A large U.S.-based Fortune 500 industrial company was experiencing multiple leaks on a 1,500-ft span of 6-in. steel force sewer main conveying sanitary wastewater from one of its plants to a municipally owned collection system. It was not the first time the company had experienced leaks on this particular force main. It recently had been troubled by a number of similar sewage-releasing leaks that damaged plant roads and caused an environmental incident. Because of the past history of the main and the nature of the burst (it was visible above ground), the plant suspected that the main had other leaks not yet visible at surface grade.

The company began looking for a leak detection service provider capable of identifying and pinpointing the leaks. Finding a service provider able to do this on an operating force main in a noninvasive fashion, however, was going to be a challenge: Noninvasive leak detection methods often are unable to acoustically identify leaks over the background noise created by force main lift station pumps.

**Acoustic Solution**

The company’s alliance engineering firm—Chester, Va.-based Evanco Environmental Technologies Inc.—turned to Toronto-based Echologics Eng. Inc., a developer of advanced acoustic-based technologies for water loss management, leak detection and pipe condition assessment, for its noninvasive leak detection expertise and services.

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 technologies fail to find. Its proprietary sensor and signal conditioning technologies reduce both electronic white noise as well as ambient background noise often created by running water, traffic or pumps. This new acoustic method of leak detection relies on measuring how quickly an acoustical signal is transmitted along a section of pipe, using sensors (hydrophones) and acoustic correlators. The process is completely noninvasive. Devices are attached to a section of pipe using standard appurtenances (e.g., valves, hydrants or direct attachments to the pipe’s outer wall).

An acoustic signal is induced into the pipe and changes to the signal—specifically, changes to its transmission or propagation velocity—can be related to changes in the pipe wall thickness. This pinpoints...
the location of leaks and yields a highly accurate measurement of the remaining or effective wall thickness of selected pipe. Because the sensors and signaling technologies work together to help substantially reduce electronic white noise and background noise, this method can detect leaks and assess the condition of various diameter pipe and materials—including ductile, cast iron, concrete, plastic and asbestos cement—as well as pipe located in noisy, high-traffic environments.

The use of acoustic leak detection is increasing among industrial water systems as well as municipal water service providers because of its accuracy and cost advantages over traditional leak detection methods. The accuracy of traditional methods can be questionable and typically requires expensive pipe excavations and system disruptions.

**Leaks Detected**

Using its acoustic leak detection technology, Echologics was able to survey the company’s entire 1,500-ft span of force sewer main in one day, and without having to break ground or interrupt service. Two leaks, each of which was responsible for an estimated loss of 3 gal of wastewater/effluent per minute, were detected acoustically and pinpointed at grade.

Before repair crews were dispatched to fix the leaks, the company’s engineering firm validated the results of the leak detection survey by conducting a visual inspection of the interior structure of the pipe. The pipe was de-energized and drained, and a video camera was inserted into the system. Images captured during the inspection validated the survey’s findings: They showed an amount of water proportional to the sizes of the leaks pinpointed by Echologics to still be flowing through the main. Because the main had been shut off in order for the camera to be inserted into the system, it was apparent that the water seeped into the pipe from the surrounding soil through leaks.

“Traditionally, leaks on force mains have been especially problematic for municipalities because the pump noise makes it difficult to locate leaks without having to excavate sections of the pipe or shut off service,” said Marc Bracken, vice president and general manager for Echologics. “Fortunately, noninvasive detection and location of force main leaks is now possible as a result of recent acoustic leak detection advancements, which help quickly and efficiently mitigate potentially damaging leaks and cost-effectively prioritize capital spending for repairs and replacement.”

As a result of the success of the force main inspection, Echologics currently is quoting additional nondestructive leak detection and condition assessment projects at the same industrial facility.

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