

Edmonton, Canada

ALBERTA UTILITY AVERTS POTENTIAL CATASTROPHIC HOLIDAY FAILURE WITH PROACTIVE PIPELINE MANAGEMENT APPROACH

EPCOR Water Services Inc. (EPCOR) provides water and wastewater services to more than 85 communities and industrial sites across Western Canada. The utility serves 800,000 people in the Edmonton, Alberta region alone. They have assumed ownership of smaller regional utilities and their infrastructure as the city expands. In 2015, EPCOR acquired the Northside Pipeline, a 16.7-kilometer (10-mi) water main comprised of prestressed concrete cylinder pipe (PCCP) that is 900 millimeters (36 in) in diameter. The Northside Pipeline conveys drinking water from the City of Edmonton to about 60,000 people in the Northeast Capital Region.

After acquiring the 40-year-old pipeline, EPCOR wanted to better understand its current condition. The utility conducted a high-resolution condition assessment on a 9.4-kilometer (5.8-mi) section of the pipeline in November 2019. The utility gained actionable information for planning repairs and was alerted to one very high-risk pipe. EPCOR acted quickly to repair the pipe just in time for the holiday season.

Challenge

The life expectancy of concrete pressure pipe can range from 50 to 100 years, depending on design, manufacturing, installation, and operation. Failures on large-diameter PCCP mains are rare, but these pipes typically fail catastrophically and can cause significant flooding and damage.

The Northside Pipeline was constructed in 1980, but EPCOR did not own or operate the transmission main until 2015. The pipeline did not have a documented history of failures, but there was some anecdotal evidence of possible leaks and breaks.

Solution

To ensure safe and reliable water service for its customers, EPCOR partnered with Pure Technologies, a Xylem brand to complete a high-resolution condition assessment. The team inspected a 9.4-kilometer (5.8-mi) section of the critical Northside Pipeline for leaks and pipe wall deterioration. The inspections took place in November 2019, during low-demand season. The region's weather at this time is best described as unpredictable, sometimes reaching temperatures below -20 °C (-4 °F).



PROGRAM HIGHLIGHTS

- Identified multiple pipes with signs of pipe wall distress
- Detected multiple leaks, including barrel leaks on pipes with wall distress
- Emergency repair of one pipe and planned repairs on three more pipes averted potential catastrophic failures

SERVICES PROVIDED

- SmartBall® leak and air pocket detection
- PipeDiver® condition assessment
- Transient pressure monitoring
- Structural evaluation and rehabilitation recommendations

Pipe Material: PCCP

Inspection Length: 9.4 kilometers (5.8 mi)

Diameter: 900 millimeters (36 in)

The team assessed the pipeline while it remained in service using two free-swimming technologies. First, they deployed the acoustic **SmartBall®** inspection platform to identify leaks and air pockets. Next, they deployed the **PipeDiver®** platform, which uses electromagnetic technology to identify and locate pipe wall deterioration. The tool quantifies broken prestressing wire wraps, the primary indicator that PCCP will eventually fail.

The tools entered the pipeline at an isolated, depressurized metering station bypass. The tools traversed the inspection distance while navigating inline butterfly valves along the way. The team retrieved both tools from the live pipeline using specialized equipment: a collapsible net for the SmartBall platform and a hydraulic retrieval tube for the PipeDiver platform.

Pure Technologies also monitored for pressure transients over 30 days. These pressure surges can repeatedly stress the pipeline and lead to costly damages and even failure if not mitigated.

Outcome

In early December 2019, as the busy and frigid holiday season quickly approached, Pure Technologies alerted EPCOR to a high-risk pipe section with both broken wire wraps and a leak on the pipe barrel. Data from both the SmartBall and PipeDiver platforms clearly showed the location of the damaged pipe between two elbows.

EPCOR weighed their options and decided to proactively repair the pipe. After excavation, Pure Technologies verified both the leak and wire wrap damage. EPCOR successfully executed an emergency repair on the pipe, averting a potential catastrophic failure just in time for the holiday season.

In total, 99.2 percent of the pipe sections inspected by the PipeDiver platform are in good service condition. The tool identified 10 pipes with distress ranging from low-level deterioration to more significant damage necessitating repairs. The SmartBall platform identified three leaks. One leak was located at the joint between two pipes. Another two pipes with broken wire wraps also had leaks on the pipe barrel, including the one repaired in December 2019.

Using the electromagnetic inspection data, Pure Technologies completed a structural evaluation to assess the risk of failure for each pipe. Based on the evaluation, EPCOR replaced two additional pipes with distress and repaired the pipe joint leak.

By addressing problem areas on the Northside Pipeline, EPCOR prevented potential failures and reduced water loss. The inspections and structural evaluation established that the rest of the assessed area is in good condition. With actionable information on their newly acquired asset, EPCOR can now manage the pipeline proactively into the future.



EPCOR conducted an emergency repair on this high-risk pipe in December 2019. Inspections identified a leak on the pipe barrel and broken wire wraps.

“By assessing the Northside Pipeline, we avoided a catastrophic failure that could have disrupted water service to tens of thousands of people in Alberta’s Northeast Capital Region. Also, we gained valuable knowledge on the condition of the pipeline and how best to execute our work in the future to maintain system integrity.”

Andrew Rees, Manager of Water Distribution & Transmission Infrastructure at EPCOR