

Resolute Bay Non-Invasively Locates 11 Underground Leaks on HDPE Water Mains Using Advanced Acoustics

SITUATION

Resolute Bay is an Arctic waterway in the Qikiqtaaluk region of Nunavut, Canada. Home to approximately 250 people, it is one of the most northerly communities in Canada and is also one of the coldest inhabited places in the world, with an average yearly temperature of -16.4°C (2.5°F).

Resolute Bay's water system was plagued by underground leaks that were responsible for losing approximately 40% of the town's drinking water. Water loss presented an especially costly problem for the community considering the significant expenses required to treat the water and continuously heat and circulate it through the system to help prevent freezing and to minimize the expansion and contraction of its insulated water mains that are located under permafrost and comprised of high density polyethylene (HDPE).

The government of Nunavut employed numerous leak detection technologies to help locate the leaks but found that none of the methods were effective due to the insulation and plastic composition of the water mains, the system's lack of service fittings and the inability of most leak detection technologies to differentiate the noise created by the circulating water from noise created by the leaks.

Traditionally, the acoustic detection of leaks on plastic water mains is painstakingly difficult. Unlike metallic pipes, leaks on plastic mains are characterized by relatively low noise frequencies and amplitudes that are almost impossible to accurately detect with typical leak noise correlators.

Desperate for a solution, Nunavut turned to Kudlik Construction Ltd., to help remedy Resolute Bay's water loss problem.



Customer

Resolute Bay, Nunavut;
Kudlik Construction Ltd.

Situation

Approx. 40% water loss

Pipe Material(s)

High Density Polyethylene (HDPE)

Pipe Diameter

150 mm

Technology

LeakFinderRT™

Results

Non-invasive identification
of 11 leaks

ACTION

Kudlik Construction researched numerous leak detection solutions before partnering with Mississauga-based Echologics, a leading developer of acoustic-based technologies for water loss management, leak detection and pipe condition assessment. Kudlik's decision to partner with Echologics was a result of a report from the National Research Council of Canada's Institution for Research in Construction, which documented the effectiveness of the company's acoustic-based technologies in providing accurate, non-invasive leak detection, especially in scenarios involving plastic pipe, multiple leaks and excessive background noise.

A subsidiary of Mueller Water Products Inc., Echologics works with municipalities across North America and in Europe, South Africa, Singapore and Australia to isolate "silent" leaks that other acoustic systems often fail to find. Using proprietary sensor and acoustic signal conditioning technologies, Echologics' Windows-based leak detection system—LeakFinderRT™—is able to non-invasively detect underground leaks and assess the structural integrity of all pipes—irrespective of their diameter, geometry, material, etc.

Traditional acoustic leak detection methods often involve the insertion of hydrophones (water microphones) into a pipe and having the water carry them downstream as they listen for leaks. However, such intrusive technologies would not work in the case of Resolute Bay, as the diameters of pipes in its water system were too small. LeakFinderRT is completely non-invasive, as it uses standard pipe appurtenances such as hydrants, valves or direct attachments to the pipe's outer wall. The technology works by placing surface mounted sensors at two locations along the suspect water line, in most cases valves or hydrants. Sensors can be placed between

120 m and 1,300 m apart. A correlator compares the acoustic signature of the leak with the expected speed of sound in running water; a computer algorithm then calculates the data to accurately pinpoint the location of the leak.

The ability of Echologics' system to accurately detect leaks on pipes of various materials is a result of an enhanced correlation function, which dramatically improves its ability to accurately identify and locate narrow-band leak noise. This capability was especially ideal for Resolute Bay's water system and any others that have plastic pipes, multiple leak situations, and excessive background noise created by water flows.

RESULTS

During the three day project, Echologics acoustically surveyed more than 2,800 m of plastic mains using surface mounted accelerometers placed either on service shut offs, on valves, or directly on the pipe. The test area was broken down into 39 sections based on the layout and geometry of accessible fittings. Engineers non-invasively correlated a total of 11 leaks located in eight of the sections. Each of the leaks were located between the surface mounted sensors, which were placed an average of 75m apart. Leaks that were located during the survey were each estimated to be responsible for losing an average of 3.5 gallons of water per minute (gpm).



“Water loss is a critical issue to water service providers of all sizes and geographical locations, considering the significant amount of resources they focus on treating water and distributing it to their customers,” said Simon Goulet, Senior Project Manager for Kudlik Construction. **“Our use of advanced leak detection helped Resolute Bay improve the efficiency of its water system by identifying numerous underground leaks on its plastic water mains, which Nunavut was initially unable to detect with traditional leak detection systems. Not only were we able to help our customer reduce water loss and gain a better understanding of their water system, we were able to do so without breaking ground or disrupting service.”**



Site Location	Pipe and Diameter	Surveyed Distance	Number of Leaks	Estimated Water Loss
6	HDPE/150 mm	97.0 m	1	4 gpm
7	HDPE/150 mm	100.3 m	1	4-5 gpm
9	HDPE/150 mm	61.7 m	1	4-5 gpm
11	HDPE/150 mm	48.6 m	2	1-3 gpm
13, 14	HDPE/150 mm	83.2 m	1	3 gpm
17	HDPE/150 mm	22.4 m	1	3 gpm
24	HDPE/150 mm	80.0 m	3	3-5 gpm
36	HDPE/150 mm	108.3 m	1	3-5 gpm

Find out more ways Echologics can help reduce costs, conserve water, and improve customer service by calling us today at 1-866-324-6564 or visiting www.echologics.com.