field report

BY TANYA ROUCE

## Underground is top of mind:

# Annual reviews prove vital to maintaining infrastructure

**THE CHARLESTON REGION OF THE WEST VIRGINIA-AMERICAN WATER CO. HAS A BUDGET OF $1 MILLION PER YEAR FOR WATER MAIN REPLACEMENTS.**

Charleston's program has been in place since 1984 and its existence means Charleston is nearing 20 years of constant upgrades and close monitoring of its infrastructure.

Recently, a routine checkup revealed a faulty pipeline at one of the region's 20-plus river crossings—corrosion was to blame for a 4-in. (100-mm) leak in a 24-in. (600-mm) diameter ductile iron pipe. The system was unintentionally providing the river with an extra 3–5 mgd (11–19 ML/d) of water that should have been coming out of customers' taps.

Charleston Region Manager Ron Belcastro made the decision to slipline more than 1,000 ft (304.8 m) of 20-in. (51-cm) high-density polyethylene (HDPE) pipe into the 24-in (600-mm) original pipe at a cost of about $125,000. Belcastro estimated that replacing the system would have cost about half a million dollars.

When taking the ramifications of this example to the next level, the question becomes: If one of the nation's most conscientious municipal water systems is routinely repairing leaks that account for more than 20% of its water supply, what's happening in the communities in which there is not as close a watch?

### COSTS PILING UP

According to a report in *The Washington Post* (1999), about a quarter of the water handled in that city's treatment plants leaks out through a deteriorating infrastructure that can lead to contaminated drinking water and higher water bills for taxpayers. The Washington, D.C., metro area has about 66 mgd (250 ML/d) of "unaccounted for" water.

However, the nation's capital is not alone. The American Society of Civil Engineers (ASCE) recently released its 2005 report card on infrastructure that indicates drinking water providers face an annual shortfall of at least $11 billion to replace aging facilities that are near the end of their useful life and to comply with existing and future federal drinking water regulations.

The shortfall does not account for any growth in the demand for drinking water over the next 20 years. Federal funding for drinking water programs in 2005 remained steady at $850 million, less than 10% of the total national requirement.

"When the systems like the one in Washington, D.C., and many others were installed, engineers installed the best pipe they had available at that time," said Camille Rubeiz, director of engineering for the Plastics Pipe Institute (PPI). "But that pipe, some of which was installed 75 or 100 years ago, has served its design life."

Charleston's Belcastro compares water utilities to other utilities such as those that provide electricity and phone service—businesses that have a higher rate of private ownership than water companies.

"There are some (water piping systems) that are in bad shape, and others that are not," Belcastro said. "It's a function of how a system has been

funded and managed. In publicly owned systems, incumbent public officials are sometimes reluctant for political reasons to raise rates to pay for pipe maintenance. Newly elected or appointed officials in that office have the same hesitancies. So it comes down to long-term neglect, which ends with a desperate plea to Congress to bail them out. Infrastructure needs constant, annual attention. Otherwise you'll be looking at huge projects instead of smaller, manageable ones."

**MATERIAL SELECTION**

Sliplining with HDPE pipe—the method Belcastro used for the river crossing project in West Virginia—is one way municipalities can rehabilitate their infrastructures. Belcastro doesn't believe that just one kind of pipe is ideal for every application every time.

"That's why different kinds of pipe and pipe materials are manufactured. I like to pick the kind of pipe that's right for the job I have at hand," Belcastro said. For the river crossing job in West Virginia, he chose HDPE because of "advantages like heat-fused joints that are impossible to pull apart, flexibility for the turns and bends in the pipeline, and especially the resistance to corrosion."

According to Rubeiz, metal pipe manufacturers strive to prevent corrosion by either coating their base materials with insulating materials or by providing some sacrificial material that will corrode before the base metal. Because corrosion is an electrolytic process that requires the presence of electrically conductive materials—and polyethylene is a

## Small step for Texas city is giant leap for PE pipe

In the middle of a 5-mi (8.05-km) stretch of a water utility replacement project along O'Neal Street in Gainesville, Texas, lies a 4,000-ft (1,219.2-m) stretch of pipe that has a lot riding on it.

After the original job specification was written exclusively in favor of polyvinyl chloride (PVC) pipe, the city's public works officials and politicians were impressed enough by a presentation they saw on the benefits of polyethylene (PE) pipe that they rewrote the specifications to include PE pipe.

"We had plans to use PE pipe on our next project, a looped system at the water tower," said Gainesville City Manager Mike Land. "But we saw an opportunity to go to school on PE pipe with this project, so we did it."

Because the near mile-long section of the O'Neal Street project is the first in the city's history to include PE pipe, all eyes will be on it. Land said he'd heard and read about other large cities using PE pipe for their potable water systems—cities like Indianapolis, Ind.—but his own city had not yet included it on such an application.

"One reason we hadn't worked with PE pipe yet was our contractor's comfort level with the material," Land said. "He had never worked with it before. But for O'Neal Street, he got up to speed fast."

The contractor on the project was Bob McCoy, a 25-year veteran of water pipe projects using PVC and ductile-iron pipe. After one training session on how to fuse the PE pipe sections, McCoy was ready to begin installation.

"My experience was that a lot of people knew about PE pipe for gas applications, but not for water," McCoy said. "This stretch that we used PE pipe for was an area where we had to slide it under a lot of other utilities, right through the middle of town. It's an excellent section to do this installation, and it worked out very well. I'm happy to have been a part of the project at this point in my career."

Chris Dunn, a representative for a PPI member distribution company, provided the fusion equipment for the training workshop.

"Everyone had a lot of questions at first, but the process is simple enough to pick up right away," Dunn said. "PVC took a while to overtake ductile in this market, and PE is gaining ground on becoming the standard pipe material for the future."

"We can see the advantages of this product for the right applications," Land added.

Plastics Pipe Institute (PPI), the primary trade association for the PE pipe industry, said gaining market share and acceptance in the potable water market is steadily growing.

"The heat-fused joints leave the joint as strong or stronger than the pipe itself and eliminate the potential leak points every 10–20 ft [3–6 m] as found with PVC and ductile-iron bell and spigot connections," said PPI Director of Engineering Camille Rubeiz. "And when a contractor doesn't have to worry about the integrity of the joints, it opens up a whole list of benefits that will save the owner and the contractor a considerable amount of money and time," she concluded.

"There's going to be a lot of long-term value the city of Gainesville receives from this project," said Bill Trotter, a representative from a PPI member manufacturer of PE pipe. "They now have a contractor with experience using the pipe and can start using it for sliplining and horizontal directional drilling—applications that further highlight the benefits of PE pipe."

nonconductor—polyethylene is not subject to corrosion.

Rich Gottwald, president of PPI, says the heat-fusing creates a pipe joint that actually becomes as strong or stronger than the pipe itself.

"Using HDPE pipe to move water is a great way to be sure that none of the water is getting away," Gottwald said. "Because the pipes don't corrode and the joints are so strong . . . all the water stays in the pipe until it gets to where it's supposed to go."

Another advantage of the heat-fusing process, is the elimination of the need for restraining devices on joints and fittings (PPI, 2004). They are another costly hardware item, also subject to corrosion, that must be installed to produce a complete system when using non-HDPE.

## WAITING FOR AN EMERGENCY

It's accepted within the water industry that about 75% of cities report they are aware corrosion is a problem in their water pipes. But in some cities officials believe corrosion is a minor issue.

"It's that catastrophic event that prompts them to take a closer look at what condition their infrastructure is really in," Rubeiz said. "That's sometimes what it takes to bring about changes or improvements."

Rubeiz cites an example of why infrastructure sometimes goes for years without preventive maintenance. In the late 1990s citizens in San Francisco voted to freeze their water rates at 1999 levels through the year 2006 because they thought too much money was being spent on system improvements. In late 1999 stories with headlines like "Hayes Valley Water Line Breaks" began appearing in the *San Francisco Chronicle* (1999). An excerpt from one article states, "A spokesman for the water department said the cast-iron pipe, like many in the city's water system, apparently has been in the ground since the 1930s."

## SOLUTIONS

Across the country the implementation of annual maintenance programs like the one in Charleston, W.Va., is the exception and not the rule. Organizations such as the US Environmental Protection Agency, PPI, the Water Infrastructure Network, ASCE, AWWA, and many others are coming forward with recommendations. They're calling for increased funding from the federal government, the establishment of water trust funds, and other actions aimed at strengthening the partnerships among local, state, and federal government, and between public and private participants in the water and wastewater infrastructure community.

"Every utility, no matter what it's providing, needs a consistent, comprehensive plan," Belcastro said. "It comes down to knowing your system and prioritizing the maintenance in order to address the weak spots and avoid large headaches."

*—Tanya Rouce is the marketing communications manager for the Plastics Pipe Institute. She can be contacted at (202) 462-9607, or trouce@plasticpipe.org.*

## REFERENCES

PPI (Plastics Pipe Institute), 2004. Polyethylene Joining Procedures. www.plasticpipe.org (accessed January 2004).

*San Francisco Chronicle,* 1999. Hayes Valley Water Line Breaks.

*The Washington Post,* 1999. Growing Demand Could Tap Out Water Supply.