

Main Events *Water main break causes, costs and a case in point*

U.S. water infrastructure is in dire need of attention, and perhaps no type of system failure illustrates this point more conspicuously than water main breaks.

From coast to coast, hundreds of pipes burst on a daily basis, often making headlines by injuring motorists or passersby, damaging properties, forcing street closures and contaminating or cutting off water supplies. The U.S. Environmental Protection Agency (EPA) estimates that 240,000 water main breaks occur nationwide each year.

By Caitlin Cunningham



ARTICLE SUMMARY

Challenge: Water main breaks are on the rise nationwide. Suburban Washington, D.C., faced an extreme test in December 2008, when a 66-in. main burst.

Solution: High-quality design and materials, regular maintenance and careful consideration of construction and traffic activity can help alleviate water main breaks and related costs.

Conclusion: Public support and government infrastructure funding will be key in implementing effective water main break prevention measures and avoiding consequent costs.

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Causes

Various situations can cause a rupture. Some common triggers are outlined below.

Age and deterioration. Outdated materials, haphazard configurations and general wear and tear tend to be the foremost culprits when it comes to water main breaks. A hodgepodge of pipe materials, ages, and designs exist underground today, especially in urban areas that have experienced periods of significant population growth.

Much of our nation's water infrastructure was installed in the decade or so immediately following World War II, meaning a majority of components have reached or continue to exceed their design life. During a recent 19-year period, the average annual water main break count for large Midwestern utilities increased from 250 to 2,200, according to EPA research.

Neglect. The subterranean nature of water distribution systems allows the general public and infrastructure decision makers alike to take an out-of-sight, out-of-mind approach to elements' importance and maintenance. Pipeline needs—visual inspections, flushing and lining, for instance—often take a back burner to more blatant street-level public works projects.

Fluctuating temperatures. Extreme weather changes can cause the ground to swell and contract, placing excessive pressure on water mains. The freezing and expansion of water contents may have the same overwhelming effect.

Construction activity. Construction crews, commonly those conducting roadwork, sometimes strike and split mains, sending water flying. In some instances, the vibrations resulting from construction activities are strong enough to cause a break.

Heavy traffic. Consistently heavy motorist activity sends vibrations underground, at times stressing buried water infrastructure to the point of bursting. A single-instance excessive load, too, can cause a break, as can vibrations sent out by underground subway service.

Costs

Estimates vary, but the general consensus is that billions of dollars of water service line repairs and replacements are needed nationwide. Meanwhile, the U.S. Geological Survey has calculated that national distribution systems lose approximately 1.7 trillion gal of water per year, valued at about \$2.6 billion.

With a new administration in the White House—one strongly in favor of investing in infrastructure initiatives—groups are eagerly compiling relevant project wish lists. Those water mains with the most obvious and immediate needs may benefit from economic stimulus funding. The investment would help prevent massive breaks such as the one which recently wreaked havoc in suburban Washington, D.C.

Case in Point

On Dec. 23, 2008, a 66-in. prestressed concrete cylinder pipe (PCCP) in Bethesda, Md., burst during morning rush hour, trapping several commuters in their cars, shutting down a major route and extensively disrupting area water service. A 4-ft hole in the main discharged approximately 55 million gal of water.

"The initial scope of work was to perform immediate work around the clock until the roadway was reopened to traffic on Jan. 1, 2009," said John White, public affairs manager for the Washington Suburban Sanitation Commission (WSSC). "The repairs included removing, replacing and repairing five sections of PCCP."

WSSC engineers inspected 2,000 ft of the main near the break and discovered cracks in three additional sections, according to White. "All total, 80 ft of the water main was replaced," he said.

The 7.5-mile water main was last inspected in 1998, with the next inspection scheduled for 2011. At the time of print, investigators had begun looking into the cause of the break by analyzing broken sections of the pipe at a forensics lab. While some corrosion was detected, a clear conclusion regarding the cause of the break had yet to be reached. In order to complete area repairs (i.e., pipe bedding and pavement restoration) in a timely fashion, a private contracting company was hired at a cost of \$1.37 million, White said.

Water main problems have become the norm in this affluent suburb and its surrounding area. For the year 2007, the WSSC, the eighth largest water/wastewater utility in the nation, reported 1,693 breaks and an additional 433 leaks.

American Water Works Association (AWWA) Deputy Executive Director Tom Curtis, based in Washington, D.C., issued the following statement in response to the devastating main break affecting his region:

"Today's massive water main break outside Washington, D.C., brought a flood of new attention to our nation's water infrastructure concerns ... Unfortunately, while this incident was dramatic, water infrastructure failures are all too common across the U.S. As Congress considers economic recovery legislation, AWWA is urging our elected leaders to appropriate at least \$10 billion for drinking water infrastructure reinvestment."

Such an investment in "shovel-ready" projects, Curtis said, would create more than 400,000 jobs and help protect short- and long-term public health and safety. **WWD**

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