An effective, cost-saving way to detect natural gas pipeline leaks

October 22 2014

Major leaks from oil and gas pipelines have led to home evacuations, explosions, millions of dollars in lawsuit payouts and valuable natural resources escaping into the air, ground and water. But in a report in ACS' journal *Industrial & Engineering Chemistry Research*, scientists say they have developed a new software-based method that finds leaks even when they're small, which could help prevent serious incidents—and save money for customers and industry.

Gary Valtinson and Miguel Bagajewicz note that using pipelines to move oil, gas and even water from one place to another is highly effective, for the most part. But serious, costly problems arise when pipes break. Existing methods for detecting leaks are limited. Hardware-based approaches using special instrumentation are expensive and complicated, and software-based systems don't model pressure drops in pipelines correctly. This leads to a lot of errors, particularly for gas pipelines. Valitonson and Bagajewicz set out to fix this flaw.

The researchers developed a method that compares pressure and flow rate measurements from a pipeline with mathematical models that can accurately predict what the pressure and flow rate should be. Their technique successfully detected small leaks and reduced errors from 21 percent to 3 percent when compared to existing software. The researchers estimated that their method would have saved millions of dollars more than other leak-detection methods.

More information: "Leak Detection in Gas Pipelines Using Accurate

Hydraulic Models" *Ind. Eng. Chem. Res.*, Article ASAP. DOI: 10.1021/ie501322g

Abstract

In this paper, we show the implementation of the Generalized Likelihood Ratio (GLR) method to detect and also identify the size and location of leaks in pipelines. We introduce the use of accurate hydraulic models for hypothesis testing and the use of economics to determine the thresholds of detection and identification. We compare the leak detection power and costs to those of other simple leak detection methods. The economic comparison includes computing the losses for not detecting the leaks (false negatives) and detecting leaks that do not exist (false positives). We also illustrate the improvement in the power of our method by using more-accurate instrumentation.