

2024 NGA Spring Conference

Understanding The Leak Extent Method to Prioritize Non-Hazardous Leak Mitigation

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Agenda

- LDAR GPAC Leak Grading & Repair Recommendations
- Harvard Study
 - ✓ What is the Leak Extent Method ?
 - ✓ Why is this Method Important ?
 - ✓ How it all Works ?
- Next Steps
- Q&A And Wrap Up



Leak Grading and Repair

Committee Voting Slide

The proposed rule, as published in the Federal Register and as supported by the Preliminary Regulatory Impact Analysis and Draft Environmental Assessment, regarding grade 2 leak criteria, for the proposed rulemaking is technically feasible, reasonable, cost-effective, and practicable if the following changes are made:

- Distribution: 10 SCFH and leak extent criteria
 - Is of sufficient magnitude to pose significant harm to the environment, considering one of the following characteristics:
 - A) estimated leakage rate of 10 scfh or more as indicated by suitable technology, or
 - B) For below-grade and subsurface leaks, estimated leak extent (land area affected by gas migration) of 2,000 square feet or greater. or
 - C) an alternative method demonstrated to meet the capability of identifying a minimum leakage rate of 10 SCFH consistent with method A with a notification to PHMSA in accordance with §192.18.
 - PHMSA consider the availability of the leak extent approach for appropriate conditions.
- Transmission and gathering:
 - Modifying grade 2 leak requirements to include:
 - Any reading of gas that does not qualify as a grade 1 leak that occurs in the pipe body of a transmission pipeline or a regulated gas gathering line operating at high stress (greater than 30% SMYS), or
 - A transmission pipeline or regulated gas gathering line leak measured to be greater than an appropriate volume threshold for a transmission or regulated gathering line [such as 5-10 kg/hr].



Leak Grading and Repair

Committee Voting Slide

The proposed rule, as published in the Federal Register and as supported by the Preliminary Regulatory Impact Analysis and Draft Environmental Assessment, regarding leak grading and repair requirements (Grade 3 criteria and repair timelines) for the proposed rulemaking is technically feasible, reasonable, cost-effective, and practicable if the following changes are made:

- Repair timeline
 - Revise general repair timeline from 24 months to 36 months
 - HCA and Class 3+4 gas transmission lines: 1 year
- Grade 3 Criteria:
 - Repair is required for grade 3 gas distribution pipelines with an emissions rate greater than or equal to 5 scfh, or a leak extent method equivalent to 5 scfh, or an alternative method demonstrated to meet the capability of identifying a minimum leakage rate of 5 scfh with a notification to PHMSA in accordance with Sec. 192.18. Repair is required within 36 months, unless the pipeline is scheduled for replacement and replaced within 7 years. All other grade 3 leaks are to be re-evaluated at a 1-yr reinspection interval. PHMSA would evaluate where a leak extent method would be appropriate and equivalent.
- PHMSA consider the prioritization process for elimination of grade 3 leaks.

GPAC Approved
13—2
11/30/2023

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PHMSA: Your Safety is Our Mission



2016 Hendrick et al. “Super-emitter” Study

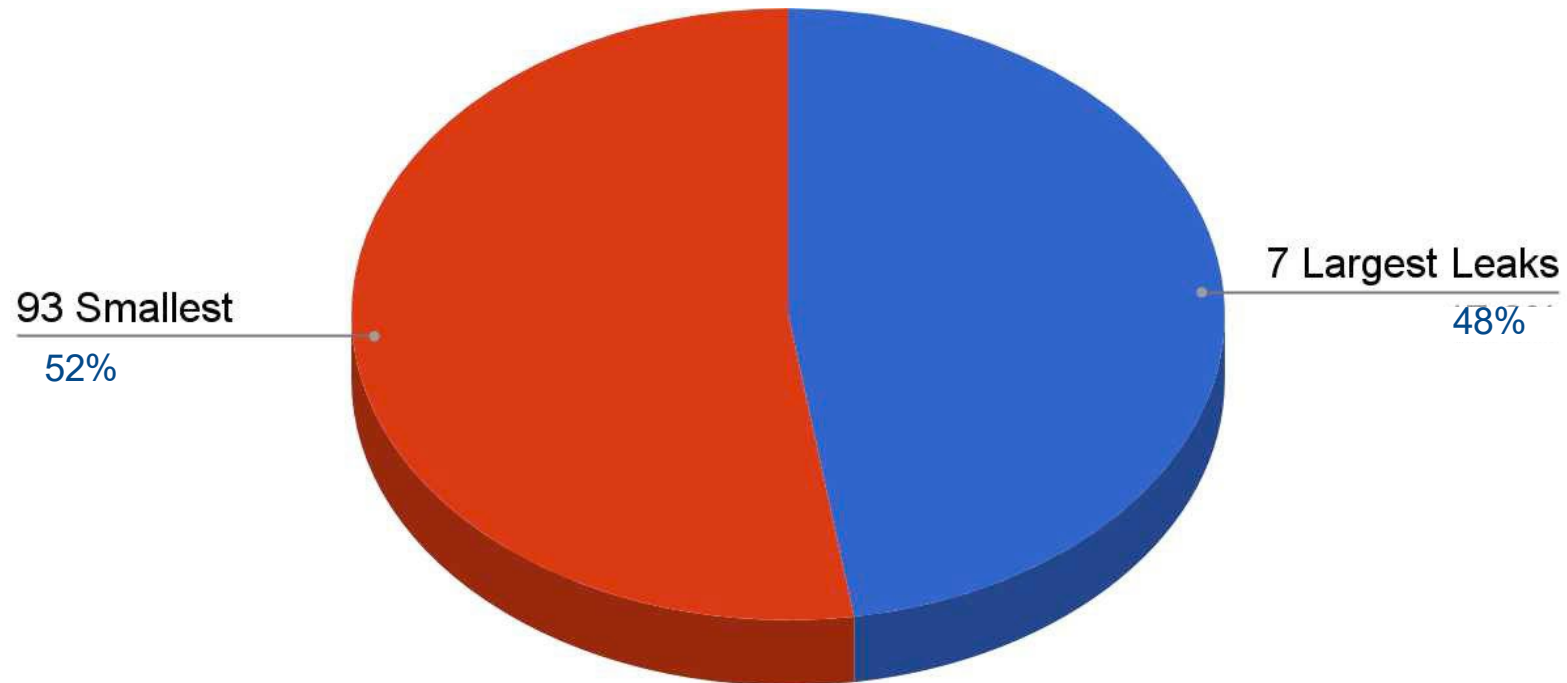
7% of Leaks Emit Half of All the Gas

Research conducted by Boston University¹⁵ in 2016 found that in Greater Boston just 7% of the leaks on the pipes under the streets in the distribution system emit fully half of all the gas by volume. These leaks are called super-emitting leaks.

Scientific research has duplicated this relationship from wellhead to distribution system, showing that a small fraction of the leaks are responsible for half the emissions.



2016: Hendrick et al. “Super-emitter” Study Found 7% of Leaks Emit Almost Half the Gas



Emissions of 100 leaks in Boston area (cast iron, primarily low pressure)

Hendrick's Study Used the Chamber Method

Scientifically verified but not "field practical"



Significant Environmental Impact Law Passed in 2016


- In 2016, the Gas Leak Allies, a coalition of over 25 nonprofits and researchers working to reduce emissions, worked to develop and pass new legislation requiring that these super-emitting gas leaks of “significant environmental impact” (SEI) must be repaired.
- Grassroots mobilization by Mothers Out Front was a driving force in this effort. Unfortunately, with the concept of super-emitting leaks so new, *the gas companies had no proven method to identify which unrepaired leaks in the state were high emitters.*



The 2017 Large Volume Leak Study

- In response, in 2017 HEET coordinated the “Large Volume Leak Study”, working with Columbia Gas MA, Eversource Gas, and National Grid Gas, as well as with Gas Safety Inc., Mothers Out Front and other stakeholders.
- The study measured leak emissions using the chamber method, a peer reviewed method for measuring emissions over time, and then tested five proposed proxy methods for identifying the largest volume leaks quickly in the field. Gas workers worked together with grassroots volunteers and scientists to collect the data on leaks across the state.





**Identifying and Rank-Ordering Large Volume
Leaks in the Underground
Natural Gas Distribution System of Massachusetts**

Zeyneb Pervane Magavi
A Thesis in the Field of Sustainability
for the Degree of Master of Liberal Arts in Extension Studies

Harvard University
May 2018

The Chamber Method Flux Measures Were Used to Benchmark The Leak Extent Method

Participating gas utilities selected 72 Grade 3 gas leaks across the state, representing all leak-prone pipe materials (cast iron, wrought iron, bare steel, coated steel, and old plastic) and pressures ranging from 0.5 – 99 PSI.

A previous study found a heavy-tailed distribution of natural gas leaks by volume in a cast iron low-pressure leak population,

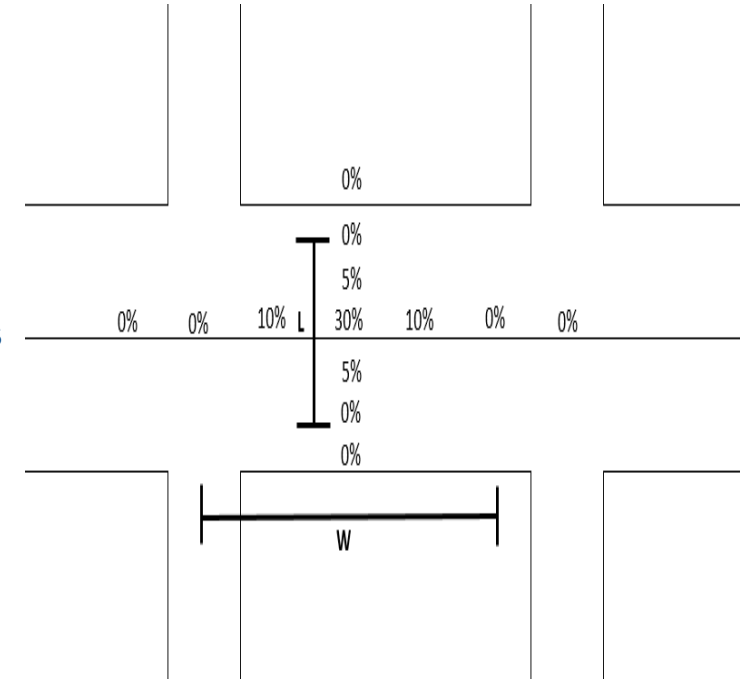


Standardized Survey Method to Measure Leak Footprint

This protocol was created by all MA gas companies in Spring of 2018 in order to enact the leak extent method, adhering to the Shared Action Plan.

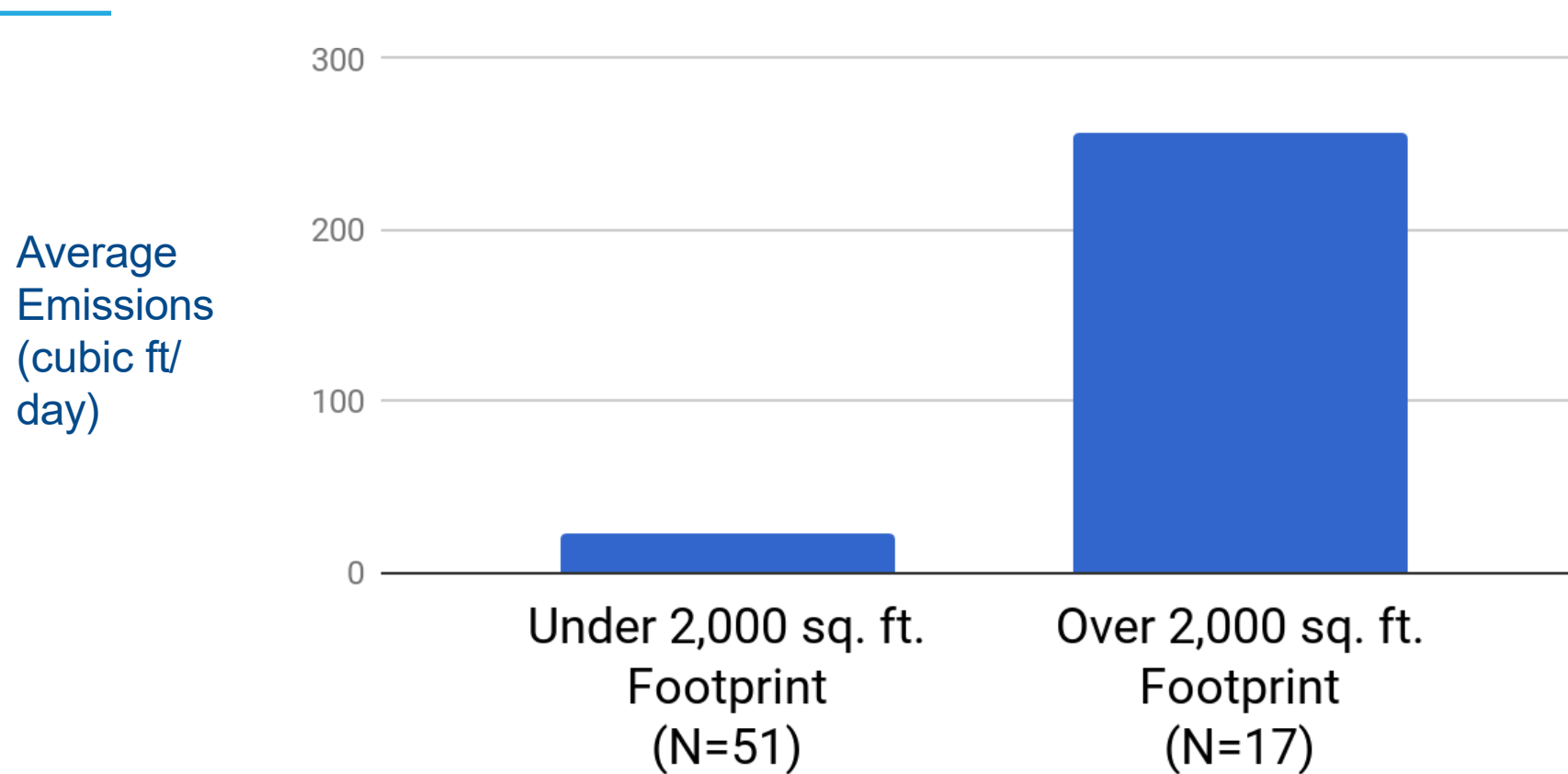
Suggested Method to Establish Leak Extent using CGI and Barhole

1. Establish the initial leakage perimeter of the suspected leakage area using a surface gas detection survey in accordance with appropriate Company standards or procedures.
2. If a gas indication is found, continue to establish the leakage perimeter by using the subsurface gas detection survey in accordance with appropriate Company standards or procedures.
3. Leak Extent is measured by multiplying the greatest width (perpendicular to the pipe) by the longest length (parallel to the pipe) to get total surface area. The width and length is established based on zero to zero readings.

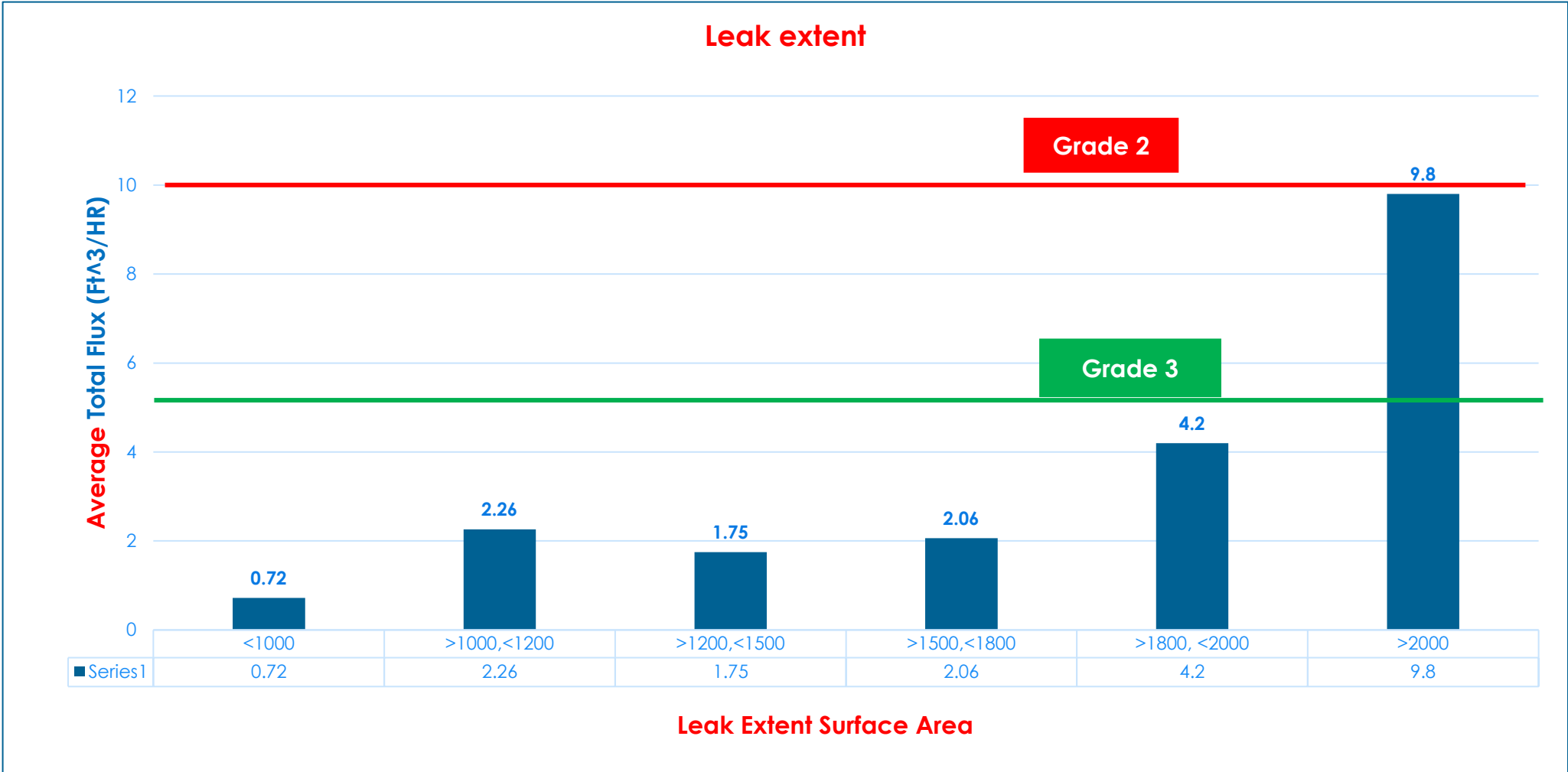


Research Key Findings

Leak footprint IS correlated with emissions



Average Total Flux (CF/Hour)



Key Findings of the 2017 Large Volume Leak Study

- ✓ The study concluded that the ***leak extent method was the fastest and most reliable proxy method for identifying high emitting leaks***. This method classifies a leak with a gas-saturated surface area larger than 2,000 ft² as emitting enough gas to be considered a leak with a significant environmental impact (SEI).
- ✓ The study found the emissions of a leak are strongly correlated (n=67, R²=0.86) with the leak extent, or size of the gas-saturated surface area over the leak. The bigger the leak, the greater the emissions.

Based on the outcomes of the Large Volume Leak Study, in October 2017, HEET, Columbia Gas, Eversource, and National Grid created a five-year “Shared Action Plan”. The three gas companies and HEET submitted comments jointly to the Massachusetts Department of Public Utilities (DPU) with the request that the leak extent method and the Shared Action Plan be enacted as regulation.

Questions ??

