

PROJECT facts

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Natural Gas
Infrastructure Reliability

09/2002

CONTACT POINTS

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PRIMARY PARTNER

West Virginia University
Morgantown, WV

PROJECT DURATION

2 Years

COST SHARING

DOE	\$406,462
Non-DOE	\$108,586

STRATEGIC CENTER FOR NATURAL GAS WEBSITE

www.netl.doe.gov/scng

ACOUSTIC DETECTING AND LOCATING GAS PIPELINE INFRINGEMENT

Background

Because of the high pressure in gas pipelines, infringement by excavations, blasting, landslides, mine subsidence, or other events will produce a sudden high supersonic velocity discharge. Such a discharge also produces a large amplitude rarefaction wave, followed by supersonic jet acoustic noise at unique frequencies. The external jet noise is picked up at the pipe wall openings and transferred to the gas inside, transmitted in the form of longitudinal waves by the gas, and transverse vibrations of the pipe wall.

Description

This project will develop a system to detect these unique sound waves and vibrations that are generated when a pipeline break releases gas due to landslides, excavations, demolitions, or other sudden disturbances. The system will be designed to monitor the background noise inside the pipe and pick up any new frequencies that might signal a pipeline rupture.

West Virginia University will measure and analyze the initial wave amplitude and the unique frequencies associated with jet and background noise. These frequencies will be calculated and validated by field measurements to determine the distance over which these signals can be detected. If the distance is long enough, then pipelines can be acoustically monitored for infringement, which can be reported at regular intervals to an automated 911-type pipeline emergency control center. The acoustic monitors should be placed close enough, so that at least two can detect the initial rarefaction wave, and provide a signal for pinpointing a leak or infringement.



ACOUSTIC DETECTING AND LOCATING GAS PIPELINE INFRINGEMENT

CUSTOMER SERVICE

800-553-7681

ADDRESS

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Primary Goal

To develop a centralized and automated acoustic monitoring system to detect leaks and infringements on high-pressure natural gas distribution and transmission pipeline systems across the United States.

Benefits

Maintaining integrity of the high-pressure natural gas pipeline distribution and transmission system across the United States is essential to our national energy security. Automated and rapid detection of pipeline infringement can save significant amounts of energy and improve pipeline reliability.