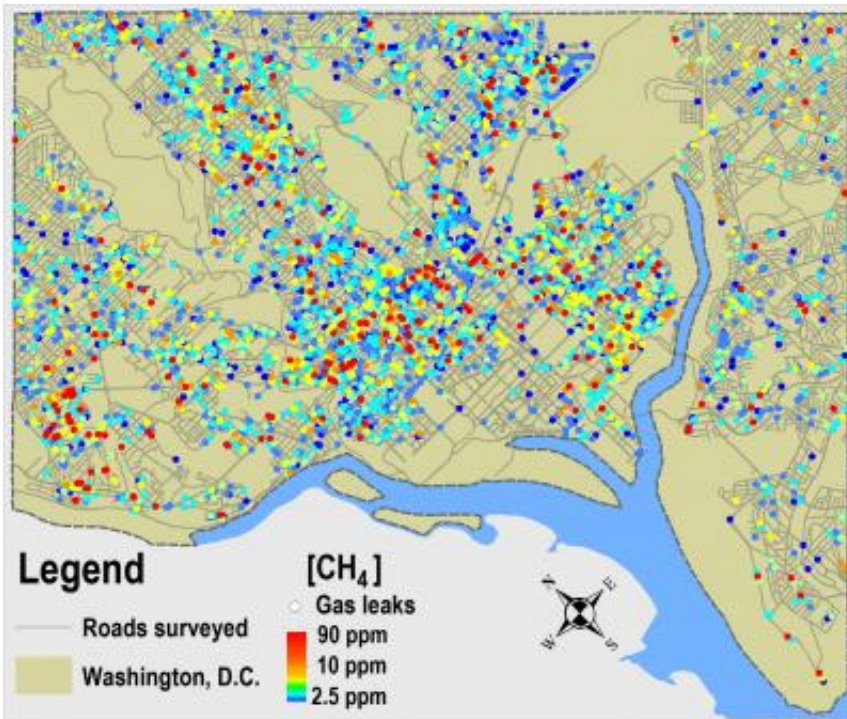


5,900 natural gas leaks discovered under Washington, D.C.

January 16 2014



This is a map of the District of Columbia showing where researchers found natural gas leaks under city streets, with colors indicating the concentration in parts per million of methane at each location. Credit: Duke University

More than 5,893 leaks from aging natural gas pipelines have been found under the streets of Washington, D.C. by a research team from Duke University and Boston University.

A dozen of the leaks could have posed explosion risks, the researchers said. Some manholes had [methane](#) concentrations as high as 500,000 parts per million of natural gas – about 10 times greater than the threshold at which explosions can occur.

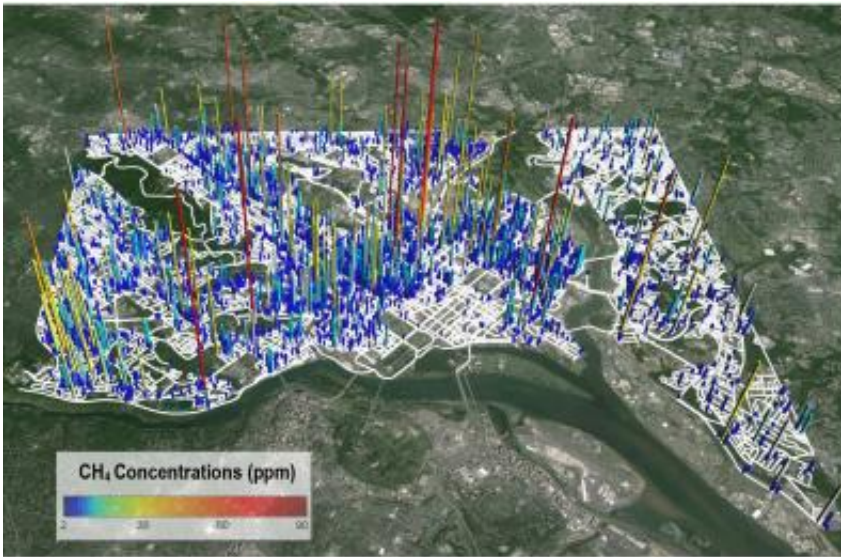
Four months after phoning in the leaks to city authorities, the research team returned and found that nine were still emitting dangerous levels of methane. "Finding the leaks a second time, four months after we first reported them, was really surprising," said Robert B. Jackson, a professor of environmental sciences at Duke who led the study.

The researchers published their findings this week in the peer-reviewed journal *Environmental Science & Technology*.

"Repairing these leaks will improve air quality, increase consumer health and safety, and save money," Jackson said. "Pipeline safety has been improving over the last two decades. Now is the time to make it even better."

Nationally, natural gas [pipeline](#) failures cause an average of 17 fatalities, 68 injuries, and \$133 million in property damage annually, according to the U.S. Pipeline and Hazardous Materials Safety Administration.

In addition to the explosion hazard, natural gas leaks also pose another threat: Methane, the primary ingredient of natural gas, is a powerful greenhouse gas that also can catalyze ozone formation. Pipeline leaks are the largest human-caused source of methane in the United States and contribute to \$3 billion of lost and unaccounted for natural gas each year.



This is a satellite image of the District of Columbia with bar charts showing where natural gas leaks were located under city streets and in what concentration methane was identified. Higher bars indicate higher concentrations in parts per million. Credit: Duke University

Jackson's team collaborated with researchers from Boston University and Gas Safety, Inc., on the new study. The team mapped gas leaks under all 1,500 road miles within Washington using a high-precision Picarro G2301 Cavity Ring-Down Spectrometer installed in a GPS-equipped car. Laboratory analyses then confirmed that the isotopic chemical signatures of the methane and ethane found in the survey closely matched that of pipeline gas.

The average methane concentration observed in the leaks was about 2.5 times higher than in background air samples collected in the city. Methane levels in some leaks were as high as 89 parts per million, about 45 times higher than normal background levels.

The team also measured how much methane was coming from four individual street-level leaks. "Methane emissions from these four leaks

ranged from 9,200 to 38,200 liters per day for each leak—that's comparable to the amount of natural gas used by between 2 and 7 homes," said Duke Ph.D. student Adrian Down.

Last year, the team mapped more than 3,300 [natural-gas pipeline](#) leaks beneath 785 road miles in the city of Boston. "The average density of leaks we mapped in the two cities is comparable, but the average methane concentrations are higher in Washington," said Nathan G. Phillips, a professor at Boston University's Department of Earth and Environment.

Like Washington and Boston, many U.S. cities have aging pipeline infrastructure that may be prone to leaks. The researchers recommend coordinated gas-leak mapping campaigns in cities where the infrastructure is deemed to be at risk.

The new study comes at a time when the nation's aging pipeline infrastructure is generating increased legislative attention. Last November, Sen. Edward J. Markey (D-Mass.) introduced two new bills to speed up the replacement of [natural gas](#) pipelines in states with older infrastructures by offering new federal programs and incentives to help defray the costs associated with the repairs.

"We need to put the right financial incentives in place," said Jackson. "Companies and public utility commissions need help to fix leaks and replace old cast iron pipes more quickly."

More information: "Natural Gas Pipeline Leaks Across Washington, D.C.," Robert B. Jackson, Adrian Down, Nathan G. Phillips, Robert C. Ackley, Charles W. Cook, Desiree L. Plata and Kaiguang Zhao. *Environmental Science & Technology*, January 16, 2014. dx.doi.org/10.1021/es404474x

Provided by Duke University

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