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# Researchers study aging water system pipes

OTTAWA, ONTARIO — The Institute for Research in Construction (IRC) has undertaken a three-year, collaborative research project with the American Water Works Association Research Foundation to reach a new understanding of the effect of corrosion pitting on aging cast-iron pipes used in water systems.

To solve this problem, IRC researchers will combine experimental stress measurements with finite element computer modeling to investigate pipe behavior under a wide variety of environmental conditions, officials said.

Working with researchers at the Canadian National Research Council's Steacie Institute for Molecular Sciences (SIMS), IRC researchers said they will will validate the modeling data using SIMS' neutron diffraction instruments at Atomic Energy of Canada Ltd.'s Chalk River Laboratories.

These instruments, IRC said, will help them understand the strain on the pipe under different stresses, loads and deflections. The major benefit of the technique is that it allows nondestructive stress measurements to be made all through the pipe wall, rather than just at the surface, according to IRC.

The research is expected to result in estimates of the minimum sizes of corrosion pitting that will increase risk of pipe failure under different soil, loading and pitting conditions. These findings, IRC said, will be of particular interest to users of pipe inspection technology and utility managers responsible for making decisions about repairing and replacing water mains.

The pipes are also known as "gray" pipes because of the color produced by the graphite flakes in the cast iron, which can be seen along the broken surface of these pipes manufactured between 1850 and the early 1970s.

Each year, cities in Canada and the United States experience

thousands of failures in small, gray cast-iron pipes, IRC said. More than 80 percent of these failures occur when the pipes crack across the center, which is similar to how a twig breaks when it bends.

There are corrosion pits at the broken edges of more than 90 percent of these failed pipes, but currently not much is known about the exact effect of this pitting on the mechanical strength of the pipes, officials said.