U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 16, 2017

The Honorable Bill Shuster
Chairman
Committee on Transportation and Infrastructure
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

I am pleased to submit the Report on lost and unaccounted for natural gas metrics, as required by Section 29 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016, Public Law No: 114-183.

Section 29 of the PIPES Act of 2016 directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

I have sent a similar letter to the Ranking Member, and Chairmen and Ranking Members of the Committee on Energy and Commerce, and the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Sincerely,

Howard W. McMillan
Acting Deputy Administrator

Enclosure

U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 16, 2017

The Honorable Peter A. DeFazio
Ranking Member
Committee on Transportation and Infrastructure
United States House of Representatives
Washington, DC 20515

Dear Congressman DeFazio:

I am pleased to submit the Report on lost and unaccounted for natural gas metrics, as required by Section 29 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016, Public Law No: 114-183.

Section 29 of the PIPES Act of 2016 directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

I have sent a similar letter to the Chairman, and Chairmen and Ranking Members of the Committee on Energy and Commerce, and the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Sincerely,

Howard W. McMillan
Acting Deputy Administrator

Enclosure

U.S. Department
of Transportation
Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 16, 2017

The Honorable Greg Walden
Chairman
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

I am pleased to submit the Report on lost and unaccounted for natural gas metrics, as required by Section 29 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016, Public Law No: 114-183.

Section 29 of the PIPES Act of 2016 directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

I have sent a similar letter to the Ranking Member, and Chairmen and Ranking Members of the Committee on Transportation and Infrastructure, and the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Sincerely,

Howard W. McMillan
Acting Deputy Administrator

Enclosure

U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 16, 2017

The Honorable Frank Pallone
Ranking Member
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Congressman Pallone:

I am pleased to submit the Report on lost and unaccounted for natural gas metrics, as required by Section 29 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016, Public Law No: 114-183.

Section 29 of the PIPES Act of 2016 directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

I have sent a similar letter to the Chairman, and Chairmen and Ranking Members of the Committee on Transportation and Infrastructure, and the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Sincerely,

Howard W. McMillan
Acting Deputy Administrator

Enclosure

U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 16, 2017

The Honorable Lamar Smith
Chairman
Committee on Science, Space and Technology
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

I am pleased to submit the Report on lost and unaccounted for natural gas metrics, as required by Section 29 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016, Public Law No: 114-183.

Section 29 of the PIPES Act of 2016 directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

I have sent a similar letter to the Ranking Member, and Chairmen and Ranking Members of the Committee on Transportation and Infrastructure, and the Committee on Energy and Commerce of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate.

Sincerely,

Howard W. McMillan
Acting Deputy Administrator

Enclosure

U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 16, 2017

The Honorable John Thune
Chairman
Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

I am pleased to submit the Report on lost and unaccounted for natural gas metrics, as required by Section 29 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016, Public Law No: 114-183.

Section 29 of the PIPES Act of 2016 directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

I have sent a similar letter to the Ranking Member, and Chairmen and Ranking Members of the Committee on Transportation and Infrastructure, the Committee on Energy and Commerce, and the Committee on Science, Space, and Technology of the House of Representatives.

Sincerely,

Howard W. McMillan
Acting Deputy Administrator

Enclosure

U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Ave., S.E.
Washington, DC 20590

May 16, 2017

The Honorable Bill Nelson
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate
Washington, DC 20510

Dear Senator Nelson:

I am pleased to submit the Report on lost and unaccounted for natural gas metrics, as required by Section 29 of the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016, Public Law No: 114-183.

Section 29 of the PIPES Act of 2016 directs the Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

I have sent a similar letter to the Chairman, and Chairmen and Ranking Members of the Committee on Transportation and Infrastructure, the Committee on Energy and Commerce, and the Committee on Science, Space, and Technology of the House of Representatives.

Sincerely,

Howard W. McMillan
Acting Deputy Administrator

Enclosure

Gas Distribution: Lost and Unaccounted for Natural Gas
Pipeline and Hazardous Materials Safety Administration

Table of Contents

A. Executive Summary

Congress directed Pipeline and Hazardous Materials Safety Administration (PHMSA) to submit a report on the metrics provided to PHMSA and other Federal and State agencies related to lost and unaccounted for (LAUF) natural gas from distribution pipeline systems.

At the Federal level, both PHMSA and the Energy Information Administration (EIA) collect data about LAUF gas. PHMSA and EIA instructions for determining the volume of LAUF gas are consistent. There are differences in the scope of the data collections and the method for calculating the percentage of LAUF gas.

LAUF gas is a combination of measurement inaccuracy and unknown leaks, but it is impossible to know the portion attributable to each. LAUF gas is not a valid proxy for either unknown leak volume or methane emissions.

PHMSA has not identified any potential safety issues surrounding LAUF gas; as such, neither alternate reporting nor measures would resolve any safety issue.

Since some State agencies use PHMSA LAUF gas data during ratemaking proceedings, while others use EIA data, both agencies should continue collecting LAUF gas data. Some agencies collect LAUF data directly from gas distribution pipeline operators as part of the ratemaking process.

PHMSA intends to propose changes to the instructions for PHMSA Form 7100.1-1, Gas Distribution System Annual Report, related to calculating the percent of LAUF gas and negative percent values. These changes would harmonize PHMSA and EIA methodologies for calculating the percentage of LAUF gas.

B. Background

Section 29 of the 2016 Protecting our Infrastructure of Pipelines and Enhancing Safety Act (PIPES Act) directed PHMSA, an agency of the U.S. Department of Transportation, to submit a report to Congress on the metrics provided to PHMSA and other Federal and State agencies related to LAUF natural gas from distribution pipeline systems.

Section 29 specifies the following elements for the report:

- An examination of different reporting requirements or standards for LAUF natural gas to different agencies, the reasons for any such discrepancies, and recommendations for harmonizing and improving the accuracy of reporting;
- An analysis of whether separate or alternative reporting could better measure the amounts and identify the location of LAUF natural gas from natural gas distribution systems;
- A description of potential safety issues associated with natural gas that is LAUF from natural gas distribution systems; and,
- An assessment of whether alternate reporting and measures will resolve any safety issues, including an analysis of potential impact, including potential savings, on rate payers and end users of natural gas products of such reporting and measures.

The Administrator must determine whether alternate reporting structures or recommendations included in the report would significantly improve the measurement and reporting of LAUF gas, and therefore, the safety of natural gas distribution systems. No later than one year after making this determination, the Administrator shall issue regulations—as deemed appropriate—to implement the recommendations.

PHMSA reviewed several documents during the preparation of this report. The three most relevant documents are summarized in the following paragraphs. If the URL provided below no longer leads to the document, PHMSA can provide a pdf of the document.

America Pays for Gas Leaks was prepared for Senator Edward J. Markey in August 2013 and found at http://www.markey.senate.gov/documents/markey_lost_gas_report.pdf. The document focuses mainly on natural gas emissions and the hazards of gas leaks. The document encourages States and non-regulated utilities to adopt a standard definition and methodology for calculating LAUF gas.

Lost and Unaccounted for Gas by ICF International was prepared for the Massachusetts Department of Public Utilities on December 23, 2014 and found at http://www.mass.gov/eea/docs/dpu/gas/icf-lauf-report.pdf. Among other things, the document concludes that LAUF gas is not an appropriate surrogate for methane emissions.

LAUF & Distribution Pipe Replacement – A National Perspective was prepared by the American Gas Association on November 17, 2015 and found at https://www.epa.gov/sites/production/files/2016-04/documents/5lacey.pdf. The document emphasizes that there is no correlation between LAUF gas and emissions.

C. Overview of LAUF Gas

LAUF gas is the difference between the volume of natural gas supply and the volume of natural gas consumption. Natural gas is bought and sold by volume, but since natural gas is highly compressible, the pressure and the temperature at which the volume is recorded has a strong effect on the measured volume. To ensure equitable payments for natural gas, the industry has

adopted standard conditions for measurement of volume: 60 degrees Fahrenheit and 14.73 pounds per square inch absolute.

Natural gas supply to distribution systems is typically measured with specialized instruments to measure the volume, temperature, and pressure of the gas. This data is used to convert the volume to standard conditions. These measurement instruments are sophisticated, but not perfect. Slight inaccuracy in the measurement of volume, temperature, and pressure can cause inaccurate calculation of the standard condition volume of natural gas supply.

Natural gas consumption for a distribution system includes metered volumes and known losses.

When natural gas is delivered to a typical residential customer, the volume is measured with a meter. Some—but not all—volume meters automatically compensate for the difference between ambient temperature and standard temperature. Pressure is assumed to be constant based on the regulator installed prior to the volume meter. Volume meters have a tendency to drift away from accurate measurement over time. Also, the technology used in temperature-compensated residential meters is not precise. The regulator upstream of the volume meter may drift from its set point, passing natural gas to the volume meter at a slightly higher or lower pressure than expected. As with natural gas supply to distribution systems, the calculation of the standard condition volume of natural gas delivered to residential customers is inaccurate.

When natural gas is delivered to industrial and commercial customers, measurement device sophistication generally increases as the volume of gas being measured increases. However, measurement of the standard condition volume delivered to these customers will never be 100 percent accurate.

In addition to measurement inaccuracy, operational factors can also contribute to LAUF gas. Customer volume meter readings are not recorded at the same time. Some volume of natural gas will be unaccounted for when the "gas-in" and "gas-out" meter-reading cycles are not synchronized. In anticipation of high customer demand, the pressure within natural gas distribution systems can be increased to provide more energy available for delivery, a process often referred to as "line pack." Essentially, more standard volume gas is pushed through the gas-in meters, but not reflected in the gas-out meter readings.

Known losses from the distribution system are typically not metered and must be estimated. During maintenance, construction, and emergency response, natural gas may intentionally be released. Gas may also leak from the distribution system at locations that may or may not be known to the operator of the distribution system. Generally, known leaks are small and release a very limited volume of gas. When leak locations are unknown, the volume of gas being released is also unknown. Operators of natural gas distribution systems estimate the volume of known lost gas and include this volume in gas consumption when calculating LAUF gas.

LAUF gas is calculated as the difference between gas supply and gas consumption. LAUF gas is a combination of measurement inaccuracy and unknown leaks, but it is impossible to know the portion of LAUF gas attributable to each. LAUF gas is not a valid proxy for either unknown leak volume or methane emissions.

D. Analysis of Agency Reporting and Data Collection

At the Federal level, both PHMSA and the EIA collect data about LAUF gas. PHMSA and EIA instructions for determining the volume of LAUF gas are consistent. There are differences in the scope of the data collections and the method for calculating the percentage of LAUF gas.

EIA collects data for a single State and a single calendar year in EIA Form 176. Companies report standard condition volumes for six components of gas supply and nine components of gas disposition for all natural gas pipeline system types they operate in a State. If a company operates gas gathering, gas distribution, gas transmission, and liquefied natural gas systems, the 15 EIA volumes include all 4 system types. EIA data does not provide LAUF gas for just gas distribution systems. The sum of gas supply volumes can exceed the sum of gas consumption volumes, resulting in negative LAUF gas. In the Natural Gas Annual, the EIA provides State summaries of LAUF gas in Table A1. When calculating the percentage of LAUF gas, EIA divides the LAUF gas volume by the gas consumption volume.

PHMSA collects the percentage of LAUF gas on PHMSA Form 7100.1-1 for a single State over a 12-month period ending June 30. PHMSA selected June 30 as the calculation date for LAUF to avoid the predominantly cold-weather month of December. Additionally, residential customer demand is lower in June than December, minimizing the impact of diverse meter-reading cycles. Selecting June for the calculation date also helps to avoid inaccuracy due to line pack, as discussed in the previous section. PHMSA does not collect LAUF gas data for any system type other than gas distribution. PHMSA collects only the percentage of LAUF gas and does not collect any component volumes. If a company calculates a negative value for LAUF gas, it has likely either overcompensated for measurement conditions or overestimated known losses. Therefore, PHMSA instructs companies that calculate a negative value for percent of LAUF gas to report zero. PHMSA instructs companies to calculate percent of LAUF gas by dividing the LAUF volume by the gas supply volume. PHMSA has regulatory responsibility for both natural gas distribution systems and systems that transport propane vapor. PHMSA collects percent LAUF gas from all distribution operators, regardless of commodity.

Many of PHMSA's State pipeline safety partners are in State agencies with gas distribution ratemaking authority. Feedback provided by these State pipeline safety partners shows that there is wide variation among State agencies in the use of LAUF gas. Some State agencies do not consider LAUF gas in ratemaking cases, while others use EIA or PHMSA data. Some agencies collect LAUF data directly from gas distribution pipeline operators as part of the ratemaking process.

The Environmental Protection Agency (EPA) collects greenhouse gas emission data from gas distribution pipeline operators. During the development of EPA emission data collections, LAUF gas was considered and rejected as a measure of emissions.

E. Potential Safety Issues Surrounding LAUF Gas.

Natural gas leaks certainly have potential safety issues as described in the report titled America Pays for Gas Leaks (see section B). However, LAUF gas is a combination of measurement inaccuracy and unknown leaks and it is impossible to know the portion attributable to each. Two gas distribution operators with the same volume of LAUF gas could have drastically different volumes of unknown leaks.

LAUF gas is not a valid proxy for either unknown leak volume or methane emissions. PHMSA has not identified any potential safety issues surrounding LAUF gas.

F. Alternate Reporting and Measures

PHMSA has not identified any potential safety issues surrounding LAUF gas; as such, neither alternate reporting nor measures would resolve any safety issue.

G. Conclusion

PHMSA and EIA instructions for calculating the volume of LAUF gas are consistent. However, there are differences in the data collection scopes and the method for calculating the percentage of LAUF gas.

PHMSA's collection of the percentage of LAUF gas based on 12 months ending June 30 is timed to minimize inaccuracy due to operational factors.

EIA's collection of 15 component volumes used to calculate LAUF gas provides additional insight into the company's natural gas operations within a calendar year.

Since some State agencies use PHMSA LAUF gas data during ratemaking proceedings, while others use EIA data, both agencies should continue collecting LAUF gas data.

PHMSA intends to propose changes to the instructions for PHMSA Form 7100.1-1, Gas Distribution System Annual Report, related to calculating the percent of LAUF gas and negative percent values. PHMSA intends to propose calculating percent LAUF gas by dividing the LAUF volume by the gas disposition volume. PHMSA also intends to propose allowing a negative value to be reported for percent LAUF gas. These changes would harmonize the PHMSA and EIA methodologies for calculating percent LAUF gas.