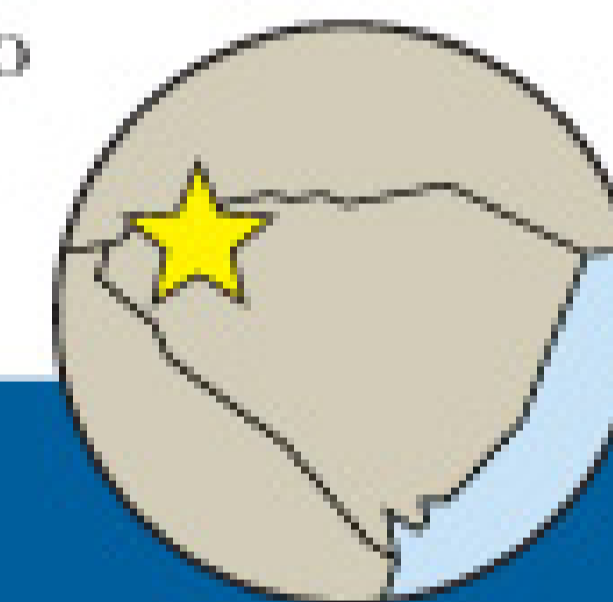


Kim McDonald, Renewable Water Resources grease control inspector, talks with Bengy Rhodes as he pumps the grease interceptor at a restaurant in Greenville, S.C. (Photography by Patrick Collard)

**I**n the midst of massive capital improvement expenditures to address infiltration and inflow in compliance with EPA Capacity, Management, Operation and Maintenance (CMOM) regulations, William Armes saw that he was staring down a bigger problem.

Armes is pretreatment manager for ReWa (Renewable Water Resources), formerly known as the Western Carolina Regional Sewer Authority. He couldn't ignore the effects of increasing development and population growth on his grease control program. He needed a plan.

From 1990 to 2000, the eight-county area referred to as upstate South Carolina, which includes the authority's five-county service territory, saw a 160 percent increase in developed acres, from 222,745 to 576,336. That



**PROFILE:**

Renewable Water Resources (ReWa), Greenville, S.C.

**FOUNDED:**  
1925

**POPULATION:**  
400,000

**AREA SERVED:**  
Five counties  
(290 square miles)

**EMPLOYEES:**  
200

**INFRASTRUCTURE:**  
300 miles of trunk sewer,  
1,750 miles of collector sewer,  
60 miles of sewer force main

**ANNUAL BUDGET:**  
\$66.9 million

**WEB SITE:**  
[www.rewaonline.org](http://www.rewaonline.org)

year, the authority began a self-assessment of compliance under CMOM requirements.

"When we were going through our CMOM program, one of the pieces of information we were asked to provide was about places where we had experienced sewer overflow problems," says Armes' colleague, collection department manager Tony Walton. "We immediately began researching those areas and found that 10 of them are grease-related. Contributing factors may be poor grade or improper installation of a line, but the main culprit is grease."

Grease control is a major initiative in a system with 300 miles of trunk sewer, 1,750 miles of collector sewer, 60 miles of force main, 7,000 manholes and 63 pump stations. ReWa attacks the problem with a comprehensive approach that includes education, inspection, data management and proactive maintenance.

**Staying out in front**

The authority's largest municipality is the city of Greenville, but it is also responsible for 17 sewer subdistricts. Armes' pretreatment division covers more than 100 industries, from bagel makers to auto parts suppliers. Enforcement is divided between a commercial group, which includes light manufacturing and food service, and an industrial group.

Armes was fairly certain that the more than 1,000 food service establishments in his area were the major grease contributors. Growth predictions told him that even though grease wasn't as large a problem as I&I, it soon would be. He got his team together to develop a cohesive strategy to head off a grease-related crisis.

"We'd had in place some elements of it beforehand based on previous grease buildup, but the CMOM program gave rise to our current grease control strategy,"



Right, Kim McDonald, ReWa grease control inspector, talks about Freshwater Freddie and some of the items she uses to educate residents about grease control. Below, Wade Beasley pumps a grease interceptor.



**“The strategy focuses heavily on education as a means of bringing structure to informing food service establishments of the need to capture and transport waste from their locations. The second layer is inspection. We make sure they’re aware of requirements and have proper equipment installed.”**

William Armes

Armes says, “There were a lot of negotiations with the EPA about what was going to go into it.”

Still, though outcomes are EPA-mandated, means are not. Armes knew he must be proactive, so he led ReWa in developing a comprehensive fat, oil and grease (FOG) strategy.

### Making a plan

The strategy covers FOG collection, transportation and disposal. It calls for commercial grease interceptors and provides guidelines on their sizing and maintenance. It prohibits chemical additives to any streams moving through the interceptors. It also contains guidelines for waivers, permitting, inspections, monitoring, reporting and documentation, as well as fines up to \$2,000 for offenses.

“The strategy focuses heavily on education as a means of bringing structure to informing food

service establishments of the need to capture and transport waste from their locations,” says Armes. “The second layer is inspection. We make sure they’re aware of requirements and have proper equipment installed.

“Once that initial inspection is done, the establishment is directed to put a regular inspection process in place and gets an inspection schedule. They get information from us on how to maintain their interceptors and implement other parts of the program.”

The third element is enforcement. “The CMOM regulations have certain elements that require us to have a municipal-level grease control strategy, but it’s up to the manager to make sure it stays current,” Armes says. “It’s not static by any means. In fact, it’s pretty dynamic. We’re reviewing that right now, how you keep the program consistent, given the

## AUTOMATIC TREATMENT

The main component in ReWa’s upgrade to its grease processing facility is a Septage Acceptance Plant (S.A.P.) from Lakeside Equipment Corp. The plant is a self-contained, fully automatic unit designed to remove debris and inorganic solids that typically pass through a conventional bar screen.

Haulers activate the system by logging into a PIN keypad, then connect a 6-inch hose from their trucks to the offload receptacle. As they pump waste into the S.A.P., it passes through the Raptor heavy-duty three-plane fine screen. The screen has a rotating rake that passes through the full depth of the basket bars, removing debris and depositing screenings into a central screw conveyor hopper that leads to the transport tube.

Screenings are spray washed over the screen basket to return organic materials to the liquid stream. Screened solids go through a grit removal aerated settling system, and the resulting grit is washed and put in a dumpster. Solids are screened out, washed and compacted. Then a stainless steel shafted screw conveys them to the discharge chute. These clean, dry solids and grit will go to a landfill.

Meanwhile, the liquid moves into a separator, where grease is floated, skimmed off, and pumped into anaerobic digesters. There, it is heated and agitated to break it down and further separate out any water, which goes to the treatment plant headworks.

A printer at the offload station supplies receipts, noting the time and date of a deposit, and operators can print summary reports of all loads. When inline flow meters are added, receipts and reports include load size. Automated data acquisition software retrieves this information and stores it in a database, where it is used for reports, monitoring, and billing.

turnover of people we deal with in food service.”

### Staffing and management

The first real challenge was staffing. “We really didn’t have any staff to spare, so we had to justify in the budget a full-time, hauled-waste inspector and a part-time one, plus a data control technician (DCT) to sample transporters and maintain documents for hauled waste and grease control programs,” Armes says.

The DCT enters data for and from inspections. For grease control, that’s mainly establishing new businesses’ contact and compliance information. This accounts for roughly 40 percent of the position’s workload. The remaining 60 percent of data entry deals with industrial hauled waste pretreatment.

This industrial data can be more elaborate. Reporting covers more than 136 parameters, and regulations require that it be tracked. A separate group of three regional inspectors, divided between a number of industries, takes care of industrial inspections. These inspectors are responsible for everything from permitting to inspecting to billing, and they provide data to the DCT.

The last duty of the DCT is to issue quarterly reports to the South Carolina Department of Health and Environmental Control, the state agency delegated by the EPA to carry out environmental policy.

Armes’ plan was detailed enough to justify hiring for these positions, so the program moved forward. An intensive promotional campaign began to create awareness among the public and affected businesses of the FOG initiative. The fiscal 2009 budget for the campaign was \$18,400. Besides the commercial and industrial components of promotion, a hauling inspector visits schools during career days or science days, handing out grease collection cans and coloring books and talking about the importance of keeping FOG out of the sewer system.

### Inspection and enforcement

“Our first inspection was pretty low-key, as in ‘How are you doing? Here’s what you need,’” says Armes. “But now that everyone except new food service establishments has

been visited and should know what they’re supposed to do, it’s time to make sure they step up to the plate to meet their obligations.”

About a third of food service establishments inspected end up in noncompliance. The authority first ordered property owners to install grease interceptors and then allowed time for installation. “But that window is coming to a close, and now we have to find a way to bring stragglers into compliance,” Armes says. “We’re now seeing a lot of noncompliance that’s not being remedied in the two to three years typically allowed. We may have to go to a permitting process to address that.”

A sampling crew from the authority’s laboratory monitors compliance. At least annually, they sample transporters’ heavy metals, grease, hydrocarbons and other parameters. “This process is more for commercial transporters hauling grease and septage,” Armes says.

### Proactive maintenance

Keeping a firm grip on the grease situation means staying proactive. After the CMOM self-assessment, ReWa formulated a predictive cleaning program to mitigate further overflows in problem areas. “We keep them on our scheduled cleaning list on a quarterly basis,” says Walton. “Others on the list get cleaned every six months. We also remove grease from the surface of about 30 of our pump station wet wells at least annually, some semi-annually.”

His department performs cleanouts with a Vac-Con Inc. combination truck with a 15-cubic-yard debris tank. GIS mapping of all system assets makes the job easier. “We have GPS data on all 7,000 manholes,” Walton reports. “We’ve also performed an above- and below-ground inventory of their characteristics. The department also GPS located all permitted industries and large users, and all 63 pump stations.

This information resides in a CityWorks Asset Maintenance Management System software package database by Azteca Systems Inc. The authority is upgrading from the Desktop package to the Anywhere package, which allows for mobile access.

The ReWa system includes 10

wastewater treatment plants also affected by FOG. The collection department services those plants, cleaning scum tanks and grit pits as needed.

For cleaning cast iron lines, the crews use a Ford F-800 diesel truck with a 5,000-psi jetter from Harben Inc. They use a 1987 International 5070 four-wheel-drive truck with a SRECO-Flexible jetter for regular cleaning and stoppage response. To access remote areas, they use an Extend-A-Jet and Model EMSP-6 jetter from SRECO-Flexible.

### Resource consolidation

At present, ReWa is working to consolidate treatment into seven regional plants for efficiency. “It’s an economy of scale,” says Armes. “We’re narrowing down to three basins: the Saluda River, Reedy River and Enoree River. We’re at

of the treatment plant,” says Armes. “But now, to address grease waste, we need something more sophisticated.”

The authority is installing a Septage Acceptance Plant from Lakeside Equipment Corp. “With the Lakeside system, we’re hoping to eliminate that grease buildup in the plant,” Armes says. “But in the collection lines, we still have to keep a proactive process.”

The approach seems to be catching on. “A lot of the subdistricts have adopted our grease strategy as part of their own programs, and are proactive about working with us to address these issues,” Armes observes. It’s a promising scenario, and ReWa hopes it is the start of a trend: Municipalities work together preemptively to keep grease problems from turning into crises. ♦



**William Armes, ReWa pretreatment manager, at work in his office in Greenville.**

### MORE INFO:

- 256 Azteca Systems Inc.**  
801/523-2751  
[www.azteca.com](http://www.azteca.com)
- 412 Harben Inc.**  
800/327-5387  
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the headwaters of all these waterways, so our permit regulations are tight.”

The Mauldin Road site that handles grease offloads is getting a major upgrade. To keep FOG out of the plant, ReWa is replacing a trench drain with a system that will separate solids, grit and grease right where the transporters discharge their loads. “For several years, we’ve depended on clarifiers and bar screens to collect floatables and settleables at the head

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# A GREAT COMBINATION

Expo Saturday Evening Jam headliner Montgomery Gentry plays hard-driving country hits, while opening act 38 Special brings memorable '80s rock

By Jim Kneiszel

Montgomery Gentry and the fun-loving attendees of the Pumper & Cleaner Environmental Expo International are a match made in honky-tonk heaven.

The 2009 Expo Saturday Evening Jam headliners and environmental services professionals both love rolling up their sleeves and putting in a good day's work.

One of Nashville's top duos over the past decade, Eddie Montgomery and Troy Gentry pride themselves on song after song recognizing the blue-collar work ethic and small-town values that give flight to the American Dream.

Montgomery Gentry stops at the Expo in Louisville, Ky., on Saturday Feb. 28 in support of the 2008 CD release, *When I Knew It All*, and the megahit, *Roll With Me*. The Saturday Evening Jam kicks off with a hard-charging show by Southern rock legends 38 Special. The Jam starts at 5 p.m. at the Broadbent Arena, which connects to the Kentucky Exposition Center, home of the Expo. The event is free to registered Expo attendees.

## Country rock

Steve Huey of All Music Guide says Montgomery Gentry "evokes the sound and spirit of Southern rockers like Lynyrd Skynyrd, the Marshall Tucker Band, and Charlie Daniels, painting themselves as

rowdy redneck rebels who still hold small-town values."

Kentucky natives Montgomery and Gentry first played together as teens in a band called Early Tymz in Lexington. That band was led by John Michael Montgomery, Eddie's younger brother, who became a solo sensation. The duo went their separate ways, but got back together and recorded a debut album, *Tattoos and Scars*, which spawned a No. 5 single, *Lonely and Gone*, and won them the Country Music Association Vocal Duo Award in 2000.

The accolades kept coming. They won similar awards from the Academy of Country Music for Top New Vocal Group or Duo, the 2000 and 2001 Radio & Records

**"We keep to our roots. We'll always talk about the good, the bad, the ugly and the party on the weekend. We'll always include the Man Upstairs and our American heroes."**

Eddie Montgomery

Readers' Poll award for Top Country Duo, and the American Music Award for Favorite New Artist — Country in 2000.

In 2001, they reached No. 2 on the country charts with the single *She Couldn't Change Me*, from their album *Carrying On*. In 2002, they released *My Town* with three more Top 5 hits: the title track, *Speed*, and their well-known tribute to the



Honky-tonk country stars Montgomery Gentry will headline the Saturday Evening Jam, Feb. 28, at the 2009 Pumper & Cleaner Environmental Expo International in Louisville, Ky. Their 2008 CD release, *When I Knew It All*, features the megahit *Roll With Me*.



The Saturday Evening Jam kicks off with a hard-charging show by Southern rock legends 38 Special. The Jam starts at 5 p.m. at the Broadbent Arena, which connects to the Kentucky Exposition Center, home of the Expo. The event is free to registered Expo attendees.

## Celebrate workers

At their Web site, <http://montgomerygentry.musiccitynetworks.com>, the duo say they share a rapport with their fans, rooted in sunup-to-sundown work ethics, God, country and family, and the ability to celebrate life and endure hardship. "We've never sold out to anybody," says Montgomery. "What you see with us is what you get."

Gentry adds, "We've always been consistent about choosing songs that deal with the working class, songs people can identify with. We've stayed true to that."

While Montgomery Gentry still likes hard-edged honky-tonk themes,

*Billboard* noted that the melodic *Roll With Me* shows more mature artistry. "Like their audience, the two are a little older and a lot wiser than they were a decade ago," *Billboard* observes.

"And their new set reflects hard-earned maturity balanced with the desire (and ability) to get into a little trouble on occasion," according to *Billboard*. "That mix is perhaps best represented by *I Pick My Parties*, which features summer tour mate Toby Keith. All three singers, it seems, are a little more selective than they were in their wilder days."

Their wide-ranging charitable efforts in recent years also speak to maturity. Montgomery explains that they both want to do good and enjoy life, and bring that attitude to the stage.

"Life is very short and you'd better live every second of it, because you never know when your name's going to be called," Montgomery says. "That's the way I've always lived my life. My parents

taught me to live that way. We keep to our roots. We'll always talk about the good, the bad, the ugly and the party on the weekend. We'll always include the Man Upstairs and our American heroes."

#### A rockin' opener

The Jam's opening act, 38 Special, might seem like a departure from the country acts that headline the Expo. But in reality, the chasm between the catchy guitar riffs from popular '80s rock bands and today's hottest country acts is often bridged with smash hits.

Expo veteran Trace Adkins performed with 38 Special in a popular Country Music Television Crossroads episode, in which Adkins said his band was giddy to work with a group led by a member of a Southern rock royal family, Donnie Van Zant. The 38 Special founder is the brother of the late Ronnie Van Zant of Lynyrd Skynyrd fame.

The group, named for a hot pistol, was formed in Jacksonville,

Fla., in 1975 when Southern swamp rock, led by groups including Skynyrd, Molly Hatchet and Blackfoot, was extremely popular. But 38 Special cultivated a slightly more refined sound, with tight, pop-friendly guitar hooks on a series of rock classics from the early 1980s.

In its heyday beginning before the 1981 release *Wild-Eyed Southern Boys*, 38 Special recorded seven

Top 40 singles, including their biggest hit, an uncharacteristic ballad, *Second Chance*. According to the Web site [www.digitaldreamdoor.com](http://www.digitaldreamdoor.com), the group produced three of the all-time best Southern Rock songs, with *Hold on Loosely*, *Second Chance* and *Rockin' Into the Night*. ♦

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# EDUCATION DAY

**Wednesday**  
February 25th, 2009

- Full day of seminars
- Exhibit hall closed
- Schedule subject to change

ROOM C201 & C202

**LRN** Leaders Resource Network

- 8:00 - 9:00 How to Become a Value Leader
- 9:30 - 10:30 Credit Collections: Getting Paid
- 11:00 - 12:00 The Value of Internet Marketing
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 2:00 Selling Value
- 2:30 - 3:30 How to Add Value to Every Customer You Have and Future Customers
- 4:00 - 5:00 How to Determine Your Operating Costs

ROOM C203

**WJTA / PSAI / CBSA**

- 8:00 - 9:00 What an Air Mover Can Do For You
- 9:30 - 10:30 The Basics of High Pressure Waterblasting
- 11:00 - 12:00 Waterjetting Applications
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 3:30 Understanding Your Cost to Insure Profitability (PSAI)
- 4:00 - 5:00 Cross Bores of Gas Lines in Sewers (CBSA)

ROOM C204 & C205

**SSCSC** Southern Section Collection Systems Committee

- 8:00 - 9:00 Trenchless Pipe Rehabilitation
- 9:30 - 10:30 CCTV Pipeline Inspections
- 11:00 - 12:00 The Nuts and Bolts of GIS
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 2:00 The Nitty-Gritty on Pipeline Cleaning
- 2:30 - 3:30 Confined Space and Protective Equipment Safety Requirements
- 4:00 - 5:00 Manhole Inspections

ROOM B101 & B102

**NAWT** National Association of Wastewater Transporters

- 8:00 - 9:00 What are My Disposal Resources
- 9:30 - 10:30 Treatment Processes, What is Out There?
- 11:00 - 12:00 Evaluating Costs as Part of the Decision Making Process
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 2:00 Meeting Part 503 Requirements
- 2:30 - 3:30 Turn Grease Trap Waste Into Gold
- 4:00 - 5:00 Developing a Business Plan

ROOM B103 & B104

**NOWRA** National Onsite Wastewater Recycling Association

- 8:00 - 9:00 NOWRA Overview & Industry Trends
- 9:30 - 10:30 Soil & Site Evaluation Overview
- 11:00 - 12:00 Septic Tanks: Function, Inspection, Installation & Trouble Shooting
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 2:00 Aerobic Treatment Units & Filters
- 2:30 - 3:30 Pumps & Controls
- 4:00 - 5:00 Operation & Maintenance of Systems

ROOM C101 - C104

**NASSCO** National Association of Sewer Service Companies

- 8:00 - 9:00 Robotics For the Future, What Does it Mean for You?
- 9:30 - 10:30 Small Diameter Epoxy Coatings
- 11:00 - 12:00 Root Control, How Does it Work and Why is it Needed?
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 2:00 OSHA Regulations
- 2:30 - 3:30 Choosing the Correct Chemical Grouts
- 4:00 - 5:00 Trained Technology Inspectors

ROOM C105 - C108

**NEHA** National Environmental Health Association

- 8:00 - 9:00 How to Work With Regulators and Regulations
- 9:30 - 10:30 Pumps: Operation & Maintenance
- 11:00 - 12:00 Routine Maintenance Inspections
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 2:00 Using the Certified Installer Credential to Help Your Business
- 2:30 - 3:30 T.B.D.
- 4:00 - 5:00 T.B.D.

ROOM C109 - C112

**SCOTT HUNTER** Business Track

- 8:00 - 9:00 The Art of Personal Sales
- 11:00 - 12:00 The Art of Personal Sales (Part 2)
- 12:00 - 1:00 **Lunch Break**
- 1:00 - 2:00 Yes, We Have to Work Together, but Does it Have to be So Painful?
- 4:00 - 5:00 The Art of Being Outrageously Successful!

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## THURSDAY

February 26th, 2009

ROOM C101-C104

### Portable Toilet Track

- 8:00 - 9:00 Portable Sanitation Start Up  
**Hampel**
- 9:30 - 10:30 Selling Portable Restrooms Services  
**Satellite Industries**
- 11:00 - 12:00 T.B.D.

ROOM C105 - C108

### Liquid Waste Track

- 8:00 - 9:00 Decentralized Wastewater Sustainability - **Aquatest**
- 9:30 - 10:30 Discover the "GREEN ERA" and capitalize on it! - **Lenzyme**
- 11:00 - 12:00 Modular Waste Water Treatment  
**Big Fish Environmental, LLC**

ROOM B103 & B104

### Municipal Track

- 8:00 - 9:00 Why Measure Sewer Flows from Private Services? - **City Meter**
- 9:30 - 10:30 Polymer Solutions for Wastewater Treatment - **Fort Bend Services**
- 11:00 - 12:00 Rotary Jets for Material Removal  
**StoneAge**

ROOM C109 - C112

### Sewer & Drain Track

- 8:00 - 9:00 Bacteria Mythbusters -  
**ProClean by Duracable**
- 9:30 - 10:30 Solutions for Nineteenth Century Manholes - **AP/M Permaform**
- 11:00 - 12:00 Manholes & Leakage Solutions  
**Sealing Systems**

## FRIDAY

February 27th, 2009

ROOM B101 & B102

### Sewer Cleaning Track

- 8:00 - 9:00 High Pressure Hose Safety & Proper Use  
**Spir Star**
- 9:30 - 10:30 The Better Jetter, Secrets to Jetting  
**US Jetting**
- 11:00 - 12:00 Chemical Root Control  
**Douglas Products**

ROOM B103 & B104

### Business Track

- 8:00 - 9:00 Maintenance Agreements for Commercial Accounts  
**Spartan Tool**
- 9:30 - 10:30 First Rate Customer Service  
**RooterMan**
- 11:00 - 12:00 Insurance and Risk Management  
**Heffernan Insurance**

ROOM C101-C104

### Miscellaneous Track

- 8:00 - 9:00 Keys to Proper Power Take-Off  
**Muncie Power Products**
- 9:30 - 10:30 Vacuum Tank, Chassis and Pumps  
**Amthor International**
- 11:00 - 12:00 Lateral Replacement Program  
**TT Technology**

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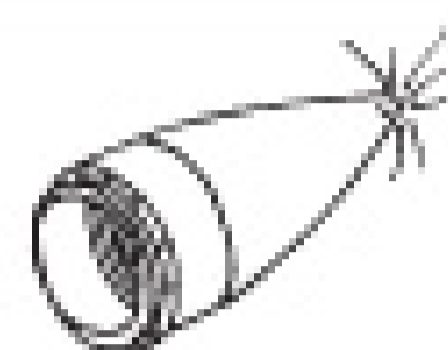
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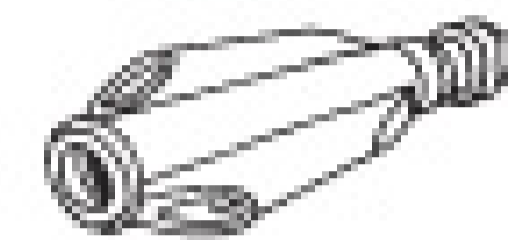
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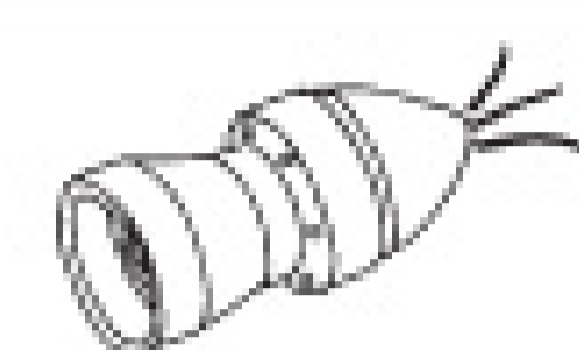
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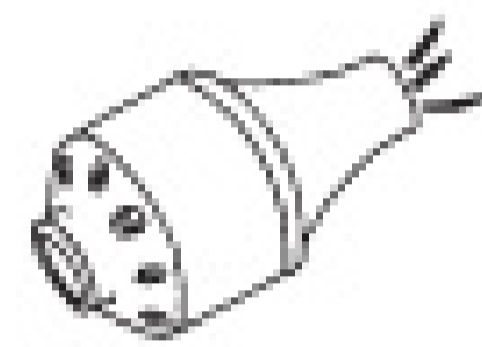
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- 1"-18° or 30° .....\$66.00
- 1"-15° or 30° .....\$68.00
- 1-1/4"-18 or 35° ..\$85.00

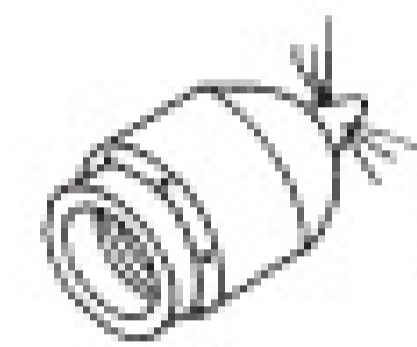


#### Aluminum Sand

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- 1"-17°/24° .....\$153.00
- 1"-24° .....\$139.00

#### Stainless Steel Nozzles

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- 3/8" .....\$39.00
- 1/2" .....\$54.00
- 3/4" .....\$59.00
- 1" .....\$105.00

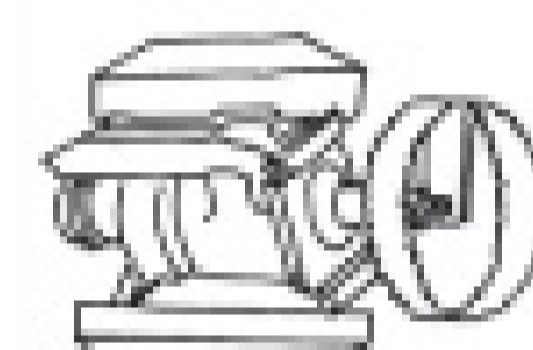


#### Steel Sand

1"-12° .....\$70.00

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  - w/concave blades...\$889.00
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- Assemblies come with one ea. of 6, 8, 10 and 12" blades, saw blades, hub, skids, etc.

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- 3"-6" available
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- 3"-6" available
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- 3"-6" available



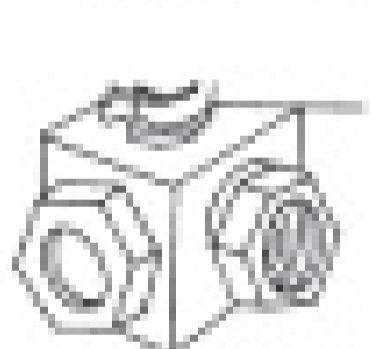
#### Swivel Joints

##### T-M® Style

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- 1-1/2" .....\$453.00
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# GRAB AND GO

The DigiSewer 180° Inspection System uses rapid sidewall scanning to acquire complete data on pipe wall condition for later evaluation in an office setting

By Gil Longwell

Pipe inspectors often spend many hours with a camera crawler stationary while they pan, tilt and rotate a camera to create a videotape record. Real-time fault analysis may require more stationary time.

The DigiSewer 180° Inspection System from EnviroSight LLC of Randolph, N.J., captures digital images that can later be manipulated as if the crawler was stopped and the camera itself was manipulated in the traditional manner.

DigiSewer digital sidewall scan-

ning is designed for the company's ROVER inspection crawlers. Its purpose is to enhance the speed and detail at which pipeline inspection is performed. When scanning is complete, municipal personnel can analyze the scans using a freeware viewer, zooming in on areas of interest and making measurements and annotations directly on the scan.

EnviroSight representatives demonstrated the technology on Sept. 15 in a 30-inch storm sewer and a 6-inch sanitary sewer in the



The DigiSewer system is designed to work with ROVER crawlers from EnviroSight LLC.



A remote control system helps direct the crawler-mounted side-wall scanning camera through the pipe.



The DigiSewer 180° Inspection System rapidly acquires sidewall scan images of pipes for later review and reporting.

Township of Upper St. Clair in suburban Pittsburgh, Pa. Marketing manager Jake Wells and sales manager Jason Kelley (from the company's Pittsburgh office) gave the demonstration. In routine service, the unit is intended for one-person operation.

## Walk-around

The DigiSewer system was installed in a 2007 Dodge Sprinter van the company has set up for demonstrations. The van is built on a FreightLiner chassis with a Mercedes 5.5-liter diesel engine.

The climate-controlled workstation provides space for the inspection operator and two or three observers. The workspace has access to the rear equipment bay through a bifold door. A window in the partition lets the operator directly observe what is going on behind the vehicle.

A downward-looking video camera displays the manhole being accessed on a dedicated screen in the operator's work area. There are two workstation monitors. One presents camera-captured images as the crawler moves through the

## TECHNOLOGY TEST DRIVE

**EQUIPMENT:**  
DigiSewer 180°  
Inspection System

**MANUFACTURER:**  
EnviroSight LLC  
973/252-6700  
www.envirosight.com

**LOCATION OF DEMO:**  
Township of Upper St. Clair, Pa.

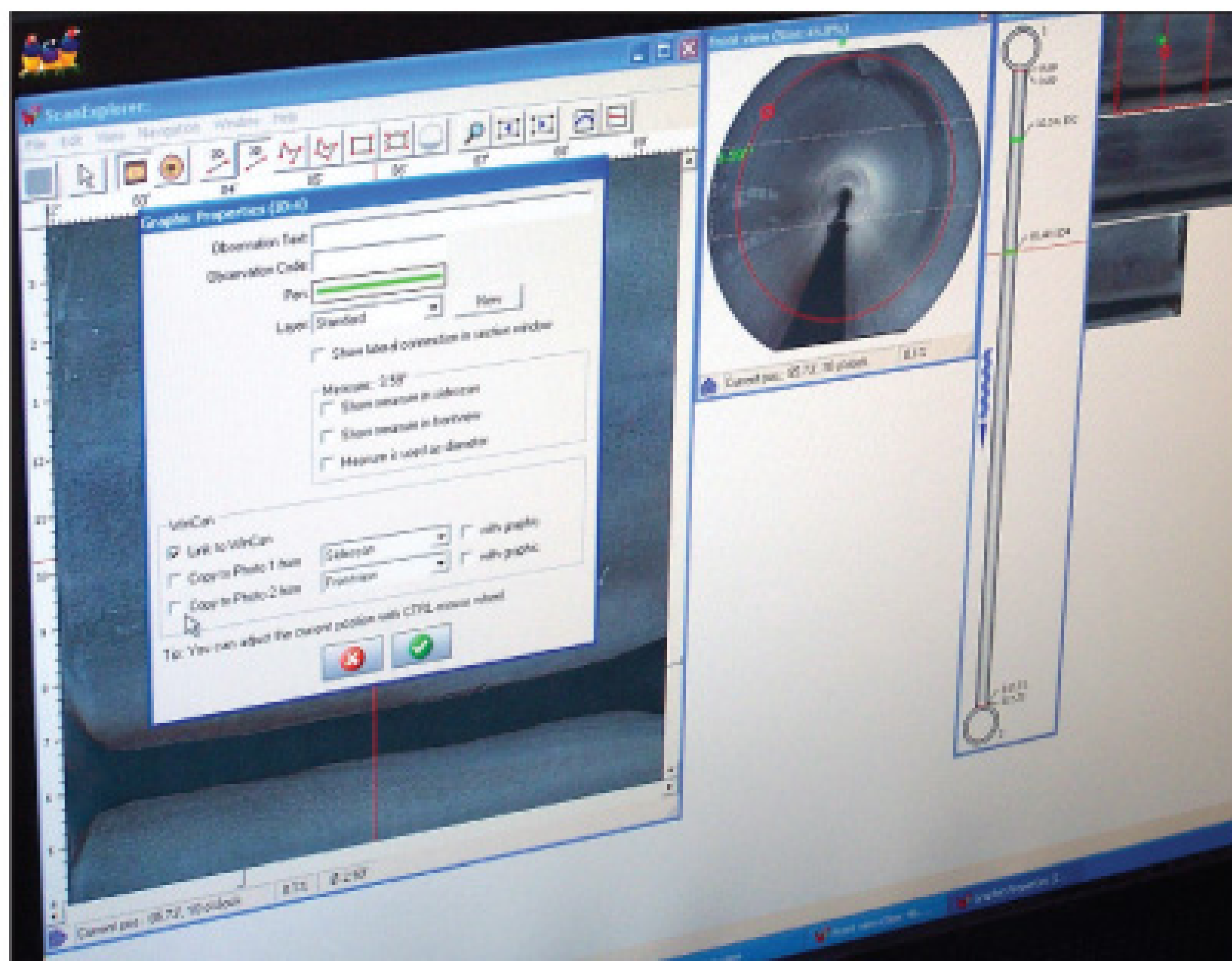
**DEMONSTRATED BY:**  
Jake Wells and Jason Kelley,  
EnviroSight

**LIST PRICE:**  
\$120,000 for complete  
crawler, camera and software  
package (without vehicle)

pipe at top speed from 56 feet per minute (ROVER Model 100) to 70 feet per minute (Model 225). The other monitor is used for computer interface operations.

The equipment bay positions a crawler storage drawer and crawler-related communications and tethering cables directly within reach. The storage drawer has a custom-fitted cradle to prevent crawler creep while the van is in transit. Built-in racks and brackets on both doors secure a variety of tools for travel, yet allow for easy one-hand removal and replacement.

A washdown hose on a retracting reel can be reached without



**Digital images acquired by the camera are easily analyzed on a computer screen. In this case, ScanExplorer from WinCan America Inc. is used. The software provides four views: straight ahead, side view, 3-D and thumbnail. Users can zoom in on areas of interest and make measurements and annotations directly on the scan.**



entering the bay. A 15-gallon onboard water tank provides washdown capacity for a full day's field work.

The DigiSewer camera with its attached super-white LED illumination is easily inserted in the camera mount on the crawler and is connected using standard EnviroSight connections. The extra-wide-angle lens is interchangeable; no adapters are needed. The camera has automatic white balance, autofocus and light sensitivity greater than 1 lux.

All crawler movements are controlled from either the operator's workstation or at the back of the van. Each control site has two joysticks, a variety of push-buttons

and rotating knobs to control specific functions. At the back of the van the controls are housed in a rough-service box at the end of an 8-foot-long flexible cable. This allows direct observation and control of the crawler as it is deployed into a manhole and maneuvered for entry into the pipe.

Power is supplied for the crawler, computer, cable winches and all other ancillaries by a 3.5-kW Onan power inverter/battery system. At night, the inverter is plugged into a 110-volt outlet at the garage, and the 12-volt or 24-volt DC battery pack is charged. At the work site, the battery current is converted to 110 volts.

WinCan survey software was loaded into the onboard computer, configured with an Intel Core 2 Duo e8400 processor running at 3 Ghz. The software continuously interacts with the DigiSewer software.

## Operation

After insertion of the crawler in the traditional manner, the camera and software demonstration began. At the first pipe joint, the operator calibrated the software for the pipe diameter using joystick and keyboard control.

A crosshair is placed in the center of the bore, and concentric colored circles are superimposed on the image to correspond with the pipe walls. Calibration ensures that the software recognizes the pipe's center and perimeter. Subsequent insertions into same-sized pipe using the same crawler do not require recalibration. Calibrations for different crawlers and pipe diameters can be stored in the software and retrieved for reuse. Calibration took about one minute.

The image from the camera was displayed on-screen and seen

The crawler never overran the cable.

The entire traverse for a 400-foot pipe segment took less than 15 minutes. More time was spent setting up, deploying, retrieving and cleaning the crawler than was needed for the data capture.

With data capture complete, the demonstration turned to data evaluation. The WinCan ScanExplorer software enables selection of any of four views, all presented simultaneously in four panes on-screen. Actions taken or annotations made in the active pane are also shown in the other three panes.

The frontal or straight-ahead view is the one the operator uses most frequently. This captured image is what the software slices, flattens and otherwise manipulates to create the three other views. The frontal view is the only view that does not benefit from the zoom magnification feature.

**The entire traverse for a 400-foot pipe segment took less than 15 minutes. More time was spent setting up, deploying, retrieving and cleaning the crawler than was needed for the data capture.**

through the WinCan software's viewing panes. The video signal was continuously saved to the computer's hard drive and can be transferred to a DVD or external drive. If there is sufficient network capacity, the file can be transferred or e-mailed via a hard-wired or wireless network.

The smooth, good-condition pipe enabled the operator to demonstrate speeds close to the specified maximum of 45 feet per minute using the Model 145 ROVER crawler. When the traverse was completed and before the crawler was signaled to back up, the operator scanned the thumbnails, doing a quick QA/QC check.

During the backup movement, the rearward-facing camera enabled the operator to monitor progress. A tension sensor on the cable reel ensures that cable retrieval and crawler speed are coordinated.

The thumbnail view showed a rectangular strip view of the entire traverse. On screen, this resembled a series of geologic core samples. To achieve this view, the software digitizes the donut-shaped sections from successive video frames. Each frame section was cut at the 12 o'clock position and straightened into a vertical strip.

The sections were then stitched together side-by-side to create the scan image. The pipe's bottom dead center was seen at the center of this strip scan. The top of the strip is the 11:59:59 position; the bottom is the 12:00:01 position. For viewing on-screen, the strip was wrapped from one line to the next like text on a page flowing from left to right and top to bottom. Fitting within the enclosing frame of the thumbnail pane, the traverse began at the top left and ended at the bottom right.

The side view displays a rectangular portion of the thumbnail. Although called a side view, this view can present any portion of the thumbnail regardless of its position on the pipe wall.

The 3-D view enables traditional pan-and-tilt observations.

The demonstrators showed how virtual digital measuring tools that determine the length or area of defects can be overlaid on any of the three views. Polygons, circles and rectangles were drawn, and the software calculated the contained area and recorded it.

Linear faults were measured by a series of connected lines, and their areas were also calculated and stored. Color-coding of area and linear notations can be retrieved and also removed from the stored image if it is necessary to revisit an unannotated view. The total area of faults for each traverse is calculated and stored.

When used in tandem, the camera and two software applications enable scanning and data capture at up to 5,000 linear feet in an eight-hour workday, according to the Envirosight representatives. Data evaluation can be completed at roughly double that pace using either the onboard computer or on a computer at a remote location.

In this demonstration, data evaluation began in the thumbnail view pane, where faults were quickly identified. A mouse-click took the technician to the side-view pane,



Jason Kelley, left, and Jake Wells of Envirosight prepare the DigiSewer 180° Inspection System.

The inspection system appears versatile. By adding the extra-wide-angle lens and software to an existing ROVER crawler, users can quickly upgrade to sidescan capability. If the purchase represents a user's first entry into crawler-based inspection, the purchase of a different camera head or lens adds conventional CCTV capability.

#### Manufacturer comments

The DigiSewer system with the crawler and a support vehicle can be purchased as a complete unit. The entire system — crawler, camera, computer and control station, and self-contained power supply — also can be packaged in a transportable 4-foot metal cube, which is usually fitted with forklift receiver slots and may be fitted with lifting loops. This enables pickup truck or ATV deployment to remote locations.

"Current crawler operators quickly adjust to the straight-ahead operation, and data evaluators will be able to quickly master the measuring tools and annotation processes," says Wells.

Data evaluation is done in an office and requires far less time than evaluation performed on videotape, the Envirosight representatives say. After problem areas are identified, the digital image technology lets the reviewer zoom in on, measure and annotate faults. "When fewer people do data evaluation, the resulting reports are more consistent," Wells observes. ♦

**"Current crawler operators quickly adjust to the straight-ahead operation, and data evaluators will be able to quickly master the measuring tools and annotation processes."**

Jake Wells

where the measuring shapes and lines were laid over the image. A few more mouse clicks and the square footage of the needed repairs was calculated and stored. This information will be exported for use in estimating needed manpower, materials, time and equipment for repair.

#### Observer comments

The thumbnail view is one of three capabilities that enable significant time savings. With the entire traverse displayed on a single monitor, faults stand out. A few mouse clicks brings the technician a magnified view of suspect areas.

Using the measuring tools, the user can calculate the volume of repair materials needed. In turn, this information enables selection of the best repair techniques. The precise location of each fault is also determined.

This collaboration of traditional crawler, extra-wide-angle lens and dedicated software enables continuous forward moving, high-speed, single-pass data capture. Although not as fast, backing the crawler to the insertion point is made easier by a rear-facing camera that the operator can watch during backing movements.

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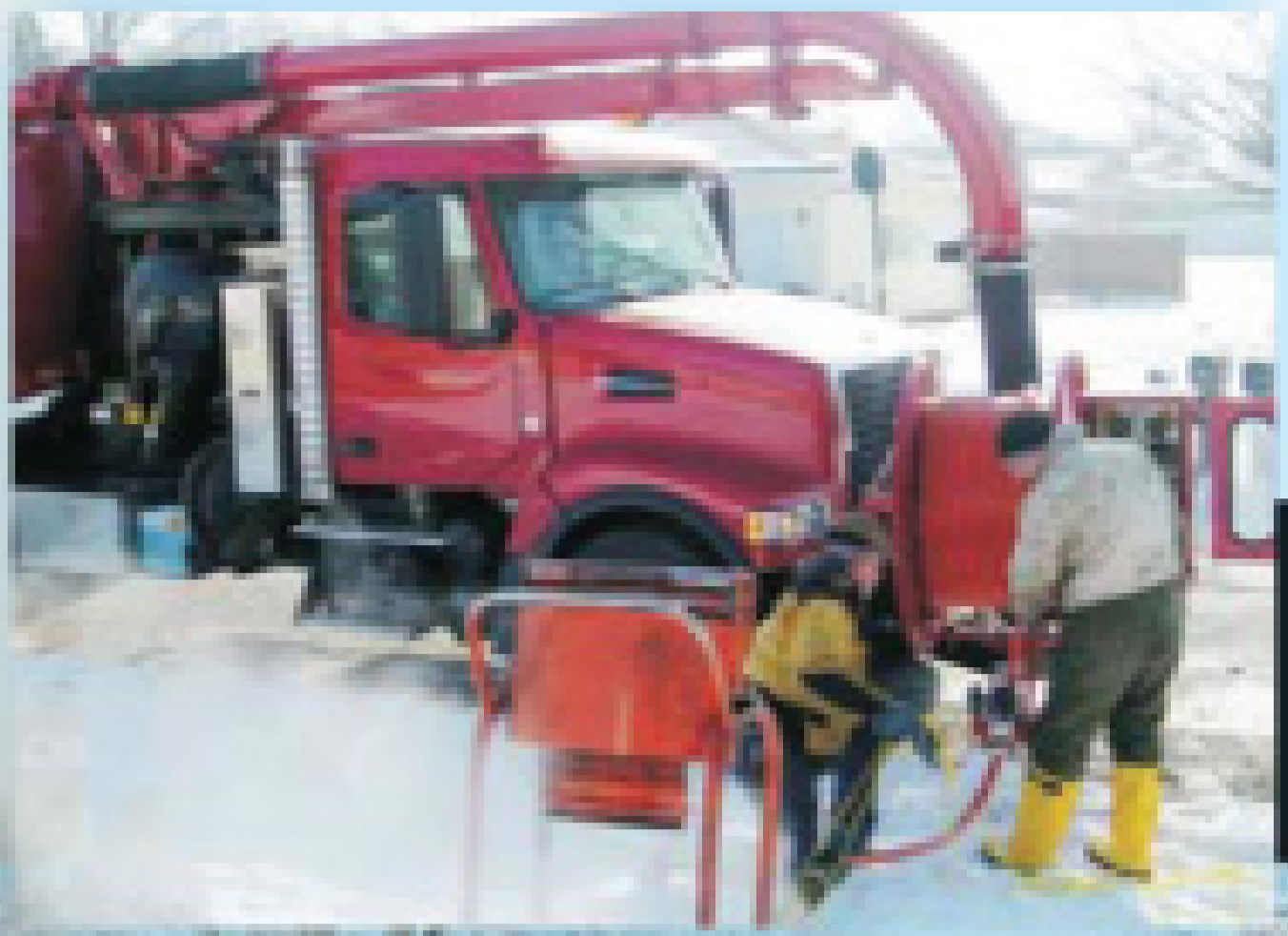
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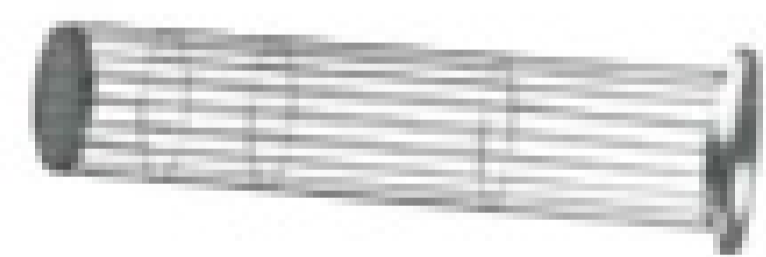
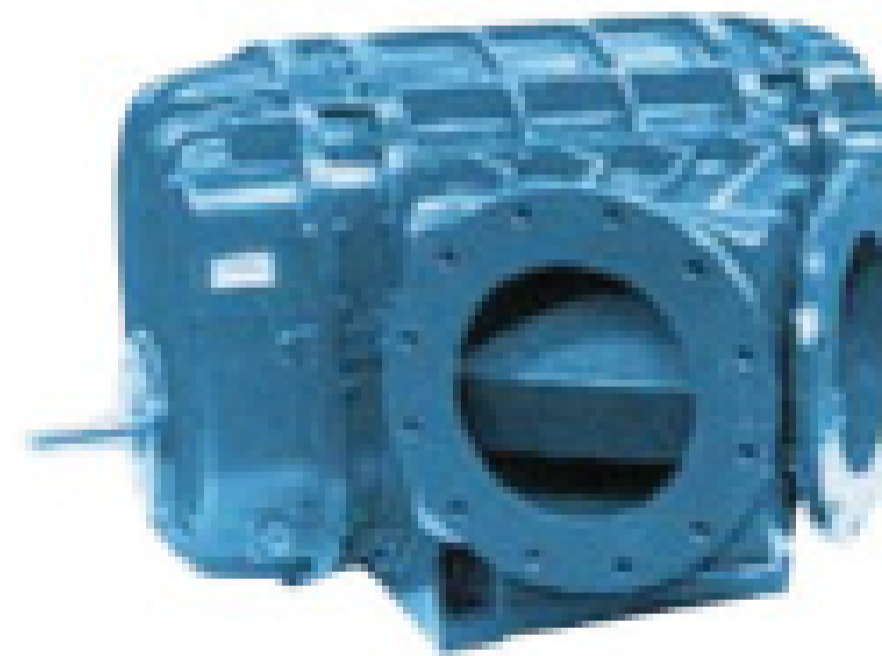
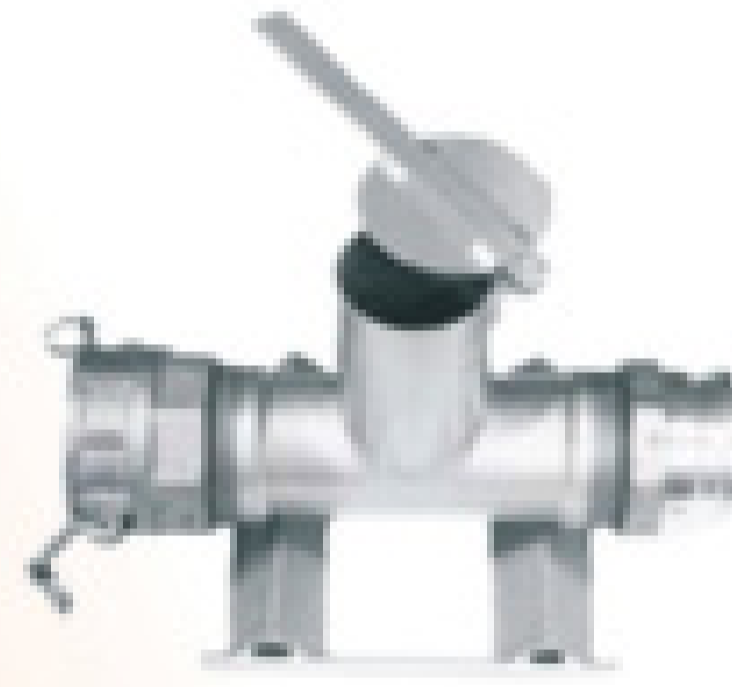
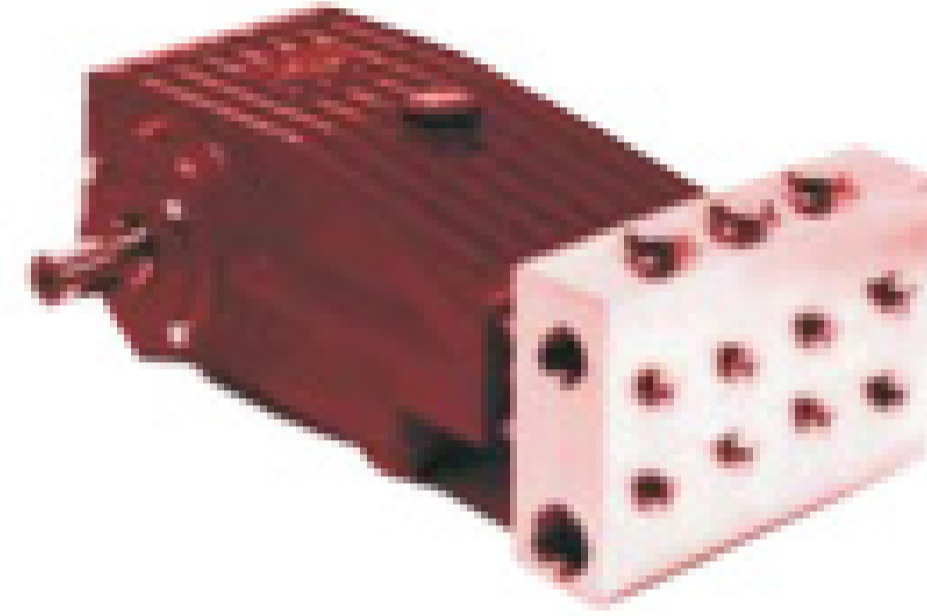
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# WORKING OFF-ROAD

Manufacturers offer a range of special-purpose vehicles that enable pipe inspection, cleaning and other tasks on undeveloped terrain

By *Scottie Dayton*

When work takes municipal crews off the beaten path, special-purpose vehicles come into play. Manufacturers provide off-road vehicles for a range of purposes, from inspection to pipe cleaning to hydroexcavating. Here is a sampling of innovative vehicles for handling jobs in rough terrain and on undeveloped rights-of-way.

## Self-propelled Machine



Designed to work with any combination truck, jet truck or trailer, the **EMPS** self-propelled hydraulic 4-wheel/track drive, variable-speed easement machine from **SRECO Flexible Inc.** handles cleaning projects in remote-access areas and rugged environments. Its compact, sleek shape maneuvers through standard 36-inch gates. During operation, its low center of gravity and outriggers provide extra stability. Controls, within easy reach of the operator, are ergonomically arranged for optimum safety.

Standard features include choice of tracks or pneumatic wheels, 600 feet of 1-inch hose with a narrow design for easy level-wind operation, forward-neutral-reverse hydraulic controls, and 20-hp air-cooled engine. Options include 4-track drive, single-lever control, dual pneumatic tires, footage counter, easement rollers, articulating reel, automatic level-wind, and various sewer-cleaning tools and nozzles. **800/421-6536; www.srecoflexible.com.**

## Versatile Excavator



Powered by a 60-hp Cummins 3.3-liter diesel engine, the **Ditch Witch FX60** vacuum excavator handles large cleanup jobs and unwanted fluids and spills. Its soft excavation capabilities include digging postholes, exposing lines, cleaning utility boxes and street repair.

The belt-driven system has a 5.2-gpm water pump with electric clutch, 900 cfm of airflow, and a 300-, 800- or 1,200-gallon debris tank. At 82 dbA, the machines meet industrial noise regulations. Less noise and vibration also decrease operator fatigue. All units have a user-friendly control panel and a hydraulic power source and are available in trailer-mounted or loose configuration. The 1,200-gallon jetter also has a hose reel. **800/654-6481; www.ditchwitch.com.**

## Ready to Travel



The weatherproof **OutPost** portable video inspection unit from **Envirosight LLC** protects and organizes pipe-inspection equipment, including crawler and cable reel. A drawer holds up to 500 pounds of accessories, and a partitioned video compartment accommodates crawler controls, multimedia computer and flat-screen monitor. A flat-black interior and fold-down blinders block ambient light for monitor viewing.

The 4- by 3.5- by 3.5-foot welded and gasketed unit has a 15-gallon washdown system and an isolated gasoline-fueled generator that powers all onboard equipment. Integral fork skids and recessed lifting hooks facilitate hoisting and tie-down.

The unit is optimized for the company's ROVER crawlers. Modular design allows quick reconfiguration for any combination of pipe size, material and condition. Three chassis sizes address 4- to 60-inch pipelines. An automatic cable reel controls tension to reduce pulling burden and prevent tangled cables. **866/936-8476; www.envirosight.com.**

## All-wheel-drive Truck



The **4018-600** diesel-powered truck from **US Jetting LLC** has a 4,000-psi/18-gpm pump and 600-gallon water tank mounted on an all-wheel-drive open cab and chassis design. An optional 4,000-psi/25-gpm pump and dual hydraulic hose reels are available. Trucks have a centrally located control panel for operator convenience and a nozzle storage rack inside a locked toolbox. The high-pressure jetting units are just as powerful and efficient as trailer-mounted units with the same engine and pump set. **800/538-8464; www.usjetting.com**

## Complete System



The **K2-CCTV** pipeline inspection system from **CUES Inc.** operates in remote areas and difficult-to-reach easements. Mounted in various off-road and amphibious vehicles, the system operates all CUES wheeled and tracked transporters and pan-and-tilt zoom cameras to inspect 6- to 200-inch pipelines. Camera options include a built-in inclinometer, sonde or laser diode system to measure cracks and offsets. A reel holds 1,200 feet of high-strength video cable. **800/327-7791; www.cuesinc.com.**

## Sewer-cleaning Unit



The **Hurricane 3010** trailer jetter from **Triple R Specialty** has a 200-gallon water tank and 3,000-psi/10-gpm Triplex pump to clean stoppages while flushing sewer lines. Units come with 400 feet of 1/2-inch jetter hose on an electric auto-rewind reel, 100 feet of 5/8-inch supply hose on a manual reel, as well as a stainless steel penetrator nozzle, flusher nozzle and rotating nozzle. It also includes a pressure-washing gun with four heads. Units can be customized. **800/356-9661; www.tripler-specialty.com.**

## Entry Level



The portable, entry-level **Mini-Mainline** video inspection system from **Ratech Electronics Ltd.** reaches hard-to-access areas such as easements and ravines. Operators simply unload the unit and roll it to the work site to inspect 4-inch to 4-foot pipes. The 26- by 30- by 44-inch-high cart also mounts in a standard cargo van or trailer for offloading as required, or breaks down to fit in a minivan or the trunk of a large car.

The system, with 500 feet of cable, operates pan-and-tilt or straight-view inspection cameras and stores data on DVD or VCR. An optional removable monitor tray table enables operators to watch inspections comfortably in any off-road situation. **800/461-9200; www.ratech-electronics.com.**

## Compact Versatility



The **Model JAJ-600TH** off-road easement machine from **Sewer Equipment Co. of America** brings the power of a truck jet or combination sewer cleaner to areas impossible to reach by truck or trailer. The unit enables operators to use the water and pressure from a truck jet or combination rig, haul the hose to the jobsite, then use an auxiliary reel to clean the line. The track-driven machine has traction superior to wheeled models. A ground pressure of 4 psi protects lawns from damage. It fits through a 36-inch gate. **800/323-1604; www.sewerequipment.com.**

## Agile and Amphibious



An all-terrain **Argo** off-road inspection vehicle from **RapidView IBAK North America** lets users conduct pipe inspections from almost any location. The eight-wheeled, amphibious vehicle can climb over logs, through creeks and even cross open water.

The vehicle has zero-radius turning for high maneuverability in tight spaces. Large tires provide a low-impact footprint for environmentally sensitive areas. Unloaded, the unit can carry six passengers. Available accessories include a soft top to protect the operator and equipment from the elements. **800/656-4225; www.rapidview.com.**

## High Functionality



The **off-road specialty inspection system** from **Cobra Technologies** mounts on 4x4 trucks, SUVs and ATVs for inspecting pipelines in remote terrain. The components, integrated into a compact self-contained unit, also fit in pickup trucks and trailers. The unit has all the functionality of a truck-mounted system.

Systems have a crawler, video reel with cable, rack-mounted controls, monitor, and the CobraTouch CDL 9000 Series Data Logger with PACP-certified data collection software. The flat touch screen monitor, with optional sunlight-readable screen, alternates between full-screen video and the inspection interface. Slide-out storage drawers, storage areas with a washdown system, and a generator complete the unit. Fork lift rails or lifting hooks are optional.

The 8-inch Cobra crawler inspects pipes up to 72 inches using wheels and remote elevator add-ons. Operating on the Cobra PTZ camera's power, the Luxeon cold-lighting system automatically illuminates at full brightness. Other features include a video reel interlocking electronic brake system, level-wind screw, and a remote crawler pendant control for one-person operation. 800/443-3761; [www.cobratec.com](http://www.cobratec.com).

Powered by a 24-hp Honda gasoline engine, the **Jet Eye SideKick** off-road easement machine from **PipeHunter Inc.** cleans and inspects simultaneously. Its camera system works in tandem with the 3/4- by 1/2-inch dual-bonded hose system. The hose reel holds 400 feet of 1-inch jetter hose or 800 feet of 1/2-inch hose. The unit is simple to operate, as a truck or trailer jet provides water and pressure. It has a daylight sunshield and stores recorded video to a thumb drive for review on any PC with QuickTime player. 800/373-1318; [www.pipehunter.com](http://www.pipehunter.com). ♦

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# COMPACT POWER

Trailer-mounted cleaning and hydroexcavation units can provide a solid complement to full-size truck-mounted vacuum systems

By Mike Moore

Industrial vacuum systems have been part of municipal fleets for decades, used for a host of tasks from cleaning sewers, catch basins and water valve boxes, to removing slurry from horizontal directional drilling projects.

Truck-mounted combination units offer high-pressure waterjets for cleaning and powerful vacuum for picking up debris. Besides cleaning chores, they can be easily adapted for hydroexcavation, which enables digging safely around buried utilities and exposing those utilities for repair work.

Because these machines are versatile and highly efficient, municipalities and contractors who buy one often find it fully utilized within a short time. Faced with a large expenditure for a second truck-mounted unit, many instead choose a trailer-mounted system. This lets them keep the truck unit free for major projects that require maximum power and use the trailer unit for the small- to medium-sized jobs.

## Small package

A wide array of attachments can make combination units even more versatile. For example, reduction tools in different sizes allow cleaning of smaller valve boxes and basins. A valve exerciser attachment, which mounts to the vacuum trailer, can save crews the manual labor of hand cranking valves.

Sometimes ground conditions or confined spaces make a work site unsuitable for a truck vacuum. Here, a more mobile trailer vacuum can provide easy access.

An expanding application for combination units is for excavating post holes for road guard rails and traffic signs. Hydroexcavating prevents damage to buried utilities and requires less labor than using an auger.

Trailer-mounted vacuum excavators are well suited for these applications because they are portable. A city or utility can choose anything from a 100-gallon unit that fits in the bed of a 1-ton truck to a full-size trailer unit with

up to a 1,200-gallon capacity. The larger units have the power to move displaced soil up to 200 feet from the source, yet require only one person to operate.

Trailer-mounted vacuums have some limitations. Most trailer units deliver vacuum capacity of about 15 inches Hg, providing a solid water lift of 15 feet from the port without introducing air into the

6-inch hoses found on truck models. The smaller hoses provide less suction, but do allow access to tighter spaces.

## Making sound decisions

In choosing a trailer-mounted combination machine or vacuum excavator, contractors should look at a variety of factors that affect proper sizing and the selection of

**A wide array of attachments can make combination units even more versatile. For example, reduction tools in different sizes allow cleaning of smaller valve boxes and basins. A valve exerciser attachment, which mounts to the vacuum trailer, can save crews the manual labor of hand cranking valves.**

stream. It is possible to go 30 or 40 feet deep if some air is mixed with the material being vacuumed.

Large vacuum trucks typically deliver at least 20 inches Hg and so can lift a column of water from a greater depth without introducing air.

In addition, the positive displacement blowers on trailer-mounted systems are typically smaller, providing 575 to 1,025 cfm air flow, compared to 3,000 cfm and up from some larger truck units. Smaller units use only 3- or 4-inch hoses, compared to the

equipment and accessories. Major considerations include:

What is the main application? Will the unit be used for jetting small sewers and cleaning of valve boxes and catch basins? Heavy-duty sewer cleaning? Potholing? Major hydroexcavation projects?

What options are desirable? Is there a need for a valve exerciser? Sewer jetter? Reduction tools? Heater for excavating in heavy clay soil or in frozen conditions?

Is there a need for dry as well as wet excavation? Water-based excavators typically dig faster

through a wide variety of soil types and reduce the volume of the displaced material. They also move more displaced wet spoil to the holding tank than an air system.

However, the displaced spoil is wet and cannot be returned to the site immediately without drying. While spoil from air systems can be directly returned to the site,

these systems do not cut as well in hard ground conditions, such as clay. Some manufacturers offer both systems in one package, letting the user choose the best option for the job.

#### The heart of the system

In comparing machines, users should look for a high-quality vacu-

um blower. They should also select a tank with capacity to hold a half-day's or day's worth of spoil, as this reduces the number of trips needed to empty the debris tank.

If a hydroexcavator will be used in areas with cobble rock, then a unit with a 4-inch hose and a blower with about 1,025 cfm air flow is desirable. Cobble soils require a larger blower to remove spoil effectively, and the larger hose helps limit clogging.

In areas without cobble rocks, a 575-cfm system and 3-inch hose will generally suffice. Blower size affects the amount of engine power required: A larger blower increases the cost of the unit.

Communities should select a filtration system that filters the spoil without clogging. Also important is a strong trailer frame that will support the weight of the unit and a full tank of spoil over a long equipment service life. Options on trailer units can include:

- Controls that allow the user to reverse the flow of the vac-

uum to blow the spoil back into the hole.

- Booms that support the weight of the hose, reducing operator effort.
- Automatic tank clean-out systems.
- Auxiliary hydraulic systems that allow users to run a concrete saw and other tools off the unit.

Trailer vacuums are a great complement to a truck vacuum and a versatile tool for busy municipal crews and the contractors who serve them. ♦

Mike Moore is vice president of sales with McLaughlin, a manufacturer of vacuum excavation and auger boring equipment and underground locator technology in Greenville, S.C. He can be reached at 864/277-5870 or [mmoore@mightymole.com](mailto:mmoore@mightymole.com).

## SAFE HYDROEXCAVATING

Safety is essential when operating any truck- or trailer-mounted hydroexcavation equipment. Here are a few basic tips to remember:

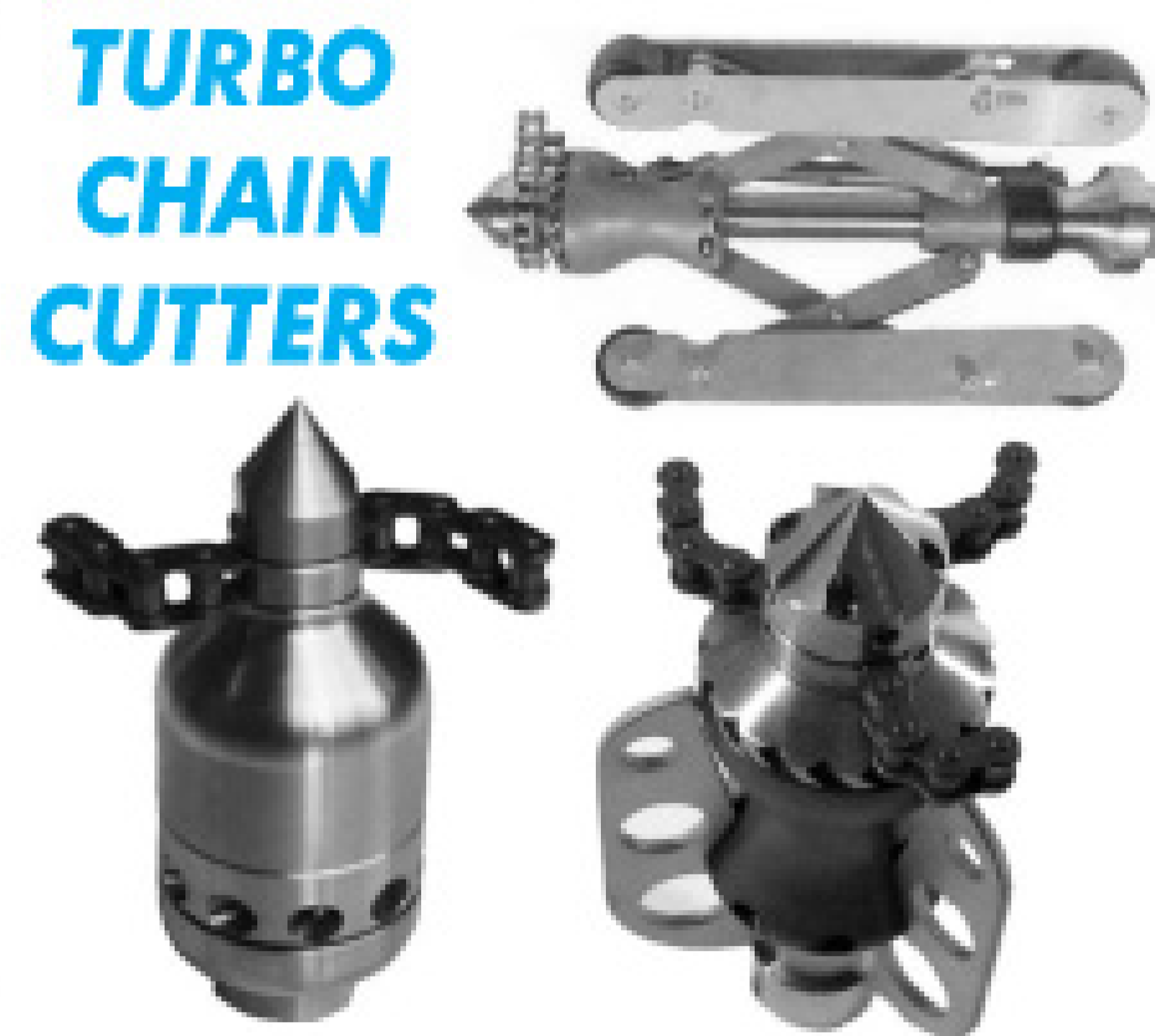
- Make sure the air knife or water lance has a covered tip so as not to damage buried lines or cables. A sharp tip may slice or puncture a line.
- Be sure operators exposing electrical lines wear dielectric boots and gloves. An electrical line could have a fault and leak current into the ground.
- Always use eye protection to protect workers from flying debris.
- Use proper traffic controls when working along streets to make sure the site and operators are clearly visible to motorists.



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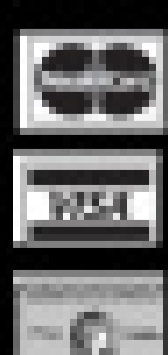


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# Product Spotlight

## Vacuum Unit Makes Its Way Over Tough Terrain

By Ken Wysocky

All-Terrain Vacuum System from Elastec/American Marine

Sometimes a vacuum truck is too big to reach remote, off-road locations to clean up small spills or clean small drains and sumps. The towable All-Terrain Vacuum System from Elastec/American Marine provides access to such sites.

"We basically downsized a vacuum trailer for smaller applications in places you can't reach with a conventional truck," says Stewart Ellis, vice president of sales and marketing. "With this lightweight machine and its low center of gravity, you can reach remote spills with minimal effect on the environment."

The 110-gallon aluminum vacuum tank weighs 738 pounds empty and 1,664 pounds full — within the towing capacities of most large ATVs. Walking-beam suspension, which allows each pair of large, high-flotation wheels to pivot up and down independently, makes travel on rough terrain easier.

The tank chassis can carry up to 3,000 pounds, and optional tracks enable it to traverse soft ground or snow. Two full-opening doors, one on each end, make the tank easy to empty and clean. The tank has a 4-inch camlock with a valve on the rear door, two sight glasses for level indication, an automatic shut-off with a bypass valve, and two suction ports with 2- and 3-inch camlocks.

The rig is 9 feet 10 inches long with the tow bar extended, 5 feet wide with tracks installed, and 5 feet tall. The tank is removable, allowing the chassis to serve as a trailer.

The tank was originally developed to handle oil spills in environmentally sensitive areas of Alaska, where a low-equipment footprint is essential. "But we're seeing loads of applications for customers that have to go off-road and suck up sludge, mud, oil, or clean portable restrooms or septic tanks," Ellis says.



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The tank can be used with almost any vacuum, including the All Terrain Vac from Elastec, which also can be towed by an ATV or utility vehicle along with the all-terrain tank. The pump chassis has high-flotation wheels and walking-beam suspension, and can be rigged with tracks.

A 3-cylinder diesel engine powers the pump, which delivers more than 300 cfm airflow and 15 inches Hg. The pump has a safety relief valve, a cyclonic separator, and an exhaust system. For more information, call 618/382-2525 or visit [www.elastec.com](http://www.elastec.com).

## Electric Eel Offers Pipe-Thawing Machines

The UES 190D and 200D pipe-thawing machines from Electric Eel Manufacturing Co. Inc. are designed to thaw frozen copper or steel pipe up to 75 feet in length, depending on pipe O.D. The units use low-voltage, high-amperage power and come with 115-volt power pack, two 25-foot cables with pipe clamps and circuit breaker to protect against overloads. 800/833-1212; [www.electriceel.com](http://www.electriceel.com); Expo booth 169.



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## Doran Designs Tire Pressure Monitor

The 360HD tire pressure monitoring system from Doran Mfg. provides audible and visual warnings for low pressure, fast leak and more. 866/816-7233; [www.doranmfg.com](http://www.doranmfg.com).



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## RIDGID Designs Ratcheting Plastic Pipe Cutter

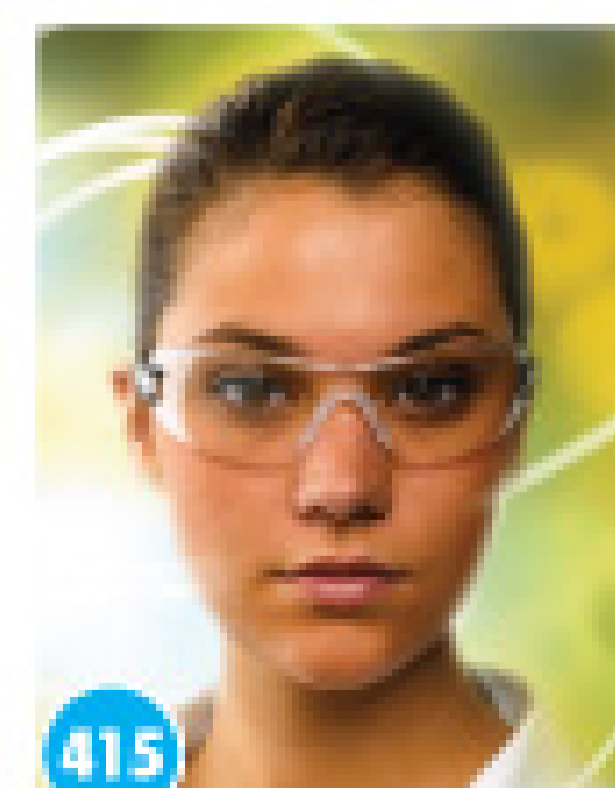
The RC-2375 ratcheting plastic pipe and tubing cutter from RIDGID is designed to cut up to 2 3/8-inch O.D. PVC, CPVC, PEX, polyethylene and rubber hose. The aluminum cutters feature ergonomic handles and X-CEL quick-change blade technology. 800/769-7743; [www.ridgid.com](http://www.ridgid.com); Expo booth 7115.



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## Gateway Designs Luminary Safety Eyewear

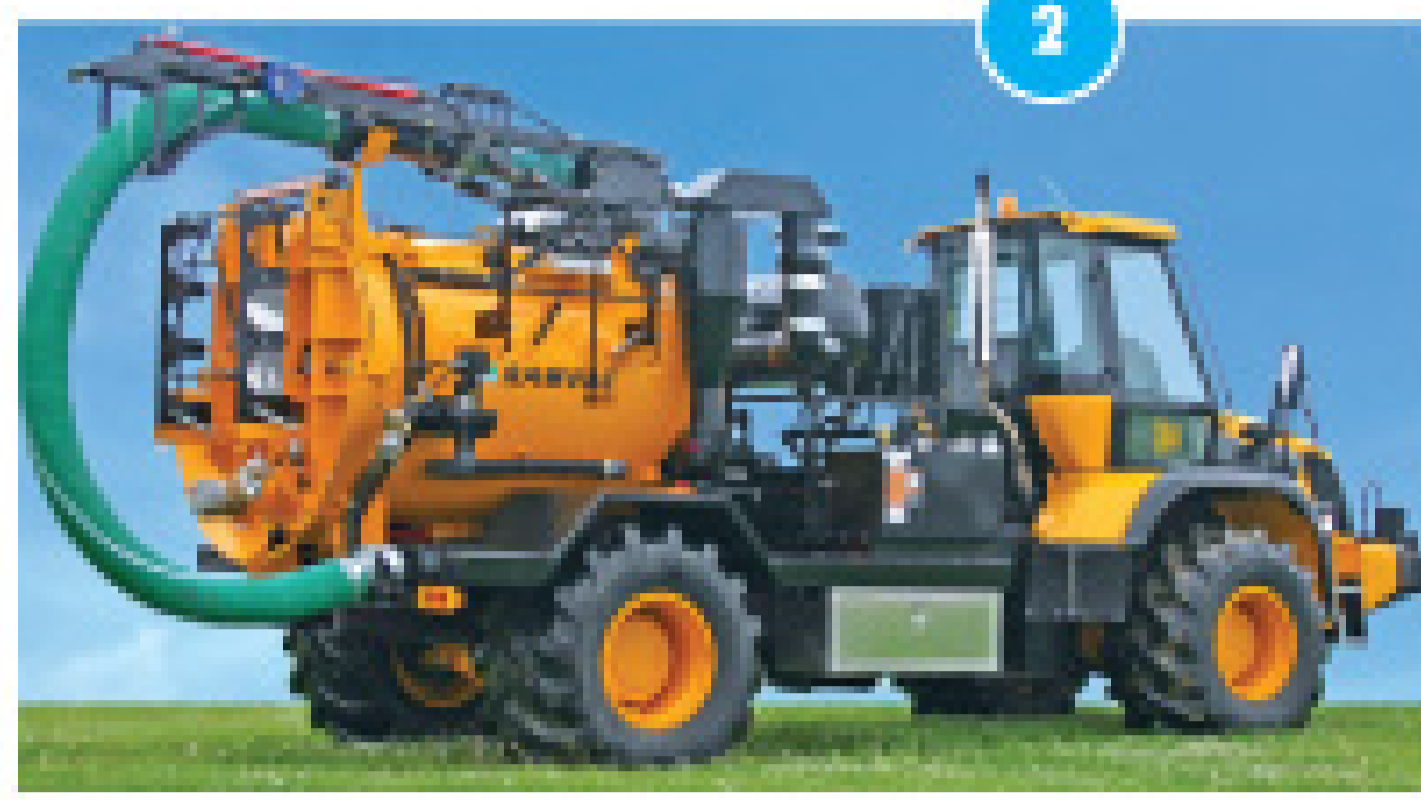
Luminary eyewear from Gateway Safety Inc. weighs four-fifths of an ounce and features soft, flexible, translucent temple insets. A one-piece polycarbonate lens, with an integrated brow guard and wraparound design, offers coverage against workplace hazards, while standard anti-scratch coating adds durability. 800/822-5347; [www.gatewayssafety.com](http://www.gatewayssafety.com).



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## Sewer Equipment Introduces RamVac 4400

The RamVac 4400 from Sewer Equipment Co. of America combines with an articulated truck for vacuum excavation in remote locations. The unit has a 4,400-cfm positive-displacement blower with hydrostatic drive, 8-inch hose system, wireless remote, and 6-cubic-yard debris tank. Options include a high-pressure water system and conventional 4- or 6-wheel drive platform. **800/323-1604; www.ram-vac.com; Expo booth 4095.**



## Western Mule Offers P-20 Fold-A-Way Bumper Crane

The P-20 fold-away bumper crane from Western Mule features 2,000 pounds of lifting capacity, six different boom positions, and vertical boom storage that enables it to fold compact and out of the way when not in use. A lighter duty P10 is designed to lift up to 1,000 pounds and is offered with DC, AC and manual hand-crank models. **559/266-6977; www.westernmule.com; Expo booth 3027.**



## CUES Introduces Eco-Friendly Inspection Vehicles

The ECO CCTV pipeline inspection vehicle from CUES and the EIV all-electric vehicle are designed to reduce pollution and energy costs. The truck-mounted ECO can run on battery or engine power, has zero generator emissions and can be set to inspect 6- to 200-inch mainlines. The EIV can travel a minimum of 40 miles roundtrip to accomplish eight hours of CCTV inspection or condition assessment with one charge. **800/327-7791; www.cuesinc.com; Expo booth 1068.**

## ADS Introduces Spider-Q Pump Station Monitor

The Spider-Q pump station monitor and alarm from ADS LLC is a volumetric quantification system, featuring wireless data access, automatic data delivery, influent and effluent flow calculation, alarming and reporting. The stand-alone, compact, single-box system requires no user software and operates using a Web server built into the monitor, allowing direct communication with most computers, regardless of brand or operating system. **800/633-7246; www.adsenv.com.**



## PortaCo Offers Manhole Cover Remover

The MH-00-96-O manhole cover remover from PortaCo can accommodate 24- to 36-inch covers and remove up to a 400-pound lid. **218/236-0223; www.portaco.com.**

## Envirosight Launches QuickView 3.5 Camera

Version 3.5 of the QuickView pipeline zoom inspection camera from Envirosight LLC offers double the zoom of previous models with 400 times the magnification, 65 percent brighter illumination and improved sensitivity for low-light viewing. The camera's enhanced performance enables an operator to see as far as 400 feet down a typical 18-inch line. **973/252-6700; www.envirosight.com; Expo booth 1130. ♦**



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# EYES ON THE STREAMS

Volunteers help the City of Raleigh, N.C., keep tabs on pollution and stay in compliance with EPA public education requirements

By Ken Wysocky

As a former Boy Scout, Bill Knapp Jr. of Raleigh, N.C., respects nature and loves volunteer work. Thanks to the city's Adopt-a-Stream program, his passions intersect as neatly as a lateral and a sewer main.

Knapp, 82, a retired veterinarian, just completed three years as chief watchdog of a 2-mile stretch of Crabtree Creek. Thanks to his Boy Scout roots, he found great satisfaction in strolling the banks while looking — and sniffing — for pollution.

"Being in Boy Scouts taught me about nature and the outdoors," Knapp says. "The older I become, the more I appreciate nature. We're dependent on nature in so many ways, so we've got to do what we can to protect it."

Knapp is one of more than 600 volunteers that serve the city's public works department, says Mac Smith, a water quality technician. Established in 1996, the Adopt-a-Stream program is the department's first stab at creating a volunteer program to reach out to and educate the public about local waterways.

Public outreach and education is one of six major criteria large cities must satisfy to obtain a Stage I stormwater permit from the U.S. EPA. "We want local people to know what streams are in their

neighborhood, and to look out for illicit discharges," Smith says. "We have more than 60 groups, with anywhere from 5 to 15 volunteers in each group. It has taken time to get that many people involved, and the number of active groups tends to cycle up and down."

## Waterway patrols

Smith says the program is similar to the well-known Adopt-a-Highway. Volunteers "adopt" at least a 1-mile stretch of waterway for three years. During that time, they patrol their section at least twice per year, spring and fall. Patrollers use their eyes and noses to spot strange-colored water and detect unusual odors.

The volunteers also must clean up their stretch of stream once per year, preferably along with North Carolina's annual "Big Sweep" campaign in early October. The city provides trash bags and picks up the debris.

Initially, the stream cleanups were no small task. Knapp participated as a member of the Crabtree Rotary Club, which in turn partners with local Boy Scout Troop 357.

"The Boy Scouts pull canoes with ropes and use them as barges for debris," he says. "At the same time, Rotarians do creek-side cleaning. A highway crosses the stream, so we find a lot of truck parts, such as doors, fenders,

hoods, transmissions and tires. We also find bikes, wagons and even wheelchairs. You'd be surprised what you find underwater."

The program pays big dividends. Adopted waterways are much cleaner and debris-free. And in at least one instance, a volunteer discovered a sewer leak on the city's Big Branch Stream. "This volunteer noticed a grayish algae

**"We want local people to know what streams are in their neighborhood, and to look out for illicit discharges."**

Mac Smith

forming on the side of the stream," Smith says. "It could have been much worse if he hadn't discovered it."

## Spreading the word

Knapp heard about the program when a stormwater management division representative gave a presentation at a Rotary club meeting. "It impressed me so much that I embarked on the program right away," Knapp says. "No government agency can do it all with its existing manpower."

Public presentations are one of several ways the department promotes the volunteer opportunities, says Amy Hathaway, a project engineer. Others include news stories, radio interviews, and 15- to 20-

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minute spots on public-access cable TV.

The department also produces a quarterly newsletter, *Public Watersheds: Volunteers in Action*, to remind volunteers of their obligations and keep them interested and motivated. An Adopt-a-Stream sign with the creek's and the volunteer group's names is posted on each adopted stretch of stream.

"The sign lets people know who's cleaning up the creek and educates the public about the name of a stream that they might cross every day going to work, but never realize what the name is," Smith says. The department also promotes the program and other volunteer opportunities on its Web site.

## Wide appeal

Volunteers range from elementary school children to Boy Scouts to members of religious organizations. High school students who need to fulfill community service requirements also find the program a good fit.

For residents interested in something more in-depth, the department has added water-



quality monitoring. After attending a half-day seminar, participants go into the field with water-quality monitoring kits to test streams for one year. There are about 10 volunteers in that program.

The volunteers are encouraged to test water five to 10 times per year for BOD, dissolved oxygen, pH, nitrate, phosphate, temperature and turbidity; and three times per year for coliform bacteria. They also use nets to gather insect larvae in late summer.

Smith and Hathaway say the volunteers are integral to the department. Participation exceeds the minimum EPA requirement. Hathaway says the program is especially valuable because many people think stormwater is treated, and so see no harm in pouring

motor oil or paint thinner into a sewer drain.

"This program is pretty important to us," says Smith "The more eyes we have in the field, the better. Fortunately, we don't have many sewer overflows. But the more groups we have out there, the better the chances they'll find a leak sooner."

As for Knapp, he believes volunteer work is an obligation. In fact, he plans to keep taking occasional walks along Crabtree Creek, just to keep an eye on things.

"Retired people should do volunteer work if they're physically able," he says. "This program is very worthwhile. It helps the community, wildlife and nature. I'd recommend it to anyone." ♦

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# VIEWING THE ECONOMY

By Irvin Gemora

**A**gainst the backdrop of one of the most challenging U.S. economies in decades, we welcome a new year and a new president this month.

What does this mean for our industry? Only time will tell. Today we know our nation's economy is not healthy and that fundamental changes are needed to restore confidence that our nation can get back onto a more sound footing before things can improve. I hope the new administration will benefit our economy and our industry, making our infrastructure a true priority with appropriate funding.

That funding begins with budgeting appropriately for the

tasks at hand and recognizing what the true priorities are. I believe protecting our country's most vital asset — the public sewer system — should be a key area of focus.

Budgeting for the year ahead is a task I take seriously as executive director of NASSCO. That includes forecasting as accurately as possible our projected income from all sources, as well as accounting for expenses (fixed and variable). My task is no different from that of every manager at every level of business who is required to budget for an area of responsibility.

The task is fundamental to planning the future direction of a business. Setting strategies and tactics to keep a business moving

forward is always a function of available resources. One challenge in preparing a budget is trying to understand the national economy, the sources of money that support our industry, and other positive and negative forces that can affect the future.

As I prepare the budget for the year ahead I always discuss important matters, such as the economy, with as many industry leaders as possible to try to understand how others see the near-term and long-term future. At WEFTEC a few months ago, I spoke with many contractors, suppliers and consultants to feel the pulse of the industry. From the vast majority of those I interviewed, the feeling is that



2009 looks like a good year, based on current backlogs and planned programs that are under way now.

I hope that one year from now I can look back and see that my forecasts were accurate and our industry continues to thrive under our country's new leadership. ♦

Irvin Gemora is executive director of NASSCO. He can be reached at [director@nassco.org](mailto:director@nassco.org). The NASSCO headquarters is at 11521 Cronridge Dr., Suite J, Owings Mills, MD 21117.

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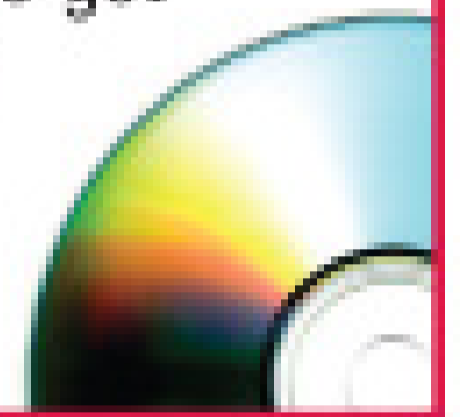
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## INDUSTRY NEWS

JANUARY 2009

### HammerHead Redesigns Web Site

HammerHead Trenchless Equipment has redesigned its interactive Web site, [www.hammerheadtrenchless.com](http://www.hammerheadtrenchless.com). The new site offers comprehensive, real-time interactive media, featuring coverage of jobs around the world as well as trenchless technology methods and new products.



### Whittington Joins Spir Star

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### Jetstream of Houston Named Top Company

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