

Maryland utility seeks answers to copper pinhole problem

It's a puzzlement. What causes pinhole leaks in copper pipe? And why in the summer of 2000 did reports of these pinhole leaks in suburban Maryland increase?

When customers started reporting the problem more frequently, the Washington Suburban Sanitary Commission, serving 1.6 million people in Montgomery and Prince George's counties, began investigating. Despite the fact that household plumbing is not the utility's responsibility, "it's a concern for our customers, so obviously it's a concern for us," said WSSC general manager John Griffin. The increase in calls prompted WSSC to seek answers, and perhaps, solutions.

The cost from pinhole leaks can run high, often because they are so small they are not detected until major damage in the home has occurred. The cost of repair and rehabilitation for damage from a single leak can range from \$100 to \$20,000.

The utility has sought information from its customers, corrosion experts, the copper and plumbing industries, and other utilities. Through its Web site, www.wsscwater.com, bill inserts, customer letters, media interviews, and briefings for elected officials and home owners, the utility has embarked on an extensive research and outreach program.

Asking its customers who experienced leaks to fill out questionnaires, the utility built a database that includes property location, leak location within the property, dates and frequency of leaks, age and size of plumbing installation, water temperature, and repair work. A majority of the pinhole leaks have occurred in cold-water horizontal copper piping, and a majority were reported in homes built before 1970 and in the older communities within the service area. WSSC has received reports from more than 3,500 of its 400,000 customers.

In addition, WSSC retained experts in copper corrosion—Marc Edwards, professor of engineering at Virginia Tech, Steve Reiber of HDR Engineering, and Richard Lewis of Richard Lewis Engineering.

Edwards spoke at the AWWA annual conference in Washington in June on the issue. "Under normal circumstances, copper will last hundreds, even thousands, of years," he said. But the exception is the copper pipe with pinholes, which form from the inside out. Often the pits are too small to be seen without the aid of a microscope.

Copper pinholes can occur anywhere. In one area in Colorado, 11 percent of the homes experienced a pinhole leak in copper plumbing each year. A California utility averages one report per customer per year. A Scottish hospital experienced 64 pinhole leaks, and a hospital in Saudi Arabia 657 leaks.

The bottom line is that there is no definitive information about what causes the copper pitting. So far, it cannot be traced to aggressive water, stray current, installation, flux, or tube defects, although one or more of these factors may cause pinhole leaks in isolated cases.

However, Edwards pointed out that home owners feel caught in the middle when there is no one to take responsibility.

WSSC is providing ongoing updates to its customers on the status of the investigation and giving customers some general suggestions about copper versus plastic pipe and about replacement versus repair.

Edwards offered an international perspective:

- In the United States, utilities are responsible for corrosion control through water quality.
- In Germany, the plumber and home owner are responsible for controlling corrosion through material selection.
- In the United Kingdom and France, the pipe manufacturer is responsible for preventing tube defects.

Saying that "changes to water quality are oftentimes the only means of stopping the problem at a reasonable cost," Edwards noted that coagulant type and dose, disinfectant type and dose, pH, alkalinity, corrosion inhibitors all affect copper pitting. He does not think there is a simple answer but that more information is needed.

WSSC agrees. “While it’s likely we will never know the exact cause of the majority of pinhole leaks in our service area, we are working as an advocate for our customers, and we believe we are in the best position to minimize these occurrences for them,” said Griffin.

WSSC’s investigation continues to focus on the interior surface of copper pipes, deposits found on the interior surface of many of the pipes that have been analyzed, and water treatment modifications that may minimize the pinhole leaks.

Potential modifications include adding phosphate or silicate corrosion inhibitors. The utility is finalizing laboratory tests of these inhibitors and will use the results to evaluate an addition to the treatment processes at its two plants.

To share information about pinhole leaks in copper piping

- Visit WSSC at www.wsscwater.com, or
- contact WSSC’s task force manager Austin Freeman at www.wsscwater.com.

For information on copper corrosion, see

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