

Methane Emissions from Distribution M&R Stations

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Together, Building
a Better California



2019 Annual Leak Report

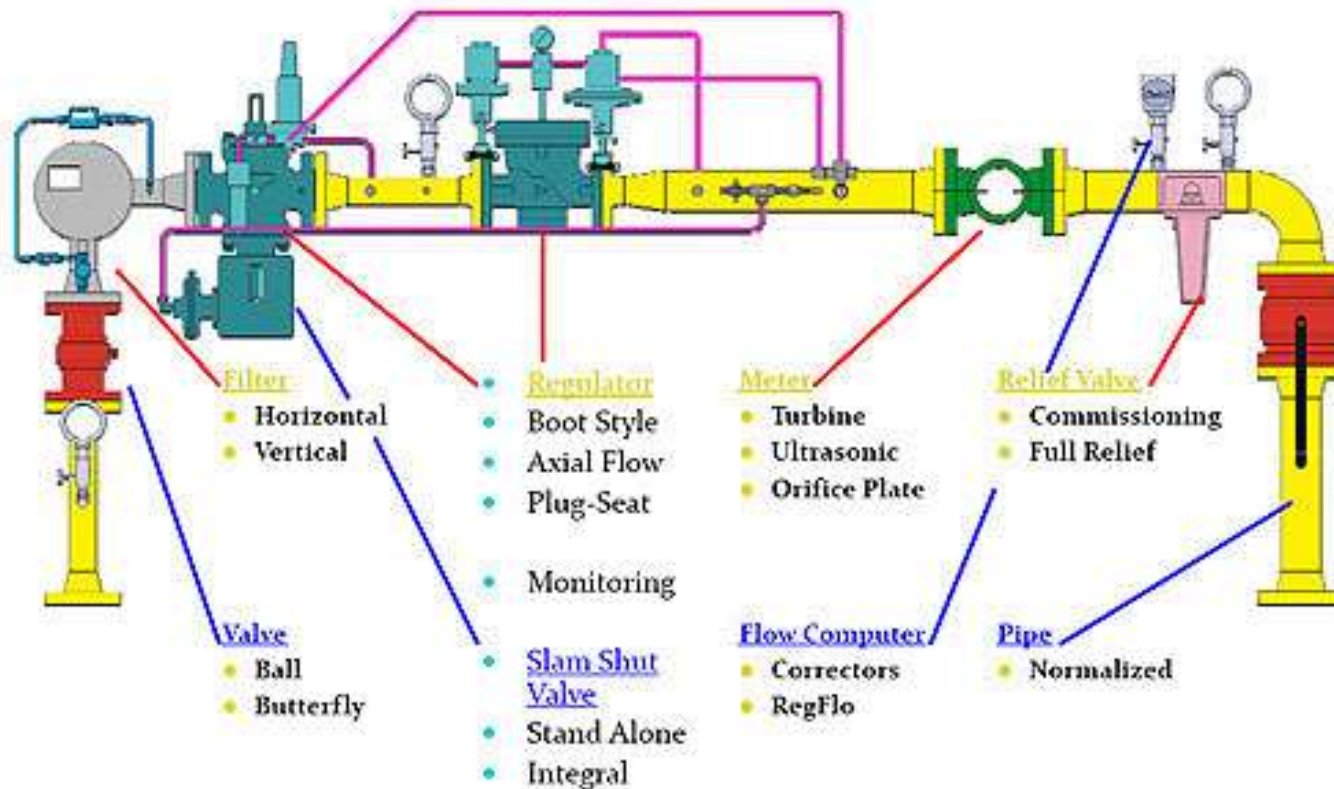
- Distribution M&R stations account for 25% of PG&E's overall emissions.
- Population-based emission factors used are old (GRI 1996), new emission factors are available (WSU 2013).
- Population-based emission factors do not show leak abatement efforts.

Station Classification	Number of Stations	Annual Emissions (Mscf)	GRI Emission Factor (Scfh)	WSU Emission Factor (Scfh)
A1: Above Ground < 100 psi	11	447	4.6	-
A2: Above Ground [100-300] psi	88	78,892	102.3	5.9
A3: Above Ground >300 psi	415	699,068	192.3	12.8
B1: Below Ground < 100 psi	320	308	0.11	0.1
B2: Below Ground [100-300] psi	679	1,249	0.21	0.1
B3: Below Ground >300 psi	879	10,581	1.4	0.1
Total	2,392	790,545		

Emissions are driven by two categories of regulation stations (A2 and A3) that are assigned very high emission factors.

Source: R15-01-008 2019 June Report

Distribution Regulation Stations



- Distribution Regulation Stations do not include bleeding pneumatic devices such as controllers and actuators.
- Except for the Relief Valve, all emissions are related to unintentional leaks.

Source: E. Zarei et al. "Dynamic Safety assessment of natural gas stations using Bayesian network" Journal of Hazardous Materials Vol. 321, January 2017, pp 830-840



Distribution Regulation Stations





Distribution M&R Station Emission Calculations

- Analyze historical SAP station leak data
- Apply filters for Facility Type to Regulation and Distribution
- Align SAP Leak Sources to CARB MRR Components
- Apply EFs
- Calculate known emissions using same methodology as Distribution Pipeline Leaks
- Calculate unknown emissions

Distribution M&R Stations Station Leaks and Emissions Proposed Emission Factors

» Component leaker EFs from CARB MRR (Appendix A Table 7)

Component	Emission Factor (scf CH ₄ /hour/component)	scf CH ₄ / scf NG ^A	Emission Factor (Mscf NG/component-day)
Connector	1.69	0.95	0.0427
Block Valve	0.557	0.95	0.0141
Control Valve	9.34	0.95	0.2360
Pressure Relief Valve	0.27	0.95	0.0068
Orifice Meter	0.212	0.95	0.0054
Regulator	0.772	0.95	0.0195
Open-ended Line	26.131	0.95	0.6602

A. Subpart W default value for CH₄ in NG [§ 98.233(u)(2)]

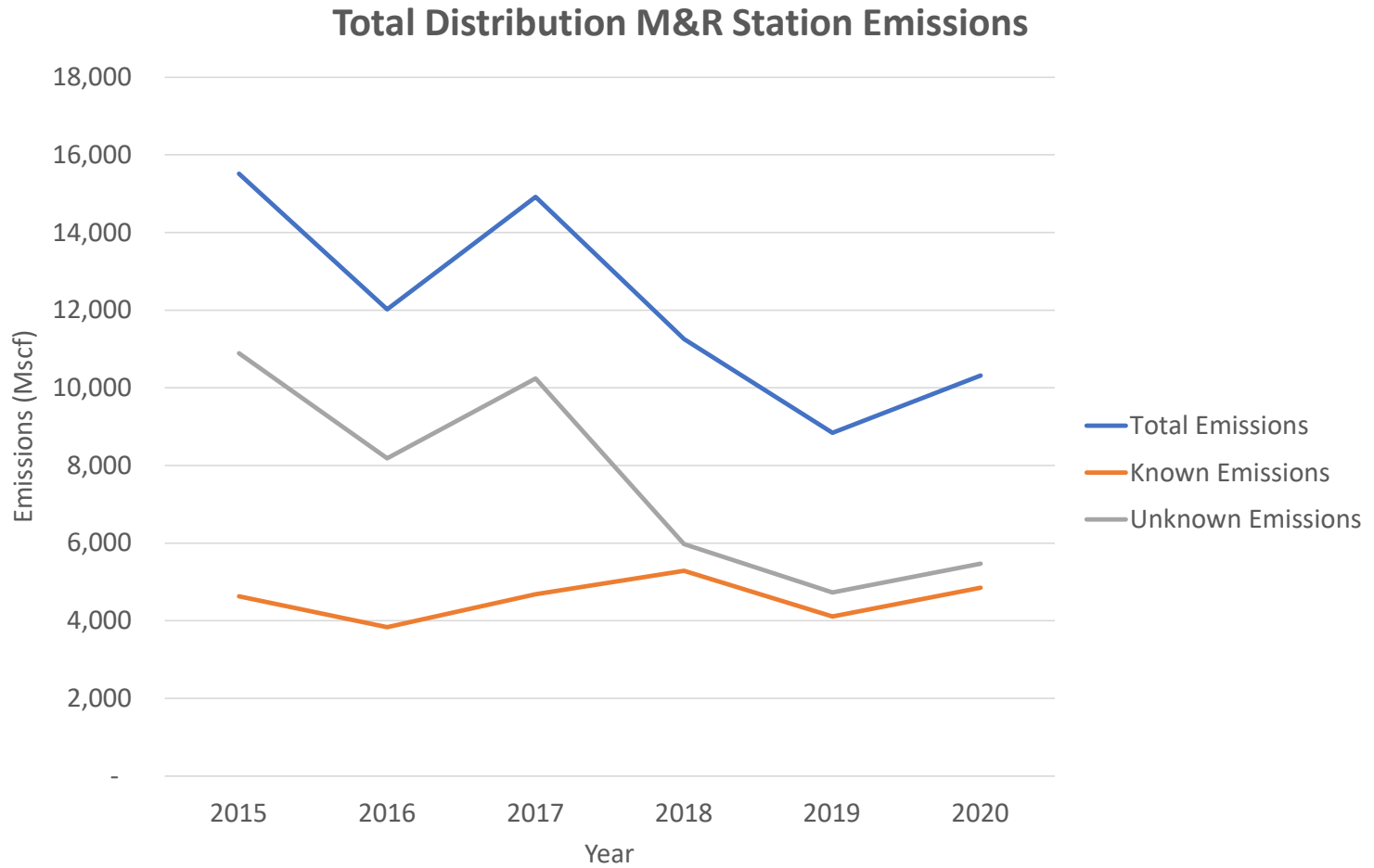
» Pneumatic device emission rates/EFs from manuf. data or CARB MRR (Appendix A Table 3)

Component	Emission Factor (scf THC/hour/component)	scf NG/ scf THC ^A	Emission Factor (Mscf NG/device-day)
Low Continuous Bleed Pneumatic Device	1.37	1.0263	0.0337
High Continuous Bleed Pneumatic Device	18.20	1.0263	0.4483
Intermittent Bleed Pneumatic Device	2.35	1.0263	0.0579

A. 1.0263 = 0.975/0.95 (Subpart W default value for CH₄ in THC [§ 98.233(r)] / Subpart W default value for CH₄ in NG [§ 98.233(u)(2)])



Total Distribution M&R Station Emissions



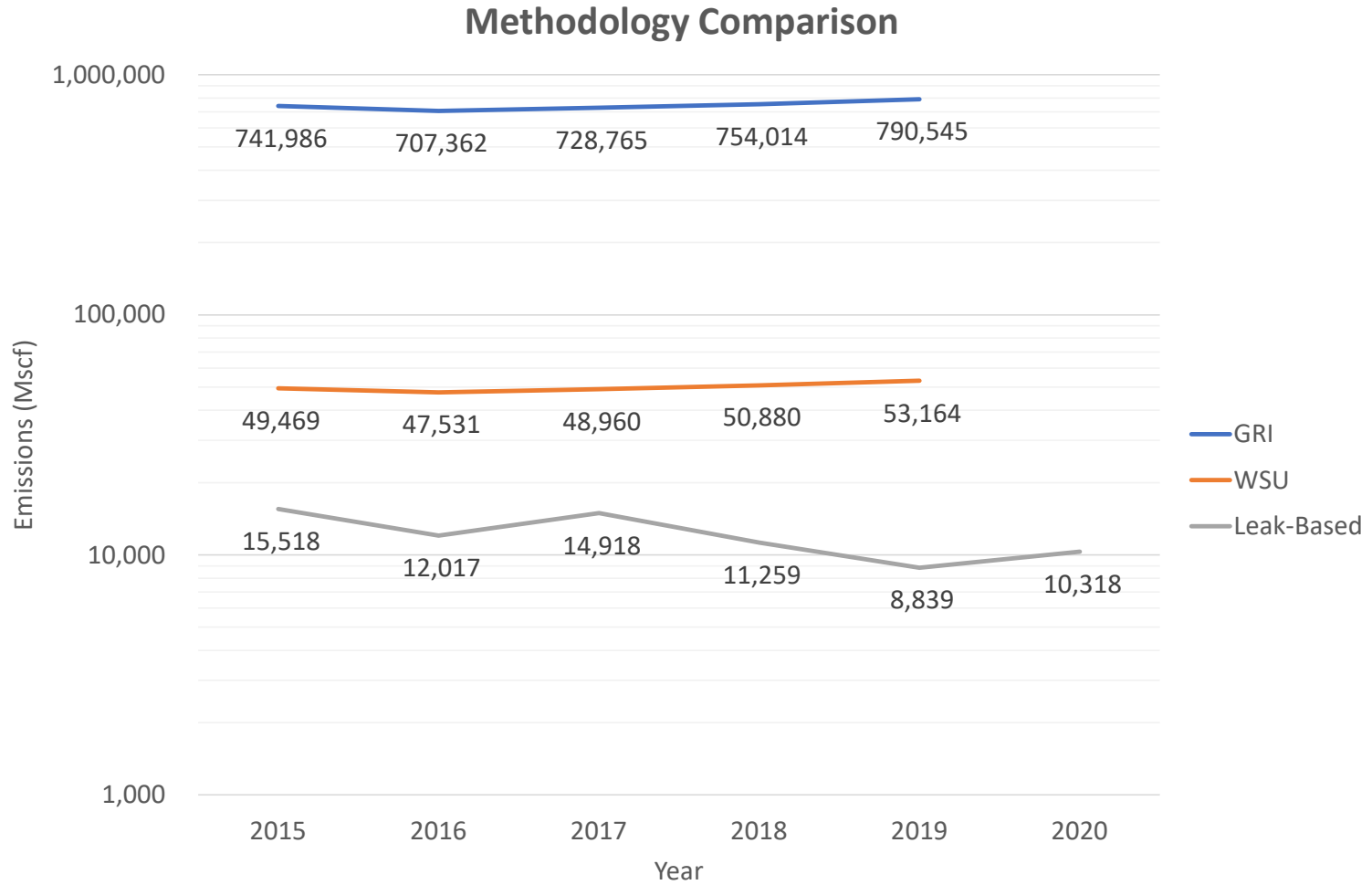


Exclusions & Data Uncertainties

- **Exclusions:**
 - TLA leaks found by Gas Pipeline Operation & Maintenance Personnel
 - Emission by design
 - Emission by operation
- **Data Uncertainties:**
 - Station leak list includes service valves, curb valves, farm tap/HPR leaks
 - Data quality for leak source & notes/remarks
 - Limited repair information



Methodology Comparison





Highlights

- Adjust 2015 baseline using the leak-based approach
- Calculate 2021 and future reporting, using leak-based approach
- Distribution M&R stations represent 0.4% of PG&E's overall emissions
- Improvement in unknown emissions due to transitioning from a 5 to 3-year survey interval
- Distribution M&R Station leak repairs follow the grading criteria.
 - Gr 1 = repair immediately
 - Gr 2 = scheduled repair within 1 year
 - Gr 3 = monitor



Next Steps

- **NYSEARCH T-786 Classification of Methane Emissions at Regulator Stations**
 - **Objective: Develop a classification framework and methodology that will provide more accurate quantitative estimation of methane emissions at regulator stations.**
- **Conduct field measurements to establish an emission factor by bubble size for M&R station leaks**
- **Continue to work with Gas Pipeline Operations & Maintenance to improve data quality and reporting**
- **Continue to utilize Super emitter surveys to identify large leaks from Distribution M&R Stations so that we can repair them faster**

Thank you

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