

# 2025 Natural Gas Leak Abatement (NGLA) Winter Workshop

10:00am-3:00pm

Wednesday, February 12, 2025



California Public  
Utilities Commission

# Welcome, Introductions, and Agenda

CPUC




California Public  
Utilities Commission

# Housekeeping Notes

- **Audio**

- Please mute your microphone unless you are speaking

- **Questions**

- Please hold questions for Q&A sessions at the end of presentations, unless otherwise noted by speaker
- Click the hand next to your name in the participant list to raise hand → 
- Alternatively, type questions in the chat
- Staff will maintain a list of outstanding questions to resolve after the workshop

- **Timing**

- We will try to stick to starting times for each presentation outlined in the agenda


- **Recording**

- A link to the recording will be made available on the CPUC NGLA webpage (<https://www.cpuc.ca.gov/about-cpuc/divisions/safety-policy-division/risk-assessment-and-safety-analytics/natural-gas-leak-abatement>)

# Agenda

PRESENTER	TOPIC	START TIME	END TIME
Introduction and Agency Reports			
CPUC/CARB	Introduction/Welcome	10:00 AM	10:10 AM
CPUC/CARB	Review of the 2024 Joint Report	10:10 AM	10:25 AM
Appendix-Specific R&D and Updates			
Joint Utilities	Appendix 2 and 5 Emission Factors and Adjustments	10:25 AM	10:40 AM
PG&E	Super Emitter Program Update	10:40 AM	10:55 AM
Template and Reporting Updates			
CPUC/CARB	Proposed Changes to the 2025 Reporting Templates and Procedures	10:55 AM	11:20 AM
-	Lunch	11:20 AM	12:45 PM
Broader R&D Updates and Compliance Plan Efforts			
PG&E	R&D Project Updates	12:45 PM	1:00 PM
Sempra	2024 R&D Overview	1:00 PM	1:45 PM
	Break	1:45 PM	2:00 PM
Sempra	Emissions Strategy Program Showcase	2:00 PM	2:40 PM
CPUC/CARB	Closing and Next Steps	2:40 PM	2:45 PM

# Questions?

- Click the hand next to your name in the participant list 
- The host will call on your name when it is your turn to speak
- Or, type question into the chat





# Review of the 2024 Joint Report

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Natural Gas Leak Abatement Program  
2025 CPUC Winter Workshop  
February 12, 2025

# Background

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- The 2024 Joint Report is the tenth Joint Report prepared by CPUC and CARB, as required by SB 1371.
- The Report presents total industry emissions and the systemwide leak rate.
- CPUC issued data request and reporting template on March 29, 2024.
- All gas companies submitted the 2023 data on June 14.
- The list of questions sent to utilities in August required minimal correction of the initial submittals.
- CPUC/SPD sent out three approval letters in September and October for the 2015 Baseline Adjustments.

# Total 2023 Statewide Natural Gas Emissions

- The 2023 total statewide NG emissions are about 3,176 MMscf:
  - 2% lower than the 2022 emissions
- D.17-06-015 targets 40% emissions reduction by 2030 from 2015 baseline
  - Total 2023 emissions for all utilities showed a 34% reduction from baseline

**Table 1: Total Statewide Natural Gas Emissions Reported Under SB 1371**

Sector Emissions	2015 Baseline*	2022**	2023	2015 Baseline to 2023 Change		2022 - 2023 YOY Change	
				MMscf, MMT CO <sub>2</sub> e	% Change	MMscf, MMT CO <sub>2</sub> e	% Change
Volume of Natural Gas (MMscf)	4,795	3,236	3,176	(1,619)	(34%)	(60)	(2%)
Mass Equivalent, 100-Yr GWP, AR 4 (MMT CO <sub>2</sub> e)	2.15	1.45	1.42	(0.72)	(34%)	(0.03)	(2%)
Mass Equivalent, 20-Yr GWP, AR 4 (MMT CO <sub>2</sub> e)	6.18	4.17	4.10	(2.09)	(34%)	(0.08)	(2%)



# 2023 Natural Gas Emissions by Utility

- D.19-08-020 restricts rate recovery beginning 2025, for emissions greater than 20% below the 2015 baseline for PG&E and SoCalGas.
  - PG&E: 38% reduction from the baseline
  - SoCalGas: 36% reduction from the baseline

**Table 5: Total Natural Gas Emissions by Gas Company**

Entity	2015 Baseline		2022		2023		2015 Baseline to 2023 Change		2022-2023 YOY Change	
	Mscf	% Total	Mscf	% Total	Mscf	% Total	Mscf	% Change	Mscf	% Change
Pacific Gas & Electric	2,204,823	46%	1,490,564	46%	1,367,005	43%	(837,818)	(38%)	(123,559)	(8%)
Southern California Gas	2,057,487	43%	1,249,680	39%	1,311,294	41%	(746,193)	(36%)	61,614	5%
San Diego Gas & Electric	285,355	6%	250,505	8%	258,754	8%	(26,601)	(9%)	8,249	3%
Southwest Gas	214,307	4%	229,905	7%	218,187	7%	3,880	2%	(11,718)	(5%)
Wild Goose Storage	24,003	0.50%	7,392	0.23%	7,149	0.23%	(16,854)	(70%)	(243)	(3%)
Gill Ranch Storage	3,636	0.08%	4,368	0.13%	4,309	0.14%	673	18%	(59)	(1%)
Lodi Gas Storage	3,919	0.08%	2,494	0.08%	8,114	0.26%	4,195	107%	5,620	225%
Central Valley Gas Storage	806	0.02%	432	0.01%	721	0.02%	(85)	(11%)	289	67%
West Coast Gas	700	0.01%	257	0.01%	204	0.01%	(496)	(71%)	(53)	(21%)
Alpine Natural Gas	6	<0.01%	275	0.01%	263	0.01%	257	>100%	(12)	(4%)
Total	4,795,042	100%	3,235,872	100%	3,176,000	100%	(1,619,042)	(34%)	(59,872)	(2%)

# Review of System Categories with Emission Decreases

- 91 MMscf decrease in Transmission Pipelines, mainly from Blowdowns
- 37 MMscf decrease in Distribution Mains and Services was mainly from Blowdowns, in Component Leaks, and Compressor emissions.
- 60 MMscf decrease in Total emissions mainly due to decreases in categories for Transmission Pipelines and Distribution Mains and Services.

System Category	2015 Baseline		2022		2023		2015 Baseline to 2023 Change		2022 – 2023 YOY Change	
	MMscf	% Total	MMscf	% Total	MMscf	% Total	MMscf	% Change	MMscf	% Change
Transmission Pipeline	589	12%	208	6%	117	4%	(472)	(80%)	(91)	(44%)
Transmission M&R Station	777	16%	705	22%	714	22%	(63)	(8%)	9	1%
Transmission Compressor Station	187	4%	96	3%	113	4%	(74)	(40%)	17	18%
Distribution Mains & Services	1,472	31%	925	29%	888	28%	(584)	(40%)	(37)	(4%)
Distribution Metering & Regulating Stations	284	6%	269	8%	265	8%	(19)	(7%)	(3)	(1%)
Customer Meters	1,133	24%	901	28%	930	29%	(204)	(18%)	29	3%
Underground Storage	353	7%	133	4%	149	5%	(203)	(58%)	17	13%
<b>Total</b>	<b>4,795</b>	<b>100%</b>	<b>3,236</b>	<b>100%</b>	<b>3,176</b>	<b>100%</b>	<b>(1,619)</b>	<b>(34%)</b>	<b>(60)</b>	<b>(2%)</b>

# Review of System Categories with Emission Increases

- 17 MMscf increase in Transmission Compressor Stations, mainly from Blowdowns.
- 29 MMscf increase in Customer Meters included a 71 MMscf increase by one utility, and a 41 MMscf decrease by another utility.
- 17 MMscf increase in Underground Storage mainly due to increases in Component Leaks and Compressor Emissions.

**Table 2: Total Natural Gas Emissions by System Category**

System Category	2015 Baseline		2022		2023		2015 Baseline to 2023 Change		2022 – 2023 YOY Change	
	MMscf	% Total	MMscf	% Total	MMscf	% Total	MMscf	% Change	MMscf	% Change
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<b>Total</b>	<b>4,795</b>	<b>100%</b>	<b>3,236</b>	<b>100%</b>	<b>3,176</b>	<b>100%</b>	<b>(1,619)</b>	<b>(34%)</b>	<b>(60)</b>	<b>(2%)</b>

# System-wide Leak Rate

- Five of the six throughput categories were similar to 2022.
- The System-wide Leak Rate was also similar.
- The System-wide Leak Rate has decreased from 2015 due to the decrease in the total emissions.

<b>Table 4: System-wide Throughput, Emissions, and Leak Rate - 2015, 2022, and 2023</b>			
Throughput Category	Natural Gas Volume (MMscf)		
	2015 Baseline	2022	2023
Total Storage Annual Volume of Injections to Storage	199,522	144,321	242,960
Total Storage Annual Volume of Gas Used by the Gas Department	N/A	1,687	2,114
Total Transmission Annual Volume of Gas Used by the Gas Department	7,717	6,185	9,934
Total Transmission Volume of Annual Gas transported to or for Customers in state	1,832,676	1,739,384	1,792,246
Total Transmission Volume of Annual Gas transported for Customers out of state	16,775	14,894	15,086
Total Distribution Annual Volume of Gas Used by the Gas Department	261	540	647
<b>Total Throughput</b>	<b>2,056,950</b>	<b>1,964,547</b>	<b>2,062,987</b>
<b>Total Emissions</b>	<b>4,795</b>	<b>3,236</b>	<b>3,176</b>
<b>System-wide Leak Rate <math>\left( \frac{\text{Total Emissions}}{\text{Total Throughput}} \right)</math></b>	<b>0.23%</b>	<b>0.16%</b>	<b>0.15%</b>



# Approved 2015 Baseline Adjustments

- The CPUC/SPD approved adjustments to the 2015 baseline emissions on September 23, 2024, for SoCalGas, on September 26, 2024, for Lodi Gas Storage, and on October 22, 2024, for San Diego Gas and Electric.
- All approvals are listed in Appendix A in the 2024 Joint Report.

SPD approved the following adjusted 2015 baseline emissions	Natural Gas Volume (MSCF)	
	Original 2015 Baseline	Adjusted 2015 Baseline Emissions
Southern California Gas, Component Fugitive Leaks in Transmission Compressor Stations	10,784	13,650
Southern California Gas, Pipeline Leaks in Distribution Main and Services Pipeline	576,261	719,581
Southern California Gas, Meter Leaks in Customer Meters	415,362	726,154
Southern California Gas, Compressor and Component Fugitive Leaks in Underground Storage	21,989	30,474
Lodi Gas Storage, Compressor Vented Emissions in Underground Storage	99	2,383
Lodi Gas Storage, Component Vented Emissions in Underground Storage	1,144	0
Lodi Gas Storage, Compressor and Component Fugitive Leaks in Underground Storage	0	1,144
San Diego Gas and Electric, Component Fugitive Leaks in Transmission Compressor Stations	2,919	3,512

# Summary

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- CPUC and CARB followed the process used in previous years to compile the 2024 Joint Report.
- D.17-06-015 implements the State's goal of reducing the 2015 Baseline natural gas emissions by 40% by 2030
  - The total self-reported emissions for all utilities in 2023 has shown a 34% reduction from the 2015 Baseline.
- D.19-08-020 adopts a restriction on rate recovery beginning 2025, for emissions greater than 20% below the 2015 Baseline levels for PG&E and SoCalGas.
  - Both PG&E and SoCalGas are exceeding this target.
- CPUC and CARB aim to finalize all template revisions by March 31, 2025, to avoid sending multiple reporting template updates.
- The proposed changes to the 2025 reporting template will be described in a later presentation.



# PROPOSED MODIFICATIONS TO APPENDIX 2 & 5 EMISSION FACTORS

February 12, 2025



# Introduction

## ➤ Background:

- Emission factors for Appendix 2 Transmission M&R Stations and Appendix 5 Distribution M&R Stations established pursuant to Senate Bill 1371 (SB 1371) and CPUC Decision 17-06-015 are currently estimated using the 2016 EPA Mandatory Reporting of Greenhouse Gases Rule (MRR) population-based or leaker-based emission factors (EFs).
- These EFs have recently been updated in an amendment published at 89 FR 42325, 42327 on May 14, 2024.
- To align emissions reporting across regulatory agencies, this presentation proposes adopting these new emission factors for M&R Station emissions reporting.



# Proposed Changes - Appendix 2 Transmission M&R Stations

- » Switch from facility population-based EFs to leaker-based EFs for fugitive station emissions and population-based EFs for vented station emissions from pneumatic devices.
  - These leaker-based EFs would be used for calculating "Component Fugitive Leaks" and "Component Vented Emissions" as Emission Source Categories to estimate current year and baseline emissions.
- » These leaker-based EFs for fugitive emissions would come either from Table W-4 of Subpart W of Part 98 or be derived from Company-Specific leak sampling data.

Onshore Natural Gas Transmission Compression	Emission Factor	
	scf/hour/component	Mscf/day/component
Leaker Emission Factors - Non-Compressor Components, Gas Service		
Valve	6.42	0.154
Connector	5.71	0.137
Open-Ended Line	11.27	0.270
Pressure Relief Valve	2.01	0.048
Meter or Instrument	2.93	0.070
Other	4.1	0.098



# Proposed Changes - Appendix 2 Transmission M&R Stations

- » Similarly, the population-based EFs for vented emissions from pneumatic devices would come either from Table W-1 of Subpart W of Part 98 or be derived from Company-Specific emission sampling data.

Onshore Natural Gas Transmission Compression	Emission Factor	
	scf/hour/component	Mscf/day/component
Population Emission Factors - Pneumatic Device Vents and Pneumatic Pumps, Gas Service		
Continuous Low Bleed	6.8	0.163
Continuous High Bleed	30	0.720
Intermittent Bleed	2.3	0.055



# Proposed Changes - Appendix 5 Transmission M&R Stations

- » Update current leaker-based EFs for fugitive station emissions using Table W-6 of Subpart W of Part 98 in the amendment published at 89 FR 42327 on May 14, 2024.

Natural Gas Distribution		
	scf/hour/component	Mscf/day/component
Leaker Emission Factors - Transmission-Distribution Transfer Station Components, Gas Service		
Connector	1.69	0.041
Block Valve	0.557	0.013
Control Valve	9.34	0.224
Pressure Relief Valve	0.27	0.006
Orifice Meter	0.212	0.005
Regulator	0.772	0.019
Open-ended Line	26.131	0.627



# Questions?



# Distribution Main and Services Super Emitter (SE) Program Update

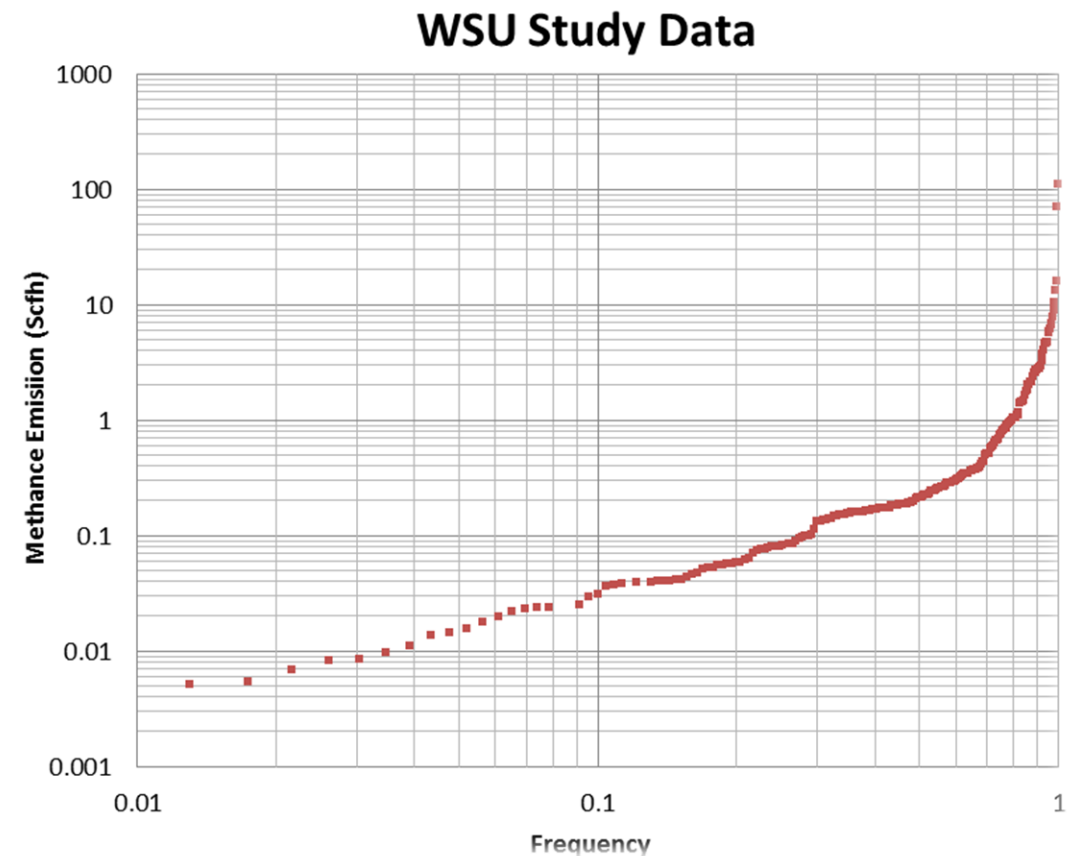
February 2025



# The Concept of Super Emitters

- Methane emissions in gas distribution systems are driven by a small number of larger leaks named Super Emitters
- Opportunity for substantially reducing methane emissions by accelerating **detection** (with mobile surveys) and **repair of the larger leaks**

Only about 2% of leaks in the distribution system were > 10 scfh but accounted for 56% of total emissions



## 1. Coverage

- Drive across the entire system, including compliance survey areas

## 2. Thresholds

- Report indications over 5 SCFH (2025) to local teams
- Prioritize confirmed leaks greater than 5 SCFH for accelerated repair

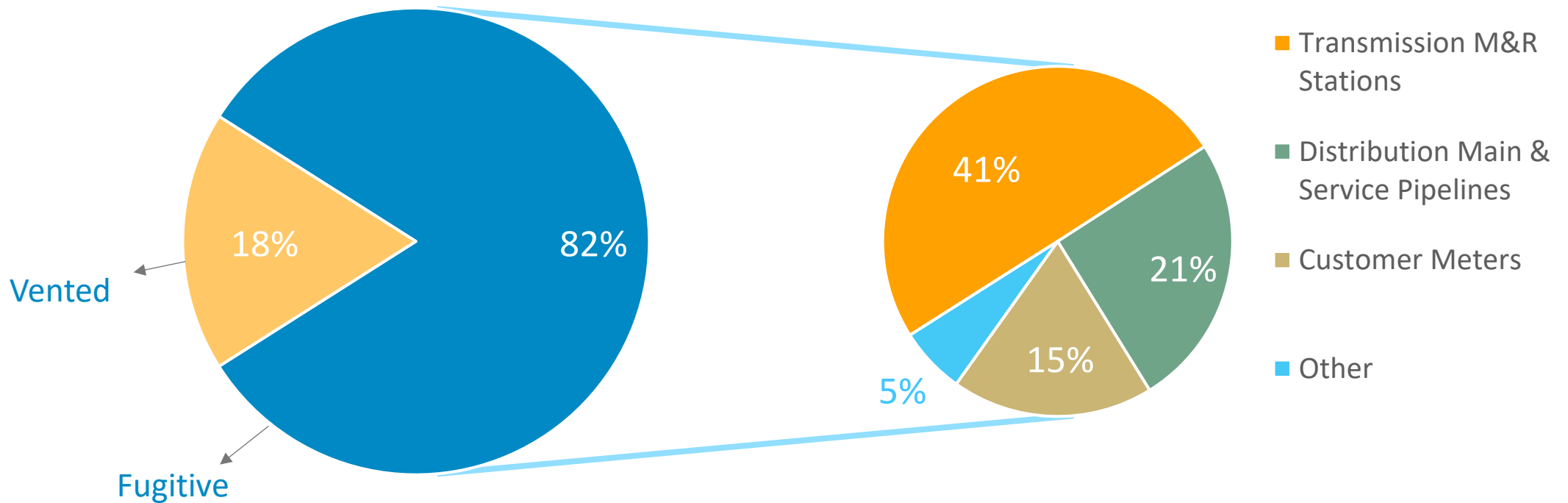
## 3. Immediate Response (IR)

- IR threshold set at 60 SCFH
- Triggering IR requires an immediate leak survey investigation



# Distribution M&S Emissions

**In 2023, Emissions from Distribution M&S Accounted for 21% of Total System Emissions**





# Super Emitter Program Optimization Strategies

## Strategies for Reducing Emissions Using Super Emitter

- Lower the Super Emitter detection threshold
- Increase super emitter program survey area
- Speed up repairs
- Conduct more frequent surveys to identify leaks earlier

$$Emission(MCF) = EF * Days\ Open$$

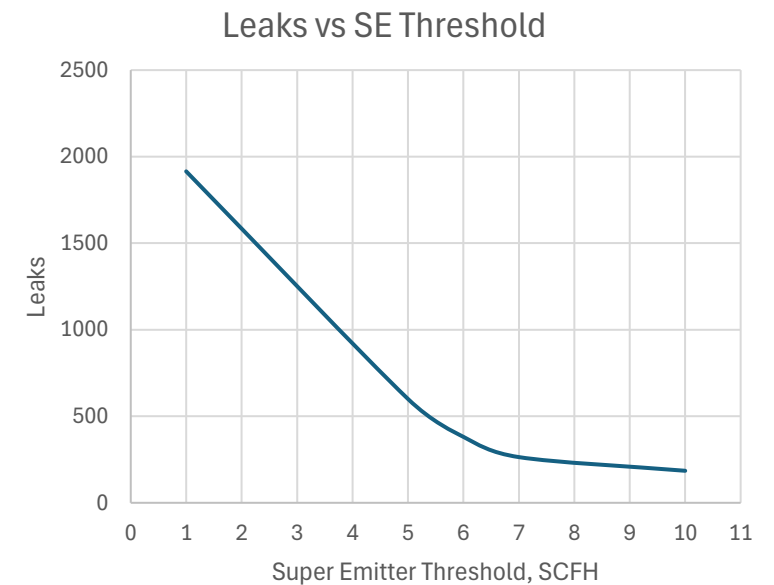
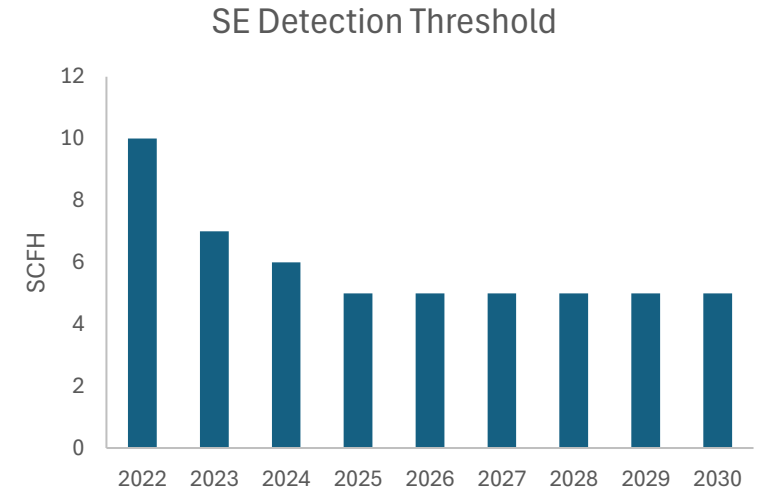
**EF:** Emission Factor in MCF/Day

**Days Open:** Assumes leaks start at the beginning of the year and continue until repaired



# Reducing Super Emitter Detection Threshold

- Starting in 2023, PG&E has been lowering the detection threshold for the Super Emitter survey
- Emissions savings have been achieved through:
  - More leaks are added to the accelerated detection and repair schedule
  - The average emission factor for Non-SE leaks is reduced
- 2024 Cost Effectiveness
  - Between 10 SCFH and 6 SCFH, an additional 323 leaks were identified and prioritized for repair
  - These leaks would have remained open for an average of 3 years\*
  - Abatement: 270 MMSCF
  - Standard Cost Effectiveness: \$23.86/MCF



\* One-third of the system is surveyed each year, plus repair time for non-SE

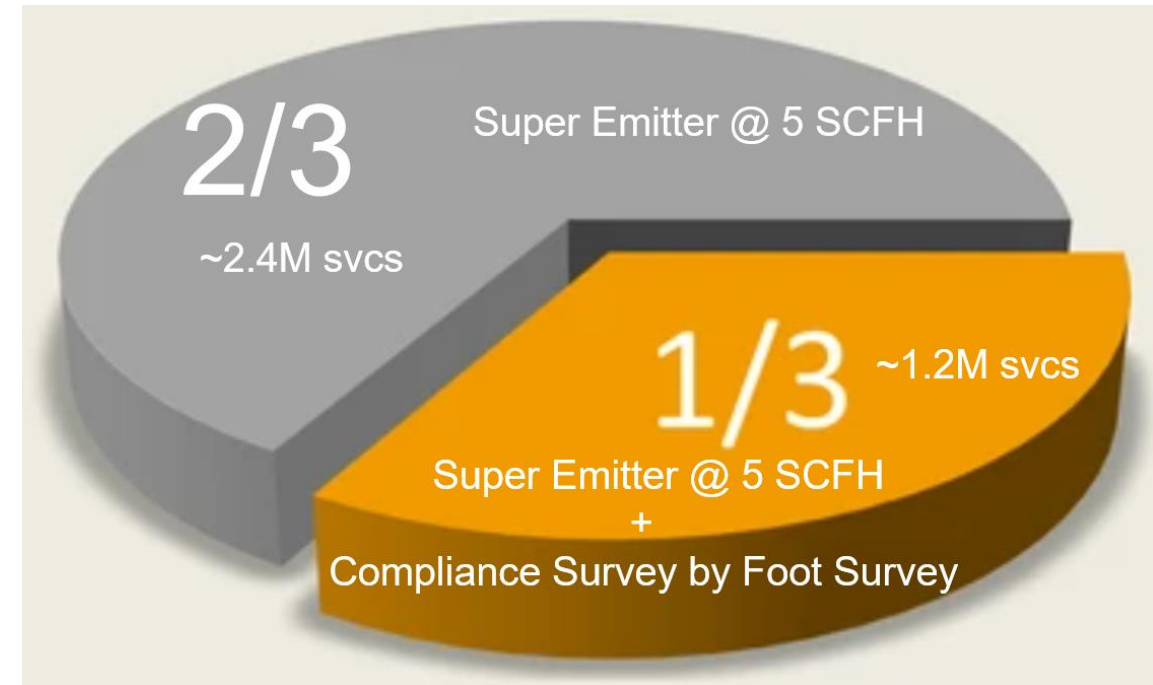


# Super Emitter Survey Coverage

- Initiated in 2018, SE surveys have been conducted across approximately 70% of the system, excluding areas covered by compliance surveys
- Starting in 2024, the SE survey targets 100% system coverage
- It allows exclusion of “Super Emitter” Leaks when calculating emissions for the category of Found and Unknown leaks – adjusted for uncertainties

Emission Factor SCFH			
SE Threshold	Non-SE	SE	Average
5	0.61	8.63	1.49

## 2025 PG&E Leak Survey Program



# Future Work: Potential of Dynamic Scheduling

## ■ High Leak Density Area

- Survey Frequency: Semi-annual
- Days Leaking: For leaks found during the second survey, calculation is done assuming they have been leaking since the last survey date

## ■ Remaining System

- Survey Frequency: Annual
- Days Leaking: From the start of the year until the repair date

Year	2023	2024	2025	2026	2027-2030
SE Survey	7 SCFH @ 1x per year	6 SCFH @ 1x per year	5 SCFH @ 1x per year	5 SCFH @ 1x per year	5 SCFH @ 1.25x per year



# Thank you





# Proposed Changes to the 2025 Reporting Template and Procedures

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Natural Gas Leak Abatement Program  
2025 CPUC Winter Workshop  
February 12, 2025

# Overview

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- Appendices 3 and 7
  - Provide a note for the “Compressor and Component Fugitive Leaks” worksheets to show the formula and calculations for the Number of Days Leaking.
  - Replace the “ID” header with “Quantity” in the worksheets for “Component Vented Emissions.”
  - Provide a note requesting that either the initials of the facility be included in the “ID” column, or the name be provided along with the zip code in the “zip code” column for the worksheets for “Compressor Vented Emissions.”
- Appendix 4
  - Review the pipelines summary worksheet and evaluate designating current fields as optional.
- Appendices 4 and 6
  - Include the note: “Please show the calculation for determining the total emissions. If additional worksheets are necessary, please include those to show the intermediate calculations.”
- Appendix 8
  - Revise the header from, “Total Annual Volume of Gas Used by the Gas Department,” to “Total Annual Volume of Gas Used” for the on-site usage.

# Compressor and Component Fugitive Leaks

- Appendices 3 and 7: Provide a note for the “Compressor and Component Fugitive Leaks” worksheets to show the formula and calculations for the Number of Days Leaking.
- An additional note will be added that “The Number of Days Leaking may be more than 365 days due to including the estimation function of the leak occurring at half the number of days between the prior survey date and the discovery date.”

[Company Name], [Date Submitted]									
Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pipelines and Facilities to Reduce Nat									
In Response to Data Request, R15-01-008 - 2024 June Report									
Appendix 3; Rev. 03/30/2024									
Notes:									
Show the formula and calculations for the Number of Days Leaking.									
The Number of Days Leaking may be more than 365 days due to including the estimation function at half the number of days between the prior survey date and the discovery date.									
Use a formula-derived value with the formula used in the Annual Emissions column. Do not use a copy and paste-as-value.									
At the end of Annual Emissions Column, add a summation total in a cell for a column total, and then highlight orange.									
The emissions captured on this tab represent the emissions associated unintentional leaks that if repaired would not leaking. If the component is releasing gas or "bleeding" as a result									
Please include emissions from leaks found with concentrations below 10,000ppm, and add them in the total emissions column. Please use the associated emission factors provided in A									
Transmission Compressor Station: Compressor and Component Fugitive Leaks						12/31/23	01/01/23		
ID	Geographic Location	Facility/Device Type	Emission Factor: Mscf/day/dev	Manufacturer	Discovery Date (MM/DD/YY)	Repair Date (MM/DD/YY)	Prior Survey Date (MM/DD/YY)	Number of Days Leaking	Annual Emissions (Mscf)



# Component Vented Emissions

- Appendices 3 and 7: Replace the current header of "ID" with "Quantity" in the worksheets for Component Vented Emissions.

- **Proposed:**

10	Transmission Compressor Station Component Vented Emissions:							
11	ID	Geographic Location	Device Type	Bleed Rate	Manufacturer	Engineering or Manufacturer's based Estimate of Emissions	Annual Emissions (Mscf)	Explanatory Notes / Comments
12	Moisture Analyzers	Facility Name	P	L	not available	0.048	18	
13	Moisture Analyzers	Facility Name	P	L	not available	0.048	18	
14	Moisture Analyzers	Facility Name	P	L	not available	0.048	18	
15	Moisture Analyzers	Facility Name	P	L	not available	0.048	18	



10	Transmission Compressor Station Component Vented Emissions:							
11	Quantity	Geographic Location	Device Type	Bleed Rate	Manufacturer	Engineering or Manufacturer's based Estimate of Emissions	Annual Emissions (Mscf)	Explanatory Notes / Comments
12	4	Facility Name	P	L	not available	0.048	18	Moisture Analyzers

# Compressor Vented Emissions

- Appendices 3 and 7: Provide a note requesting that either the initials of the facility be included in the “ID” column **or** the name be provided along with the zip code in the “Geographic Location” column for the worksheets for “Compressor Vented Emissions.”

**Current:**

ID	Geographic Location	Compressor Type	Prime Mover	Number of Cylinders
Unit 1	Example	R	C	4
Unit 1	Example	R	C	4
Unit 2	Example	R	C	4
Unit 2	Example	R	C	4

**Proposed:**

ID	Geographic Location	Compressor Type	Prime Mover	Number of Cylinders
Station Abbreviation--Unit 1	Station Name--Zip code	R	C	4
Station Abbreviation--Unit 2	Station Name--Zip code	R	C	4
Station Abbreviation--Unit 1	Station Name--Zip code	R	C	4
Station Abbreviation--Unit 2	Station Name--Zip code	R	C	4

<
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Storage Leaks & Emissions
Compressor Vented Emissions

# Distribution Mains and Services, Unknown Leaks

- Appendix 4: Include the (highlighted) note: “Please show the calculation for determining the total emissions. If additional worksheets are necessary, please include those to show intermediate calculations, such as the formula for the Risk-Based Survey Method.”

Current:

<div> <div>✕ ✓ <i>fx</i></div> <div>11653.55</div> </div>	
J	K
Risk-Based Survey Method to Estimate Unknown Leaks:	
Total Unknown Leaks from RBS:	11,654

Proposed:

	A	B	C	D	E	F	G
1							
2	Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regula						
3	In Response to Data						
4	App						
5	Notes:						
6	Definitions in Data Request R15-01-008, 2024 June Report						
7	If highlighted cells are filled in, the other cells will auto-populate						
8	Please show the calculation for determining the total emissions.						
9	If additional worksheets are necessary, please include those to show intermediate calculations, such as the formula for the Risk-Based Survey Method.						

# Meter Leaks, Leak Count, Leaker

- Appendix 6: Include the (highlighted) note: “Please show the calculation for determining the total emissions. If additional worksheets are necessary, please include those to show intermediate calculations, such as the formula for Emissions from Leaks Detected from Survey.”

Current:

D24							26528.6104682689
21	A	B	C	D	E	F	G
	Estimated Emissions by Leak Code	Emission Factor (Mscf/day/leak)		Emissions from Leaks Detected from Survey (Mscf)	Emissions from O&M* Leaks Detected (Mscf)	Estimated Emissions from Unknown Leaks (Mscf)	Total Estimated Emissions from Leaks (Mscf)
22	Leakage Category						
23	Facility/Material	R	CI				
24	A - Soap Blown Off	0.2280	0.2280	26,529	125.9	34,001	60,655

Proposed:

H11							
	A	B	C	D	E	F	
1							[Utility Name]
2							Rulemaking (R.) 15-01-008 to Adopt Rules and Procedures Governing Commission Regulated Natural Gas Pip
3							In Response to Data Request, R15-01-00
4							Appendix 6; Rev. 03/29/2
5	Notes:						
6	At utilities request, fill out with two, three, or four categories that correspond to the bubble-size classification and label the type of leak, whether AG-Haz, or AG-No						
7	If highlighted cells are filled in, the other cells will auto-populate						
8	Please show the calculation for determining the total emissions.						
	If additional worksheets are necessary, please include those to show intermediate calculations, such as the formula for Emissions from Leaks Detected from Survey.						

# Distribution Mains and Services, Summary

- Appendix 4: Designate fields (highlighted) as optional
  - A few utilities are not using material-based emission factors
  - This information is not analyzed by CARB and CPUC staff for the Joint Reports

	Count of Leaks Carried over from Prior Year	Count of Leaks Discovered in the Year of Interest	Count of Leaks Repaired in the Year of Interest	Average Days to Repair Leaks	Count of Estimated Unsurveyed Leaks in the Year of Interest	Count of Remaining Leaks at final day of the Year of Interest (12/31/23)	Emissions from Leaks Carried over from Prior Year.	Emissions from Leaks Discovered in the Year of Interest.	Emissions from Estimated Unsurveyed Leaks in the Year of Interest	Total Emissions in the Year of Interest [Mscf of Natural Gas]
Grade 1						-			NA	-
Grade 2						-			NA	-
Grade 3						-			NA	-
<b>Graded Leak Total</b>	-	-	-	-	-	-	-	-	-	-
Above Ground Hazardous						-				
Above Ground Non-Hazardous						-				
Above Ground Non-Hazardous Minor						-				
AG Total	-	-	-	-	-	-	-	-	-	-
<b>Total of All Leaks</b>	-	-	-	-	-	-	-	-	-	-
Main/Plastic										
Main/Unprotected Steel										
Main/Protected Steel										
Service/Plastic										
Service/Unprotected Steel										
Service/Protected Steel										
Service/Copper										
<b>Total</b>	0	0	0	0	0	0	0	0	0	0

# Leak Rate Data

- Appendix 8: Discuss a revised name to the header, “Total Annual Volume of Gas Used by the Gas Department” that does not include the phrase “by the Gas Department” for the on-site usage.

	A	B	C	D	E
7	1/1/2023 - 12/31/2023				
8	The highlighted cells show the volumes that are summed together as the throughput for calculating the system wide leak rate.				
9	Gas Storage Facilities:				
10	Average Close of the Month Cushion Gas Storage Inventory (Mscf)	Average Close of the Month Working Gas Storage Inventory (Mscf)	Total Annual Volume of Injections into Storage (Mscf)	Total Annual Volume of Gas Used by the Gas Department (Mscf)	Total Annual Volume of Withdrawals from Storage (Mscf)
11					
12					
13	Transmission System:				
14	Total Annual Volume of Gas Used by the Gas Department (Mscf)	Total Annual Volume of Gas Transported to or for Customers* in State (Mscf)	Total Annual Volume of Gas Transported to or for Customers* out of State (Mscf)	Total Annual Volume of Gas Transported to utility-owned or third-party storage fields for injection into storage (Mscf)	Explanatory Notes / Comments
15					
16					
17	Distribution System:				
18	Total Annual Volume of Gas Used by the Gas Department (Mscf)	Total Annual Volume of Gas Transported to or for Customers* in State (Mscf)	Total Annual Volume of Gas Transported to or for Customers* out of State (Mscf)		Explanatory Notes / Comments
19					

Year Over Year Comparison   Leak Rate Data   NG Specification



8	The highlighted cells show the volumes that are summed together as the throughput for calculating rate.			
9	Gas Storage Facilities:			
10	Average Close of the Month Cushion Gas Storage Inventory (Mscf)	Average Close of the Month Working Gas Storage Inventory (Mscf)	Total Annual Volume of Injections into Storage (Mscf)	Total Annual Volume of Gas Used Onsite (Mscf)
11				
12				
13	Transmission System:			
14	Total Annual Volume of Gas Used Onsite (Mscf)	Total Annual Volume of Gas Transported to or for Customers* in State (Mscf)	Total Annual Volume of Gas Transported to or for Customers* out of State (Mscf)	Total Annual Volume of Gas Transported to utility-owned or third-party storage fields for injection into storage (Mscf)
15				
16				
17	Distribution System:			
18	Total Annual Volume of Gas Used Onsite (Mscf)	Total Annual Volume of Gas Transported to or for Customers* in State (Mscf)	Total Annual Volume of Gas Transported to or for Customers* out of State (Mscf)	Explanatory Notes / Comments
19				

# Key Dates for the 2025 NGLA Reporting

---

- Prior to March 31: CPUC and CARB Staff will correspond with utilities about finalizing the reporting template changes mentioned in these slides.
- March 31: CPUC will send reporting template to gas companies
- June 16: Emissions reports from gas companies due to CPUC
- July: CPUC and CARB will send a list of follow-up questions and comments to gas companies
- August 29: CPUC and CARB Staff have an internal deadline to finalize data.
- November 14: CPUC will send the Draft Joint Report to gas companies for review
- December 31: CPUC will publish the Final Joint Report

# R&D Project Updates

Gas Research & Development

February 2025



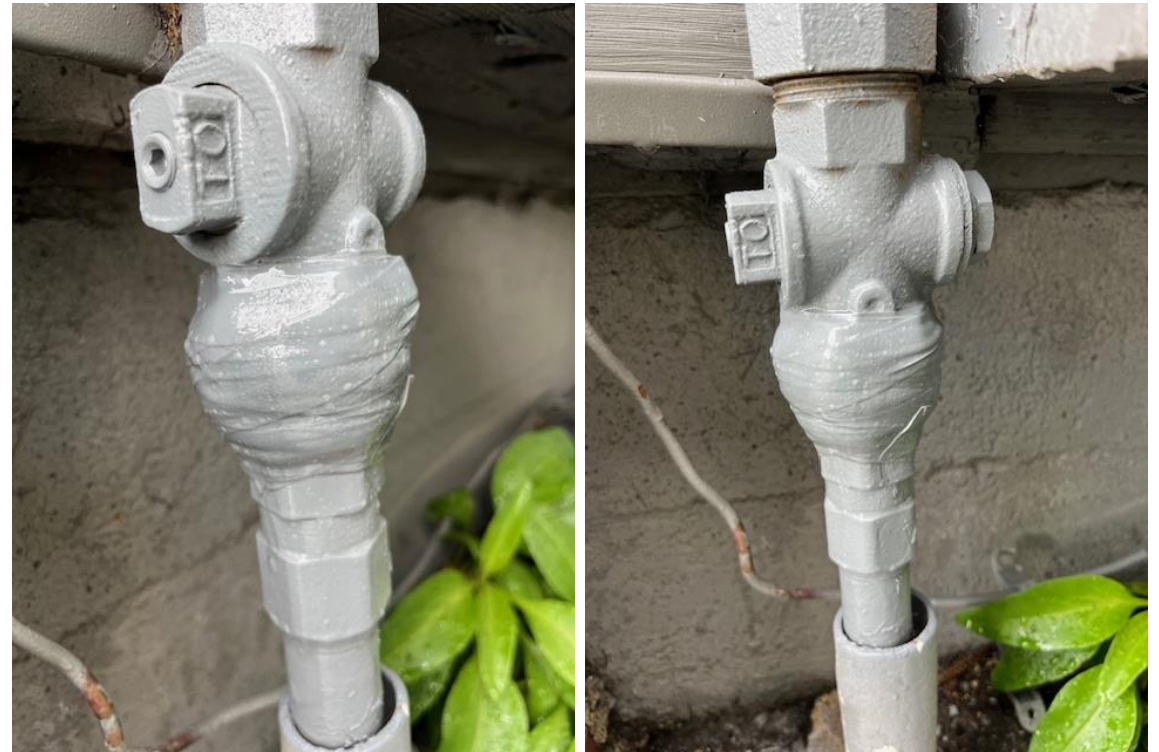


# Meter Set Assembly (MSA) Emissions

## BP-21 LLFA Tape Pilot Ph2

LLFA tape is a self-adhering silicone-based tape that allows for quick repairs without breaking down the meter set

- Can reduce emissions
- Enhance safety
- Reduce operational costs
- Kicked off a larger scale pilot in conjunction with GTI Energy in 2024 (OTD 5.24.Y.2) due to promising results from a small, internal, and bay area centralized pilot
- PG&E plans to install LLFA tape on 100 non-hazardous MSA leaks in Q1 2025 throughout the PG&E territory





# Meter Set Assembly (MSA) Emissions

## BP-22 Jomar Male Tailpiece Demo

The Jomar male tailpiece would reduce MSA high-pressure leak points

- Benefit - stopping leaks before they occur
- A large amount of leaks on the current meter set design form on the pipe nipple used to connect the female riser valve and regulator
- Changing to a male threaded meter valve eliminates 1 threaded connection below the regulator, reducing potential leak points on the high-pressure side by 50%





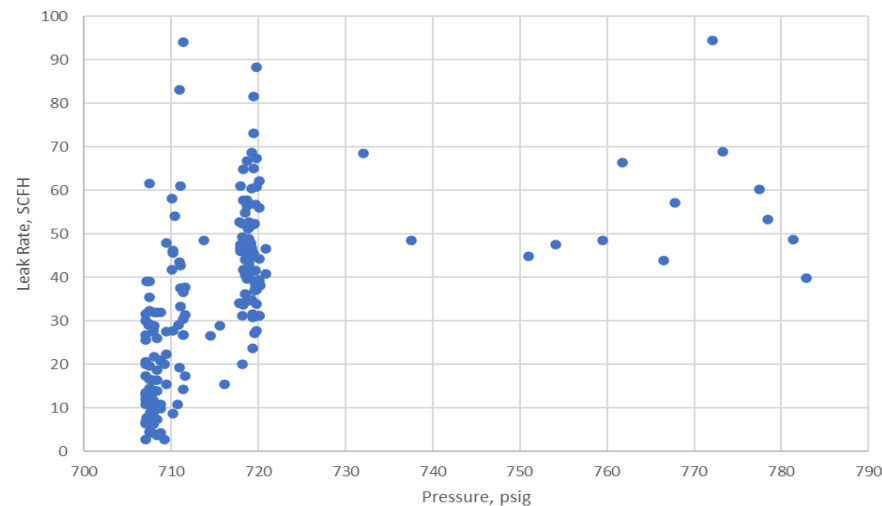
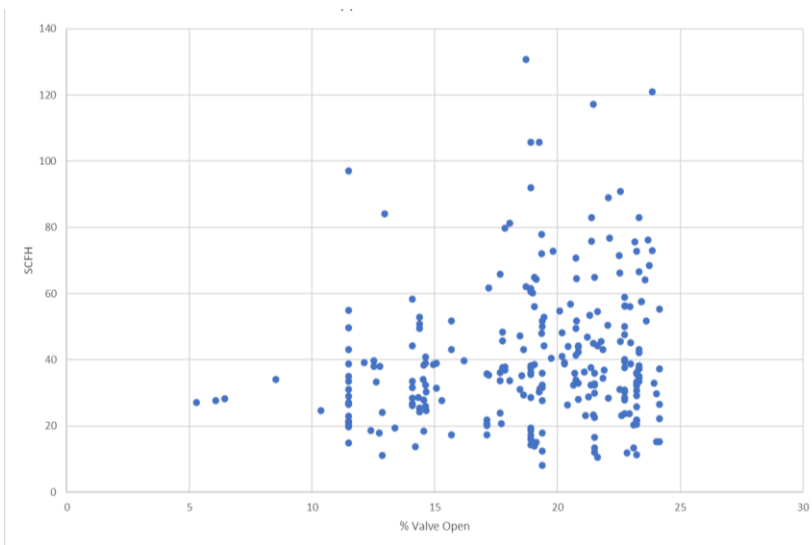
# Transmission M&R Emissions

## BP-20 QLM Lidar Based Camera

In 2024, PG&E conducted a trial with the QLM camera for continuous monitoring of 10 intermittent bleed transmission M&R stations of varying complexity over 24-hour periods

- CPUC attended a demonstration at the Vernalis Reg Station
- No clear correlation between valve position (controller modulation) and vent rate
- No clear correlation between upstream pressure and vent rate

Site Number	Measured Components	Emitting Components	Duration
Station 1	4	0	~ 24 hours
Station 2	7	0	~ 24 hours
Station 3	3	0	~ 24 hours
Station 4	8	3	~ 24 hours
Station 5	12	0	~ 24 hours
Station 6	22	3	~ 24 hours
Station 7	19	3	~ 24 hours
Station 8	8	0	~ 24 hours
Station 9	7	2	~ 24 hours
Station 10	4	4	~ 24 hours







# Underground Storage Emissions

## BP-18 Continuous Monitoring of UGS

PG&E currently conducts daily wellhead leak surveys. A continuous monitoring approach can improve safety, reduce emissions, and reduce costs

- In 2024 PG&E completed ph1 in conjunction with GTI Energy (7.24.c)
- The pilot consisted of a trial of 4 different devices on a single wellhead to validate the sensors technical specs with respect to the California Oil and Gas Rule requirements
- In 2025, PG&E plans to conduct a larger scale pilot incorporating lessons learned from ph1 to increase sensor probability of detection and integrate into the control system



# DM&S/Transmission Emissions

## BP-20 Bridger Photonics Aerial Leak Detection and Quantification

Bridger Photonics helicopter mounted Gas Mapping LiDAR can quicken leak detection, assist in localization, and help quantify emissions

- Completed evaluation of Bridger Photonics GML system with NYSEARCH in Q4 2024
- Bridger provided plume heights to assist in determining pipeline gas vs gas from customer connected equipment
- A final report is currently being generated





# DM&S/Transmission Emissions

## BP-17 Satelytics' Aerial Leak Detection

Leak detection via satellite can be faster and safer than traditional leak survey methods. Some limitations include too much cloud coverage and inability to task satellites immediately

- PG&E along with NYSEARCH (project T-796) evaluated Satelytics' Aerial System for Methane Detection and Emission Quantification
- PG&E, NYSEARCH, and Satelytics have one additional scan planned for Q1 2025 to determine POD



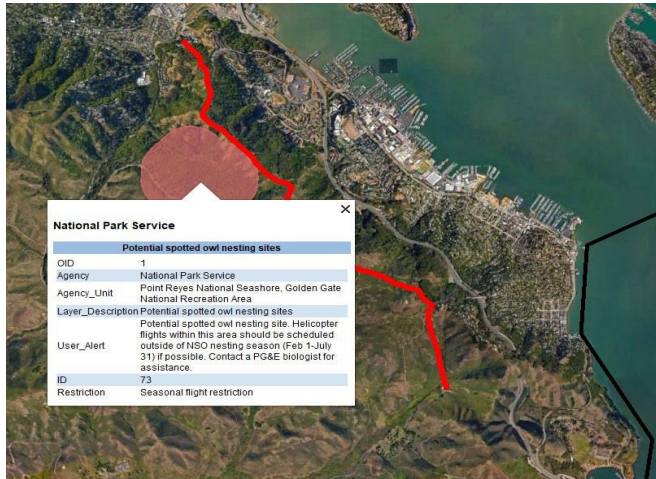


# DM&S/Transmission Emissions

## BP-17 Aerial Leak Detection via Drones

Drone Systems can quicken detection, improve localization, and be used for emergency response surveys when helicopters are not available and walking and mobile survey deems unsafe

- PG&E tested various LiDAR sensors and an OGI sensor on PG&E drones using controlled gas releases to survey hard-to-access areas
- Two sensors provided promising results, U10 and BLV-CH4





**Thank you**





# Appendix – Best Practice List

Category	Best Practice	Title	Main Points
Leak Detection	BP 15	Gas Distribution Leak Surveys	Move from 4-year to 3-year leak survey. Company can propose new technology (e.g. mobile survey)
	BP 16	Special Leak Surveys	Predictive leak analytics for supplemental special leak survey programs
	BP 17	Enhanced Methane Detection	Use of enhanced methane detection practices mobile methane detection, aerial leak detection
	BP 18	Stationary Methane Detectors	Use of stationary methane detectors at compressor stations, storage facilities, M&R stations
	BP 19	Above Ground Leak Surveys	To include in Compliance plan, frequent leak detection and data collection and above ground stations and facilities including use of optical gas imaging and other methods.
	BP20	Leak Quantification & Geographic Evaluation/Tracking	Improved quantification and geographic tracking of leaks.
Leak Repairs	BP 21	“Find It Fix It Policy”: Leak Repair Timeline and Backlogs	To specify leak repair times that exceed the minimum regulatory requirement and to eliminate backlogs. To require TLA leaks to be fixed immediately. Also suggests that leaks have to be repaired within 3 years of discovery.

Category	Best Practice	Title	Main Points
Leak Prevention	BP 22	Pipe Fitting Specifications	Revise pipe fitting specifications to ensure higher tolerance pipe threads and if necessary, propose fitting replacement program
	BP 23	Prevent/Minimize/Stop Fugitive & Vented Methane Emissions (Catastrophic Releases, High-Bleed Pneumatics, Blowdowns, etc.)	Replacement of high-bleed pneumatic devices to low-bleed. Reduction of emissions from blowdowns.
	BP 24	Dig-Ins / Public Education Program	Expand education program to broader audience and excavation contractors
	BP 25	Dig-Ins / Company Monitors for All Excavations near Transmission Lines	Provide company monitors to witness excavations near gas transmission lines
	BP 26	Dig-Ins / Repeat Offenders	Procedures to keep track of dig-ins in the last 5 years to identify repeat cases. Follow-up with offenders to include training and visits.



# R&D OVERVIEW

February 12, 2025

# R&D Overview

- » Provide a brief overview highlighting
  - Key project work during the previous Compliance Plan period (2023-2024) and,
  - Planned projects for the current Compliance Plan period (2025-2026).
- » List of projects covered in this presentation
  - Passive Mobile Methane Detection
  - Aerial Methane Mapping Cost-Effectiveness Improvements
  - Development of Cost-Effectiveness Framework
  - Customer Meter Set Emissions Data Analysis
  - Meter Set Assembly Failure Mode Analysis
  - Sealant Performance for Storage Applications



# Project Spotlight - Enhanced Methane Detection



- Fleet-based Passive Mobile Methane Detection
  - Passively detect methane emissions from normal vehicle operations and utilize data analytics to compile methane readings and potentially identify leak sources
  - Vendor has an agreement with United States Postal Service (USPS)
  - Vendor installation of ~30 units on USPS trucks within SoCalGas territory planned for Q1 2025
  - Data collection and analysis planned throughout 2025

# Project Spotlight – Aerial Methane Mapping Cost-Effectiveness Improvements

## » Ferry Scans

- Gather sensor data during helicopter ferry to planned polygon flight area
- Early R&D pilot scans indicate \$10/MCF cost effectiveness potential

## » Incomplete Combustion Emission Reduction Verification

- Develop process for validating and quantifying emission reductions from customer incomplete combustion
- Provide field investigation crew with equipment to perform measurements before and after repair
- Proof-of-concept study in progress

## » Improved Advanced Meter Algorithms

- Use data from verified customer leak detections to improve Advanced Meter Analytics
- Current project results show potential 95% true positive detection rate with 33% false positive rate.
- Next step is to validate performance through small district pilots

## » Alternative Aerial Platforms

- Lower flight altitude platforms can lead to order of magnitude improvement in minimum detection limits
- Proof-of-concept study to be conducted in 2025-2026 Compliance Plan period

# Project Spotlight – Cost-Effectiveness Framework

## Develop Methods to Quantify Ratepayer Benefits

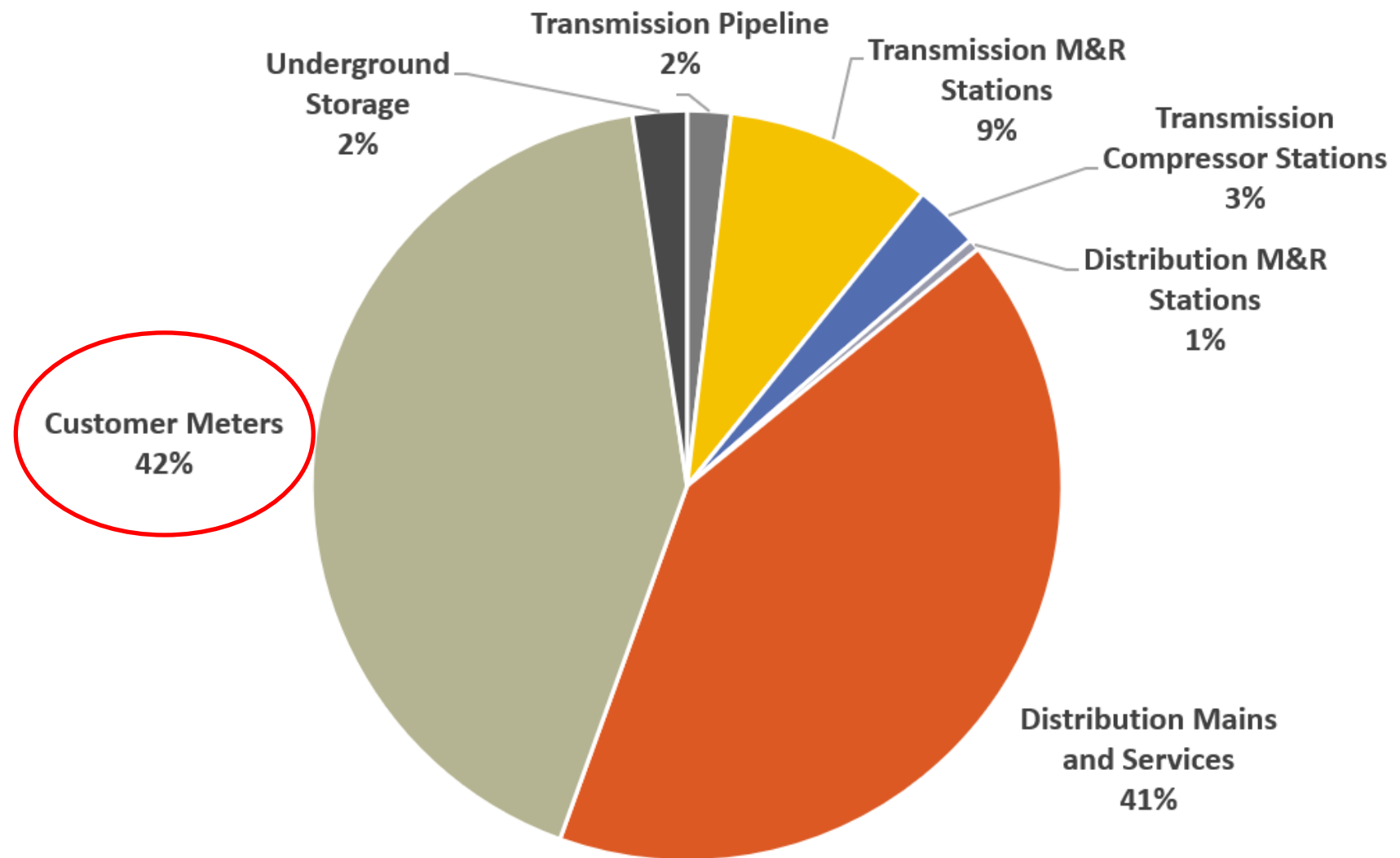
- Reduced GHG Emissions: Climate and Health Benefits
- Improved Air Quality/Reduced Criteria Pollutant Emissions
- Improved Public and Employee Safety: Benefits of Reduced Serious Incidents
- Improved Operational Efficiency
- Improved Reliability
- Improved Affordability

## Incorporate Methods to Monetize Benefits from

- U.S. Environmental Protection Agency
- Office of Management and Budget
- U.S. Government Accountability Office
- U.S. Department of Transportation
- U.S. Consumer Product Safety Commission, and other sources

$$\begin{aligned}
 & PV_{BEN\ PJT_x} \\
 &= \sum_{YR_h=YR_1}^{YR_T} \left[ \left\{ \sum_{i=1}^{N_{RCI_B}} \left( \sum_{j=1}^{N_{LC\ B,j}} (HR_{YR_h,i,j,B} * LR_{YR_h,j}) + ODC_{YR_h,i,B} + TPC_{INT_{YR_h,i,B}} \right. \right. \right. \\
 &\quad \left. \left. \left. - INC_{YR_h,i,B} \right) - \sum_{i=1}^{N_{RCI_{Pjt}}} \left( \sum_{j=1}^{N_{LC\ Pjt,j}} (HR_{YR_h,i,j,Pjt} * LR_{YR_h,j}) + ODC_{YR_h,i,Pjt} + TPC_{INT_{YR_h,i,Pjt}} - INC_{YR_h,i,Pjt} \right) \right\} * \frac{1}{(1 + r_{YR_h})^{(YR_h - YR_{PV})}} \right]
 \end{aligned}$$

# Project Spotlight – Customer Meter Set Emissions





# Customer Meter Emission Factor Sampling

System-wide random sampling across SoCalGas territory

- Collected leak flow rate samples of over 400 MSA leaks
- Collected 60 Non-leaker MSA bubble categories and flow rate measurements across over 200 non-leaking meters sampled (~29%)

ENERGY AND CLIMATE | April 5, 2024

**Development of Company-Specific Emission Factors with Confidence Intervals for Natural Gas Customer Meters in Southern California**

Edward Newton\*, Daniel Ersoy, Erik Rodriguez\*, and Brian K. Lamb



*Environmental Science & Technology*

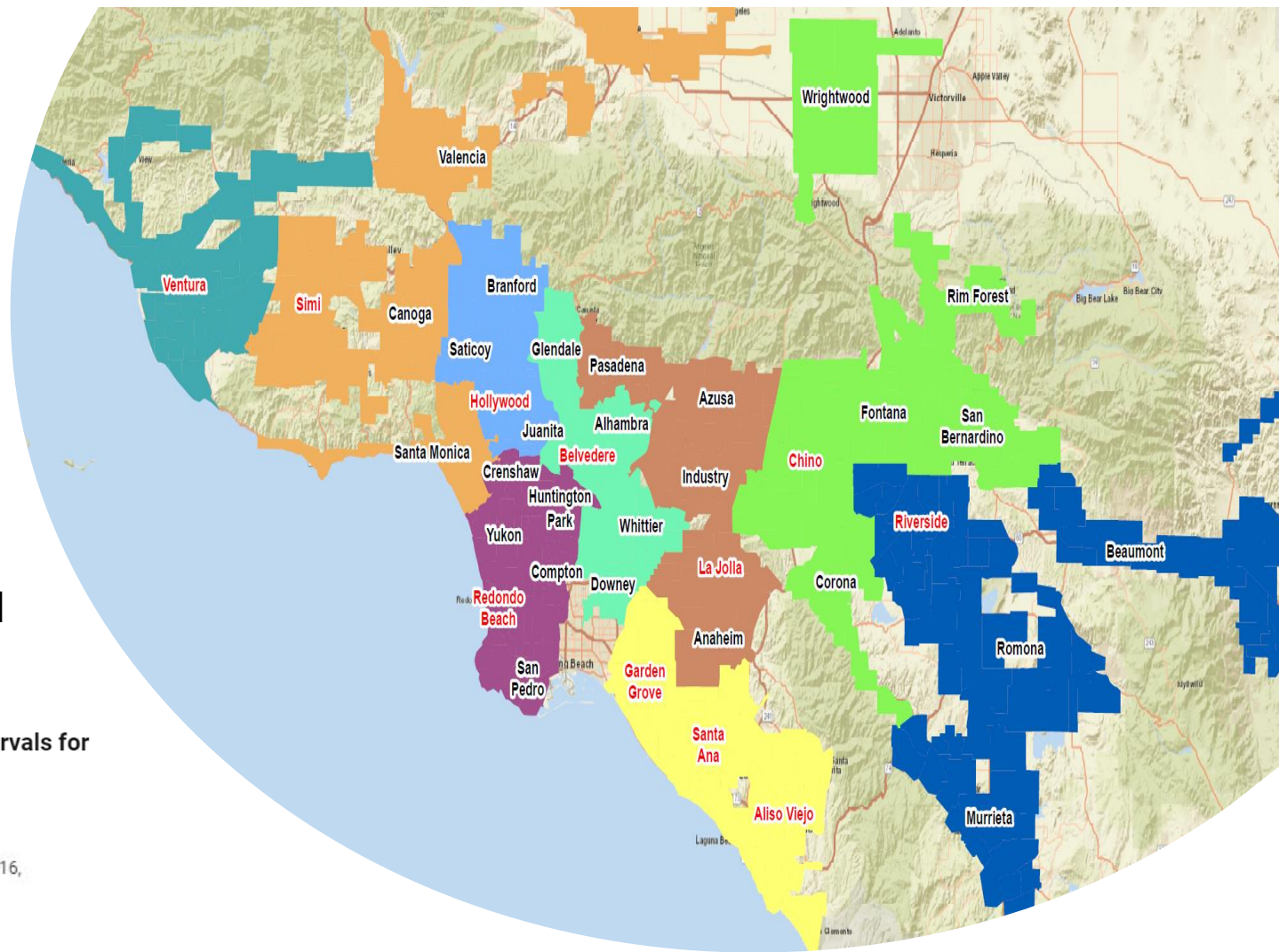
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<https://doi.org/10.1021/acs.est.3c10316>

Published April 5, 2024

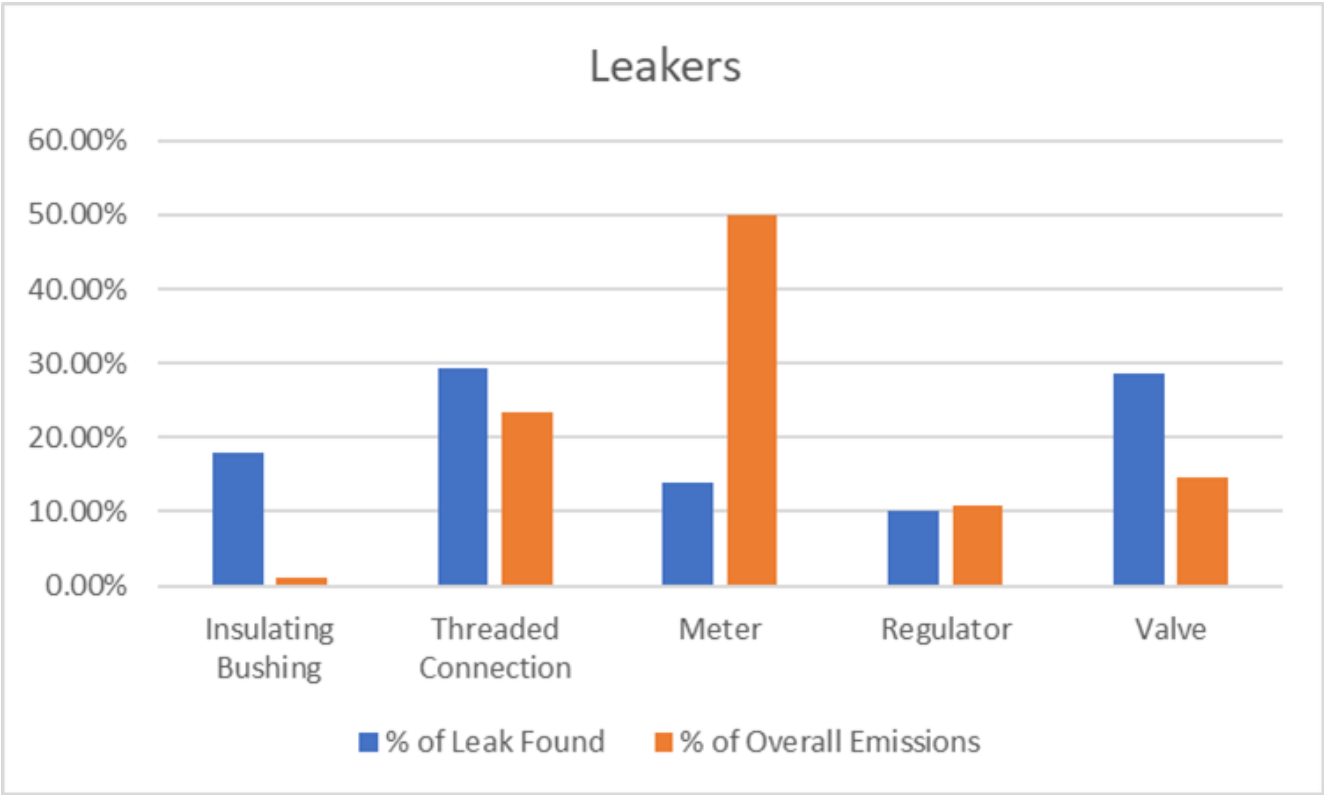
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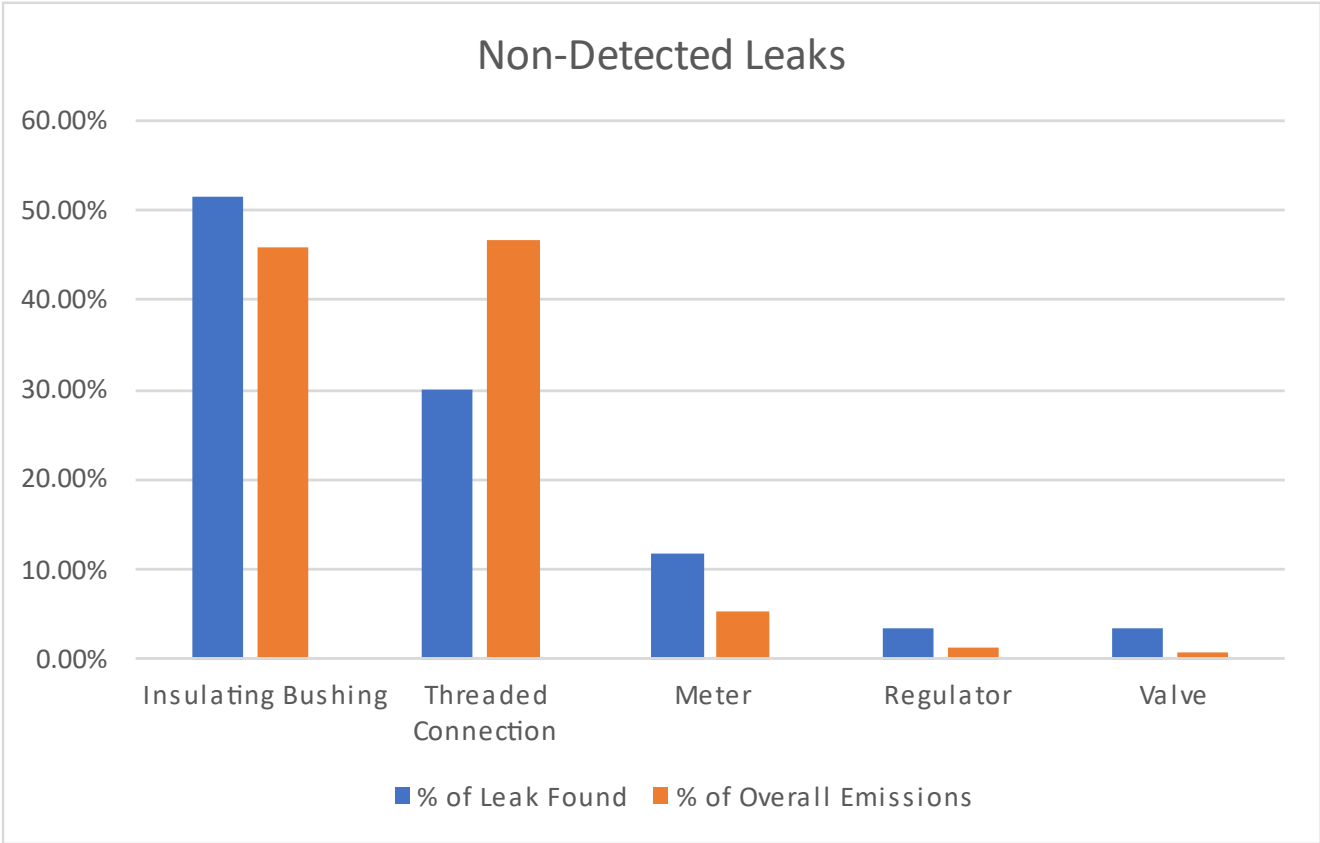
# Data Analysis - Leakers



Component	% of Leaks
Threaded Connections	30%
Valve	29%
Insulating Bushing	18%
Meter	13%
Regulator	10%

Component	% of Emissions
Meter	50%
Valve	25%
Regulator	18%
Threaded Connections	5%
Insulating Bushing	2%

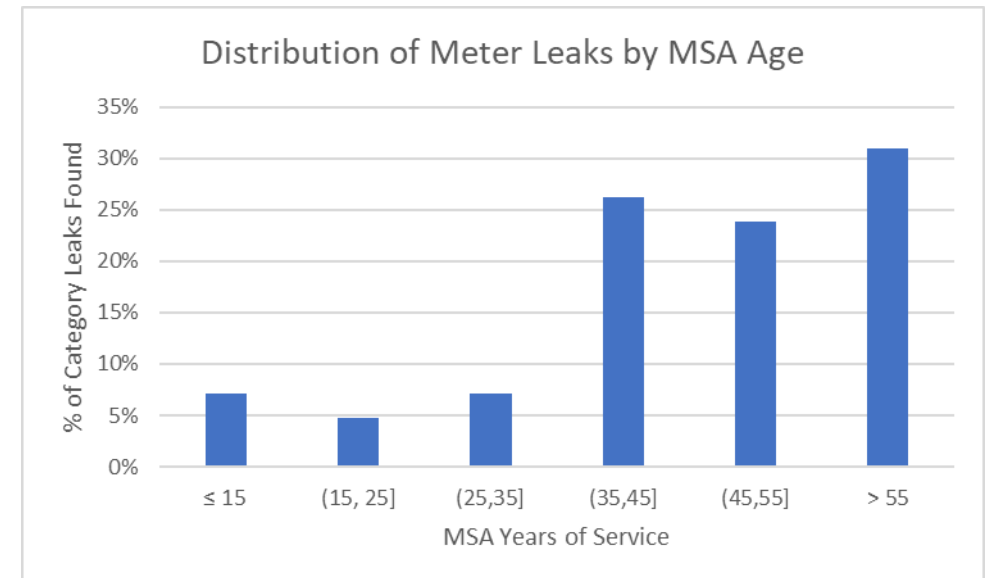
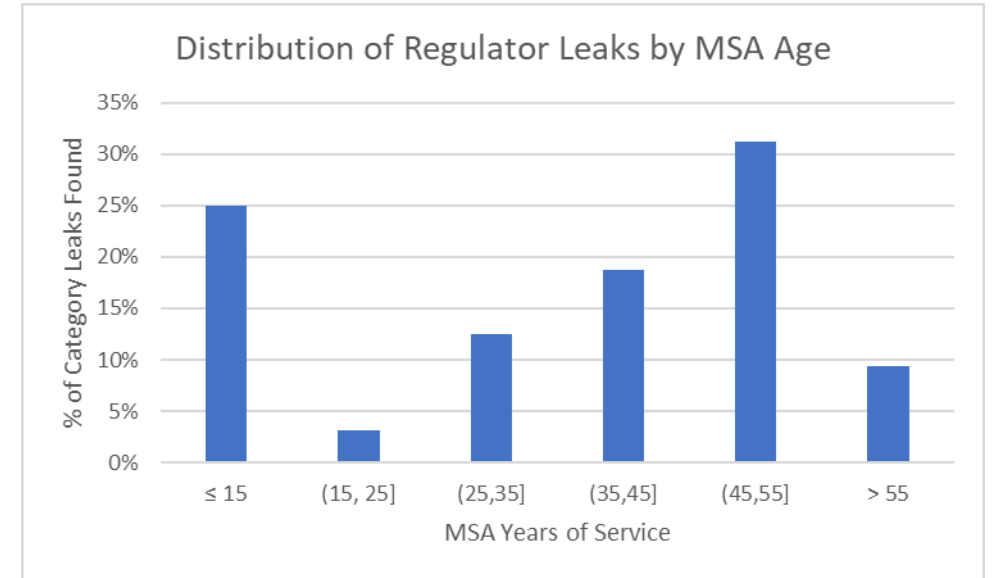
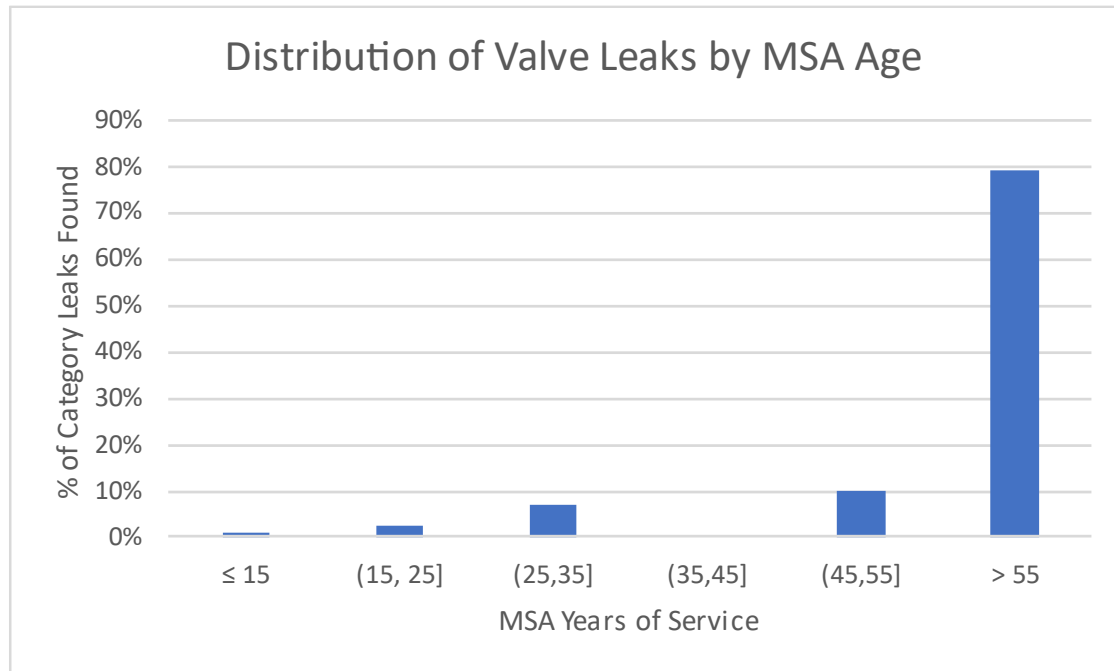
# Data Analysis – Non-Detected Leakers



Component	% of Leaks
Insulating Bushing	52%
Threaded Connections	30%
Meter	12%
Regulator	3%
Valve	3%

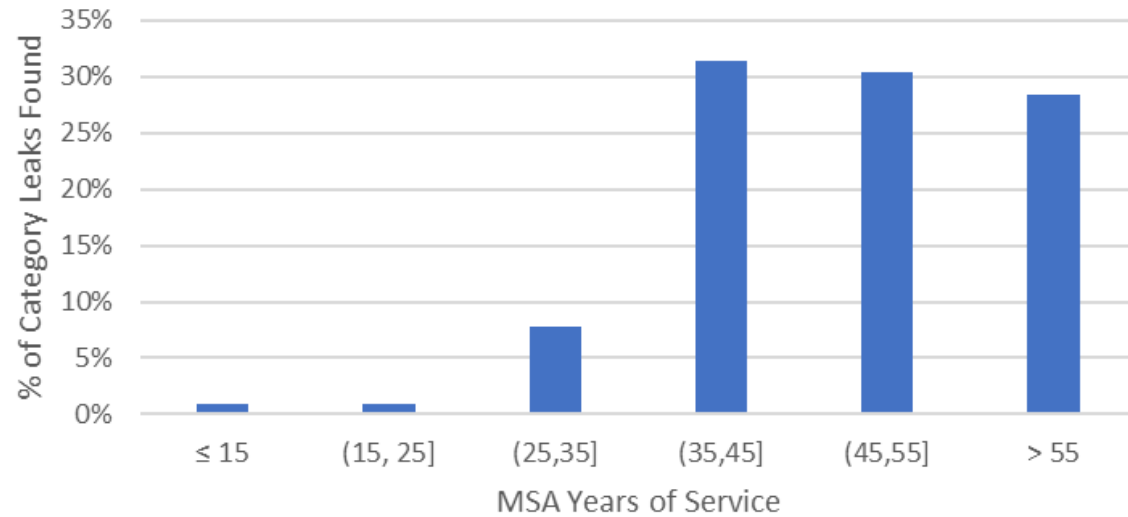
Component	% of Emissions
Threaded Connections	47%
Insulating Bushing	46%
Meter	5%
Regulator	1%
Valve	1%

# Data Analysis – Meter Age Correlations

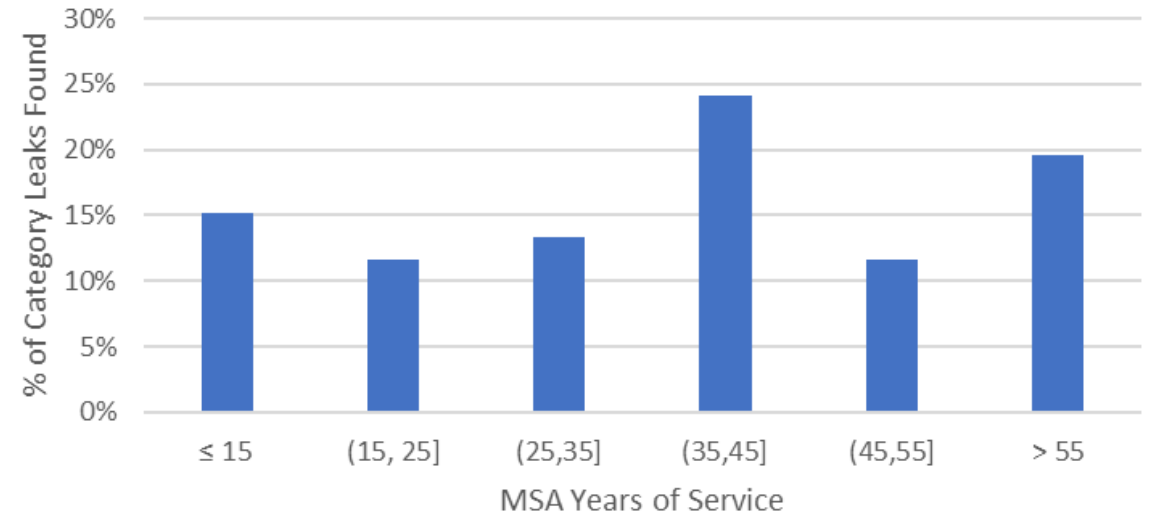


# Data Analysis – Meter Age Correlations

Distribution of Insulating Bushing Leaks by MSA Age



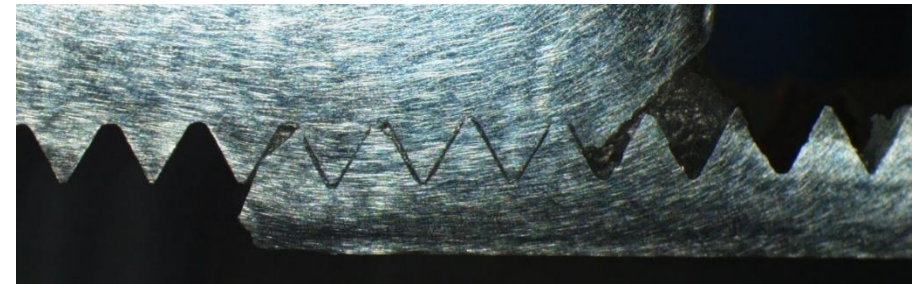
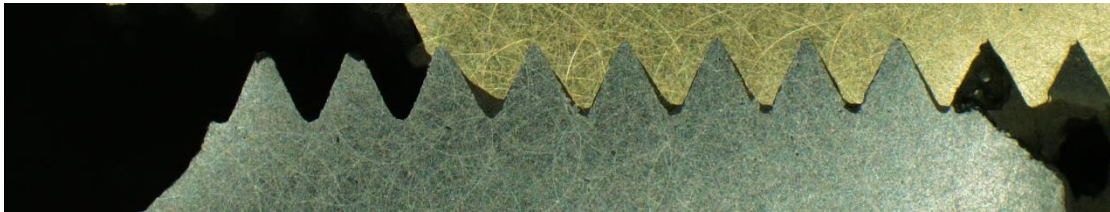
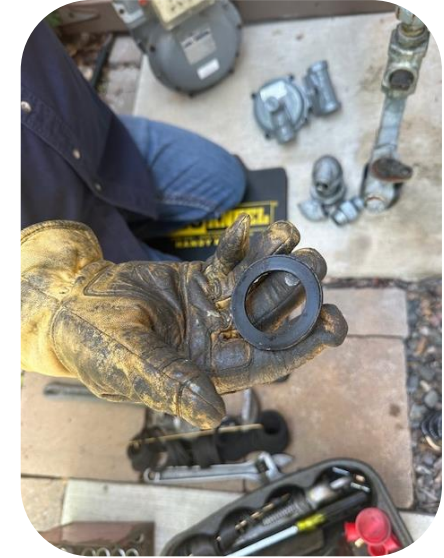
Distribution of Threaded Connection Leaks by MSA Age



# Project Spotlight – Meter Set Assembly Failure Mode Analysis

Collected samples of leaking components from the field for failure mode analysis in the lab

1. Determine root cause of failures
2. Develop remedy for root causes



# Project Spotlight – Meter Set Assembly Design Modifications



Evaluate potential improvements to customer meter sets

- Ultrasonic Meter with pressure sensing and remote shut-off (33% of emissions)
- Zero emissions regulator (12% of emissions)



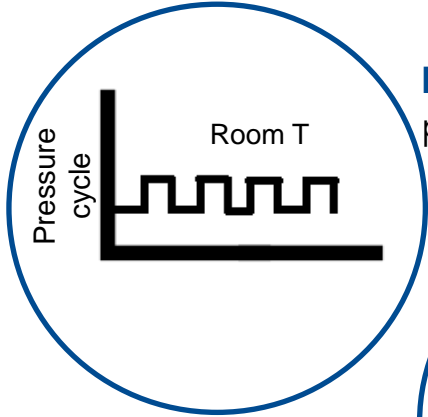
# Project Spotlight – Meter Set Assembly Design Modifications



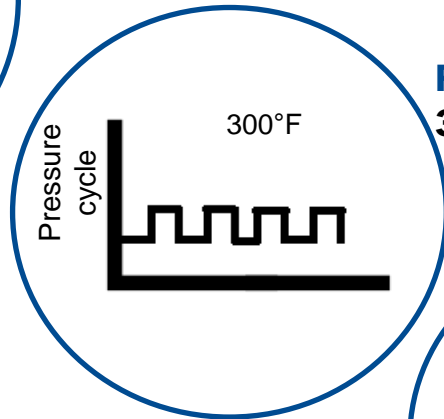
Evaluate potential improvements to customer meter sets

- Smaller form of ultrasonic meter allows for fewer threaded connections within the meter set assembly (21% of emissions)
- Service valves that do not require lubrication (16% of emissions) with built-in insulation (18% of emissions)

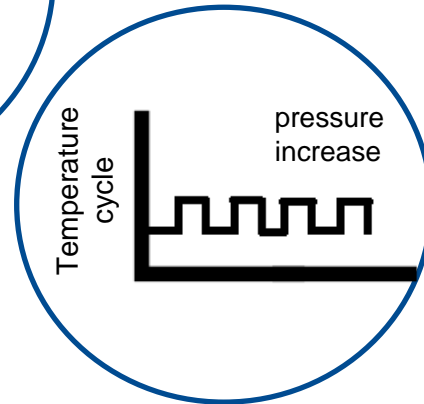
# Project Spotlight – Sealant Performance for Storage Applications



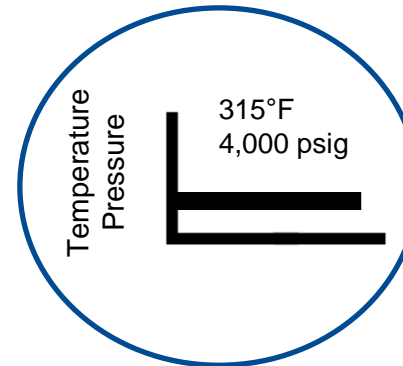
**Part 1 Pressure Cycling:** Room temperature test with pressure cycle between **400 psig and 3400 psig**.



**Part 2 High Temperature Pressure Cycling:** Hold test bath at **300°F** with pressure cycle between **400 psig and 3400 psig**.



**Part 3 High Temperature Cycling:** Temperature cycle between **350 °F and 450 °F** with step increase in pressure from **200 psig to 4,000 psig**.



**Part 4 Steady State:** Hold temperature at **315°F** and pressure at **4,000 psig** for **5+ months**.

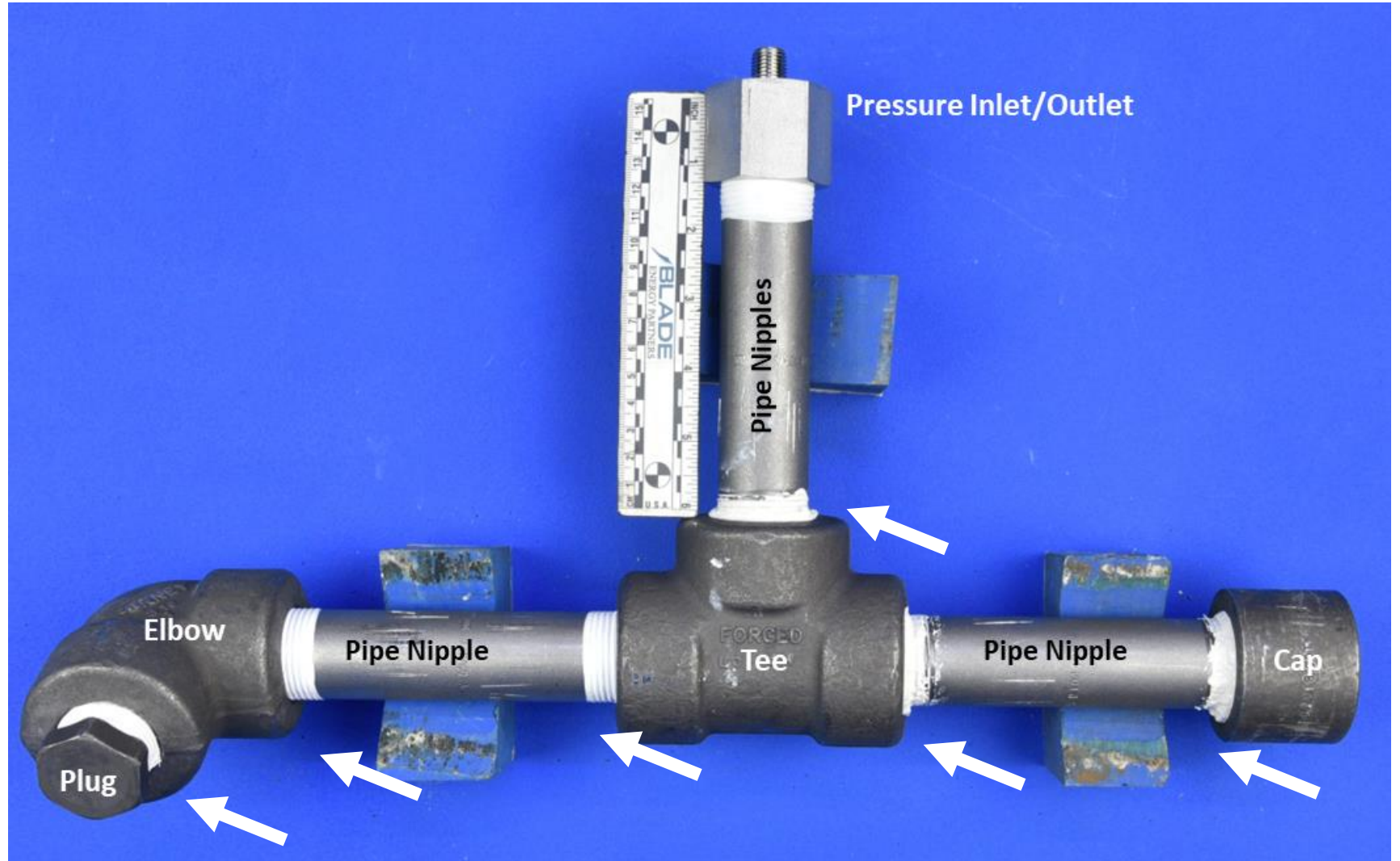


# Test Assembly

## 1" Schedule 160, Class 6000 Components:

3 nipples  
1 tee  
1 elbow  
1 plug  
1 cap

6 sealant connections per test.



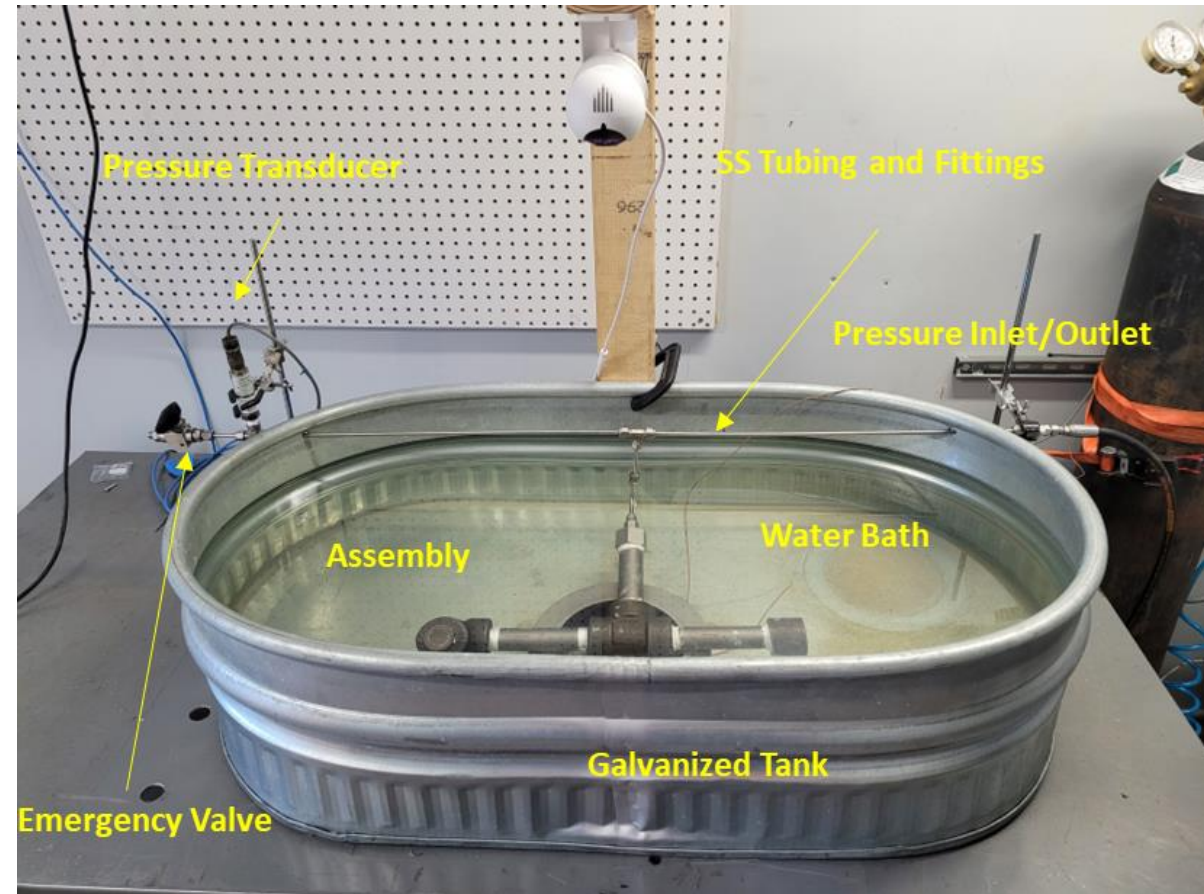
# Test System – Parts 1, 2 and 3



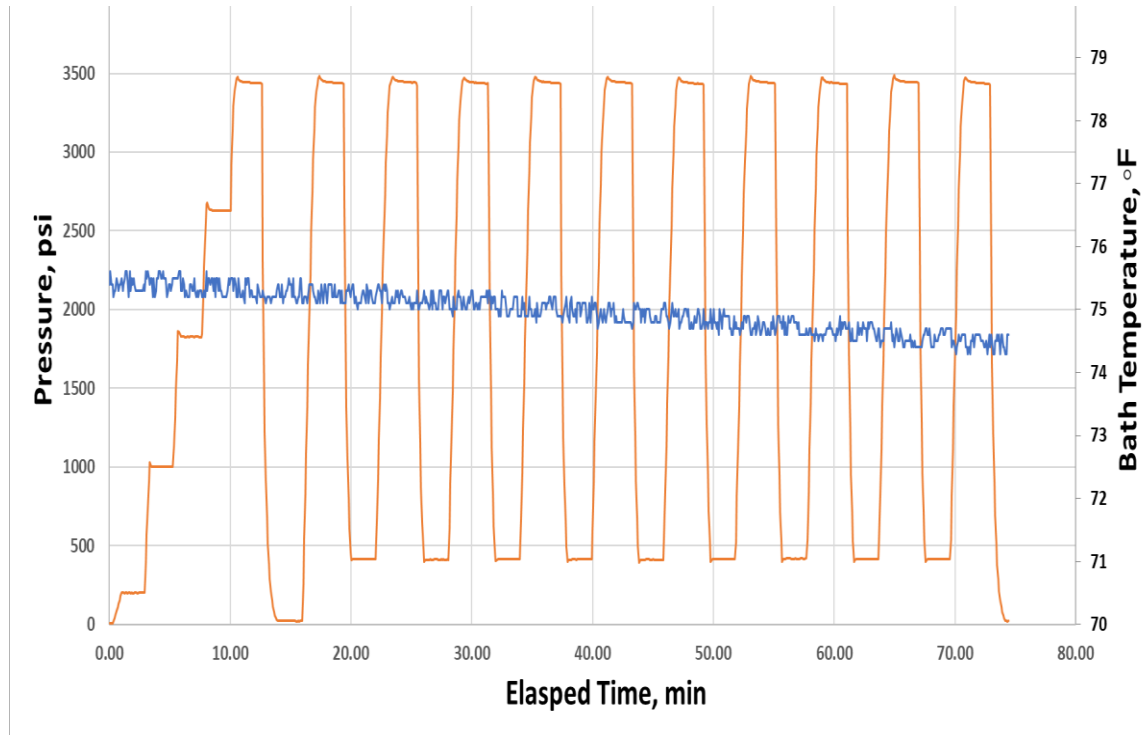
## Pass/Fail Procedure

1. If a sealant fails once, then assemble a new test assembly with new parts and new sealant and test.
2. If a sealant fails twice, it is removed from the test plan.
3. If a sealant passes on the second try, it moves on.

For Parts 2 and 3 (high temperature) the water was replaced with silicone oil.



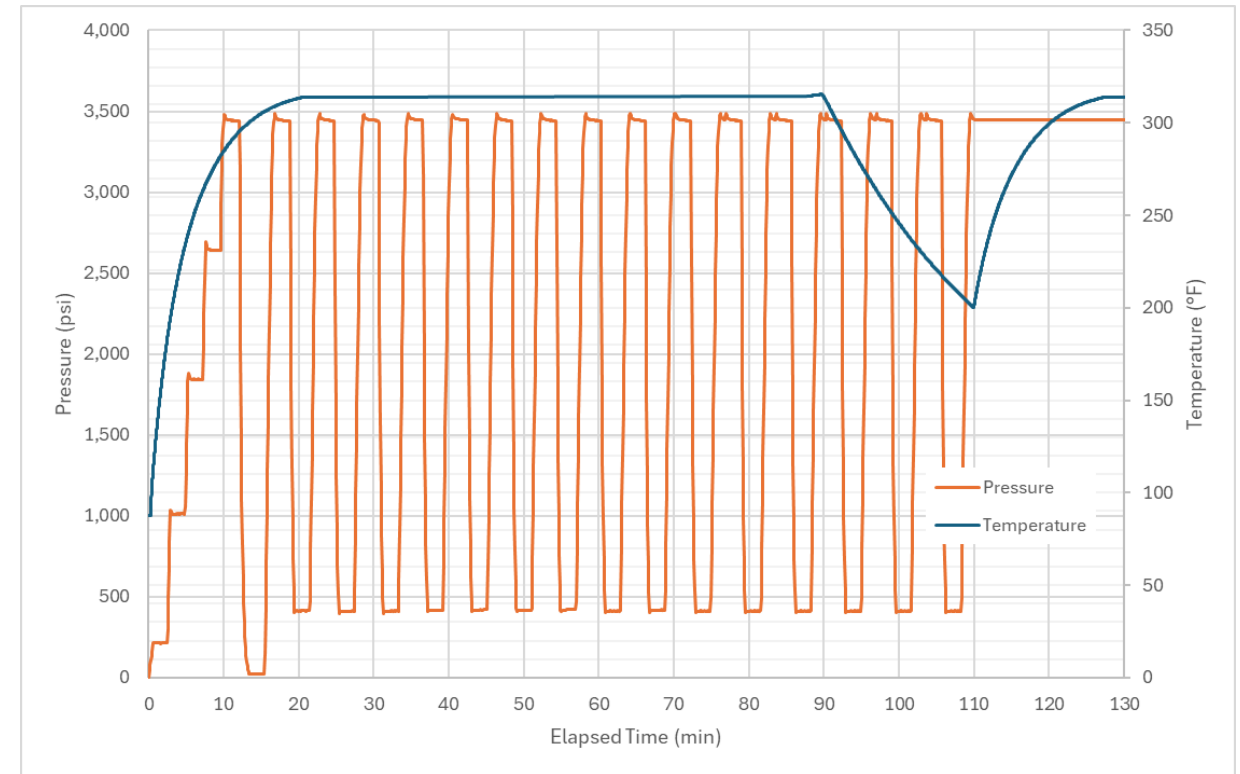
# Results – Parts 1 and 2



**BLUE:** TEMPERATURE (ROOM)

**ORANGE:** PRESSURE (STEP THEN CYCLE)

Test Duration: ~75 minutes



**BLUE:** TEMPERATURE (ROOM - 300°F - 200°F - 300°F)

**ORANGE:** PRESSURE (STEP THEN CYCLE THEN HOLD)

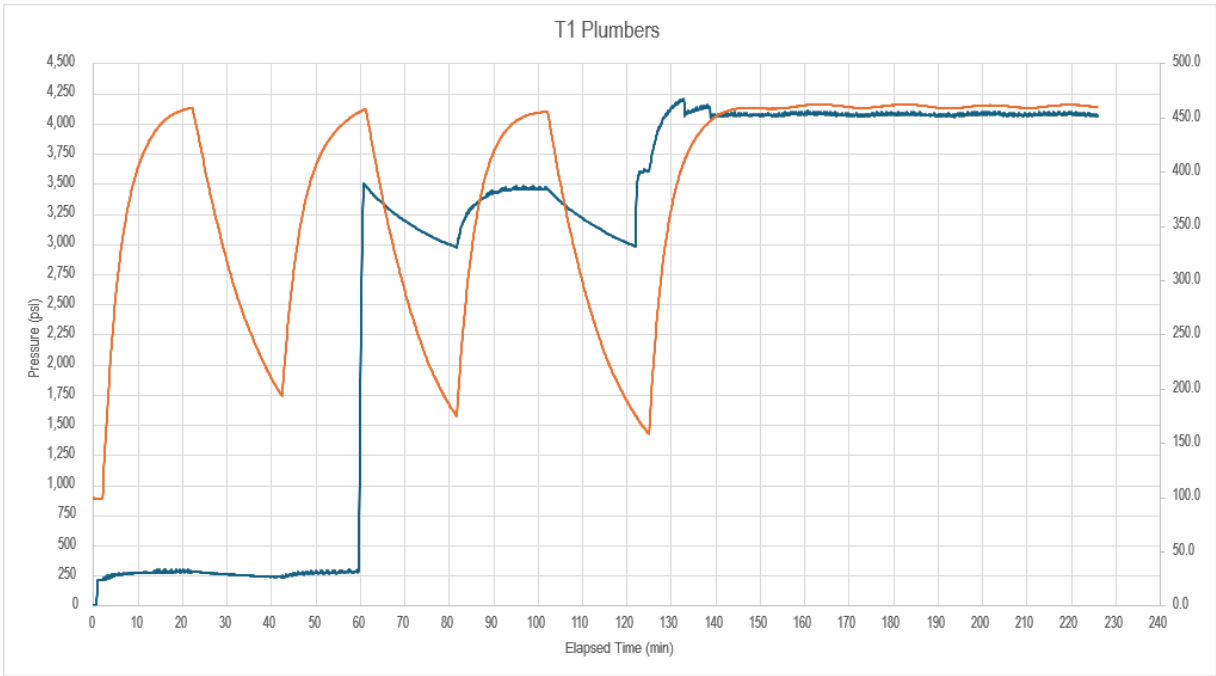
Test Duration: ~130 minutes

# Results – Parts 1 and 2

SEALANT	RESULT
P1	both attempts fail within 10 minutes
P2	both attempts fail within 10 minutes
P3	both attempts fail within 10 minutes
P4	1st attempt fail within 10 minutes 2nd attempt fail after 3 cycles to 3400 psig
P5	both attempts fail within 10 minutes
P6	1st attempt fail within 10 minutes 2nd attempt fail after 11 cycles to 3400 psig
T1	pass
T2	pass
T3	pass
T4	pass
T5	pass
T6	pass
T7	pass
T8	pass
T9	pass
T10	pass
T11	pass
T12	pass



# Results – Part 3

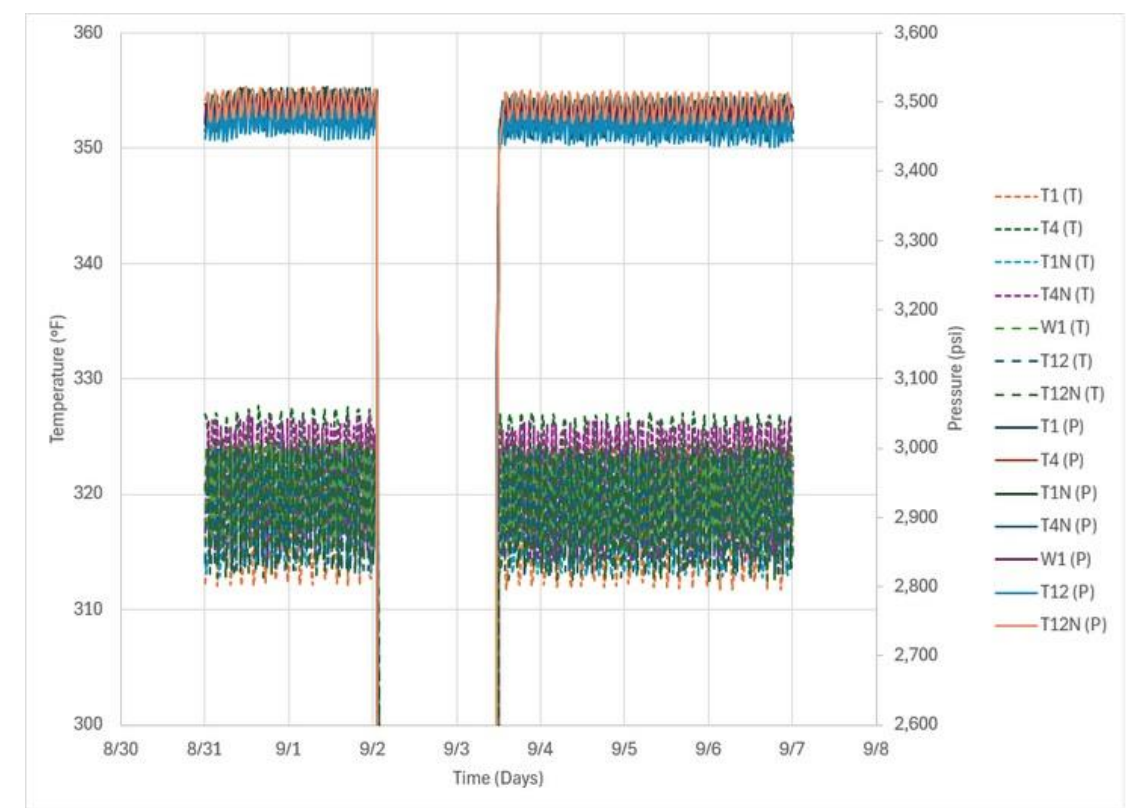
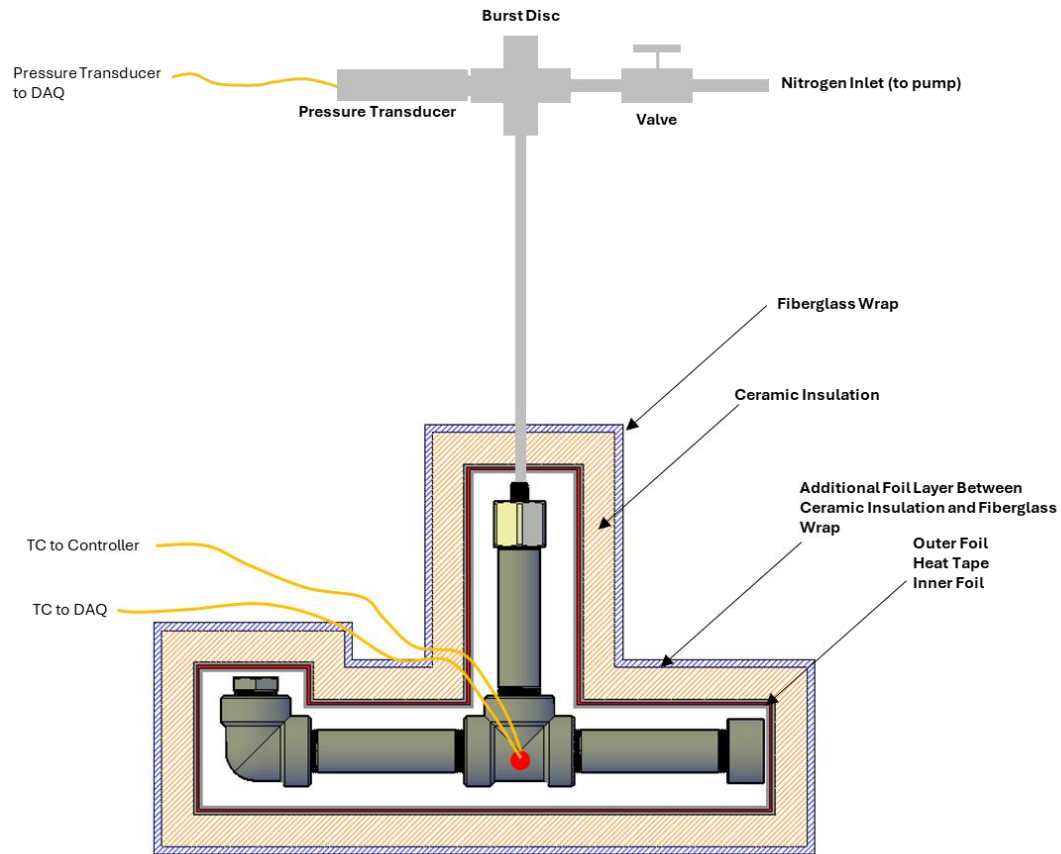


**BLUE: PRESSURE (250 - 3000 - 4000 PSIG)**  
**ORANGE: TEMPERATURE**  
**(ROOM - 450°F - 200°F CYCLE THEN HOLD AT 450°F)**

**Test Duration: ~225 minutes**

T1	pass
T2	1st attempt fail after 1 cycle up to 450°F & up to 250 psig 2nd attempt fail within 15 min
T3	both attempts fail after 1 cycle up to 450°F & up to 250 psig
T4	pass
T5	1st attempt fail after 1 cycle up to 450°F & up to 250 psig 2nd attempt fail within 15 min
T6	both attempts fail within 15 minutes
T7	both attempts fail within 15 minutes
T8	1st attempt fail within 15 min 2nd attempt fail after 1 cycle up to 450°F & up to 250 psig
T9	both attempts fail within 15 minutes
T10	both attempts fail within 15 minutes
T11	1st attempt fail after 1 cycle up to 450°F & up to 250 psig 2nd attempt fail within 15 min
T12	pass

# Current Testing – Part 4



## ON TEST:

1. ORIGINAL T1 AND NEW T1 (T1N)
2. ORIGINAL T4 AND NEW T4 (T4N)
3. ORIGINAL T12 AND NEW T12 (T12N)
4. WELDED PART AS CONTROL (W1)

HELD AT ~315°F AND ~3,400 PSIG

# Questions?



# EMISSIONS STRATEGY PROGRAM SHOWCASE

Winter Workshop – February 12, 2025



# Summary

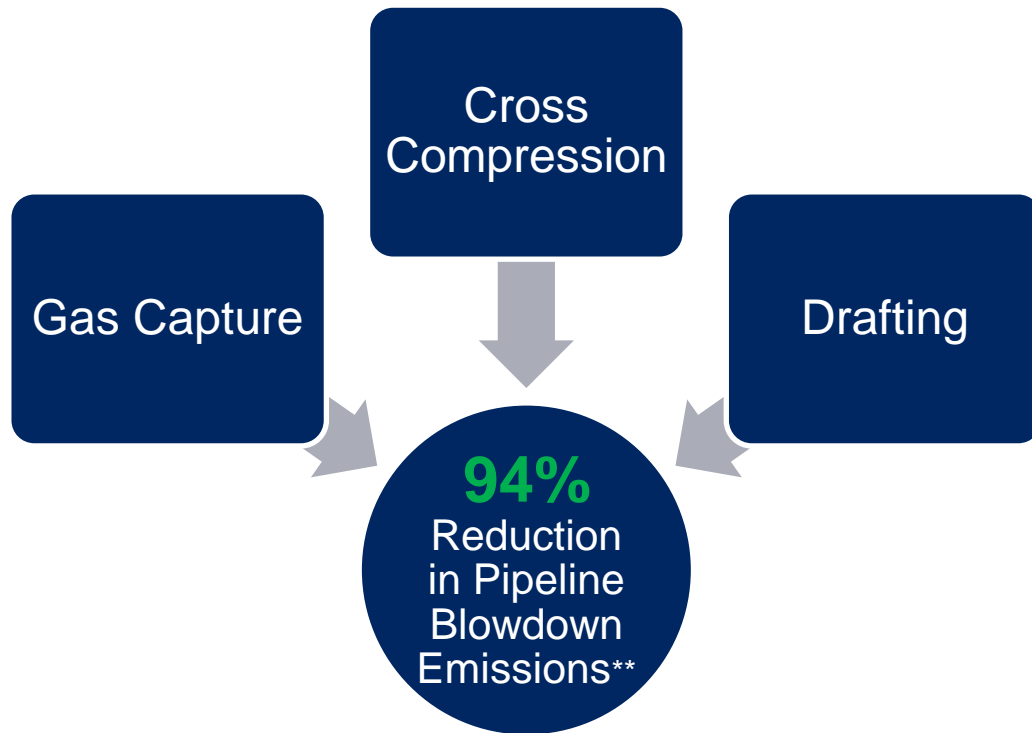
## » Program Accomplishments

- SoCalGas and SDG&E Blowdown Reduction Activities
- SoCalGas Aerial Methane Mapping
- SoCalGas Leak Inventory Reduction
- SoCalGas and SDG&E Damage Prevention Public Awareness

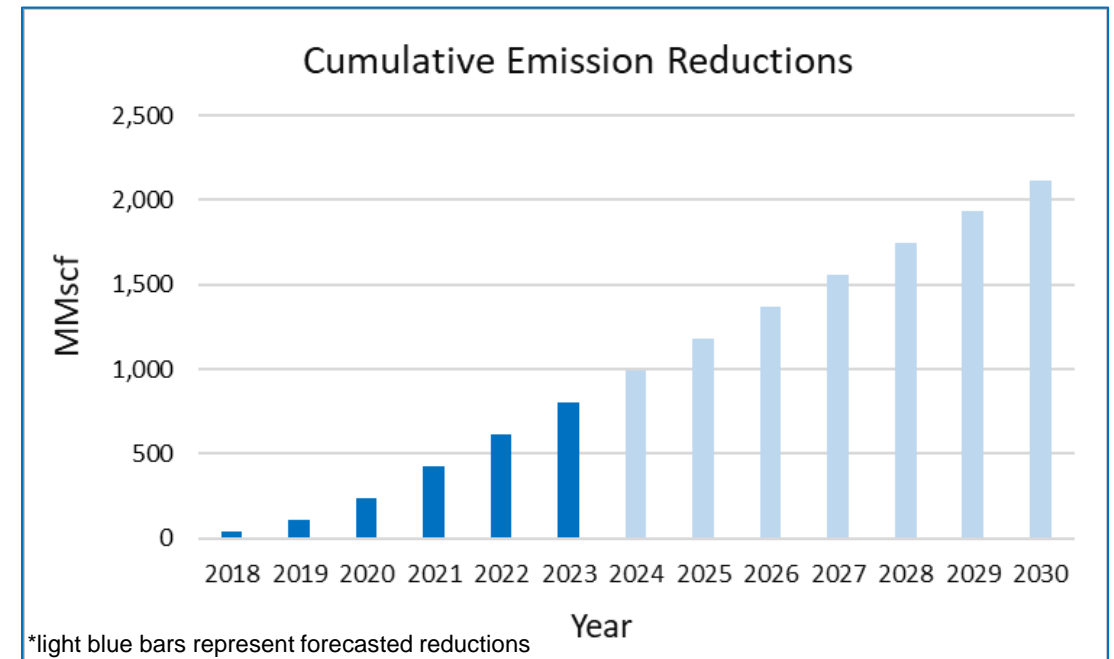
## » Emerging Opportunities

## » Roadmap to 40% Emission Reductions

# SoCalGas – Blowdown Reduction Activities



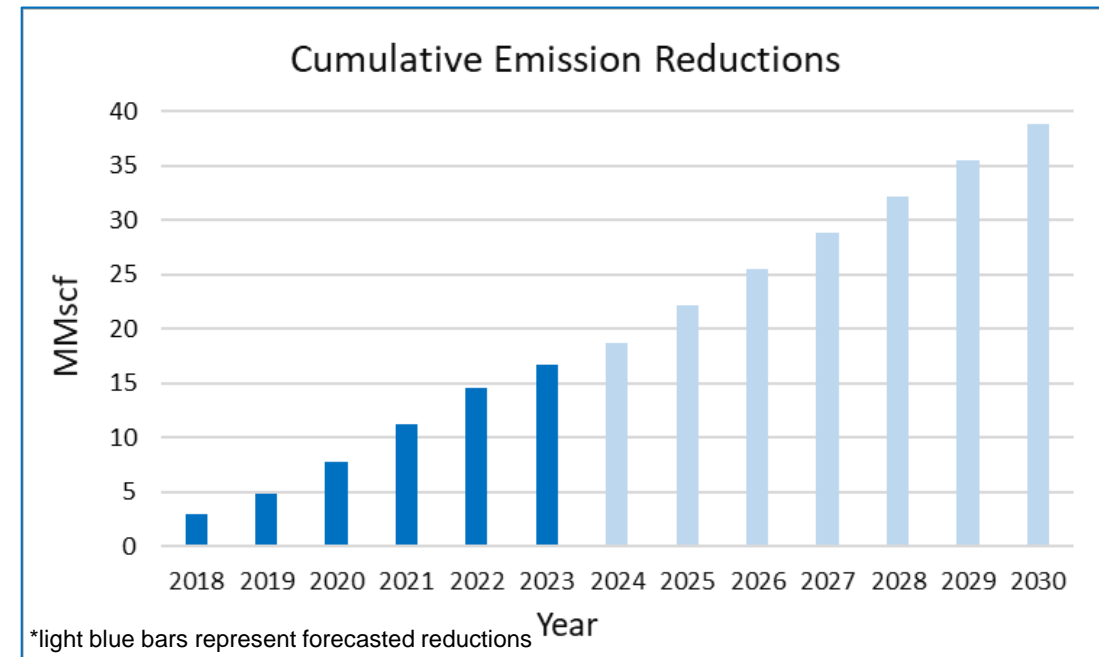
- » 802 MMscf of emission reductions from 2018 through 2023
- » Estimating 2.1 Bscf of cumulative reductions by 2030



# SDG&E – Blowdown Reduction Activities

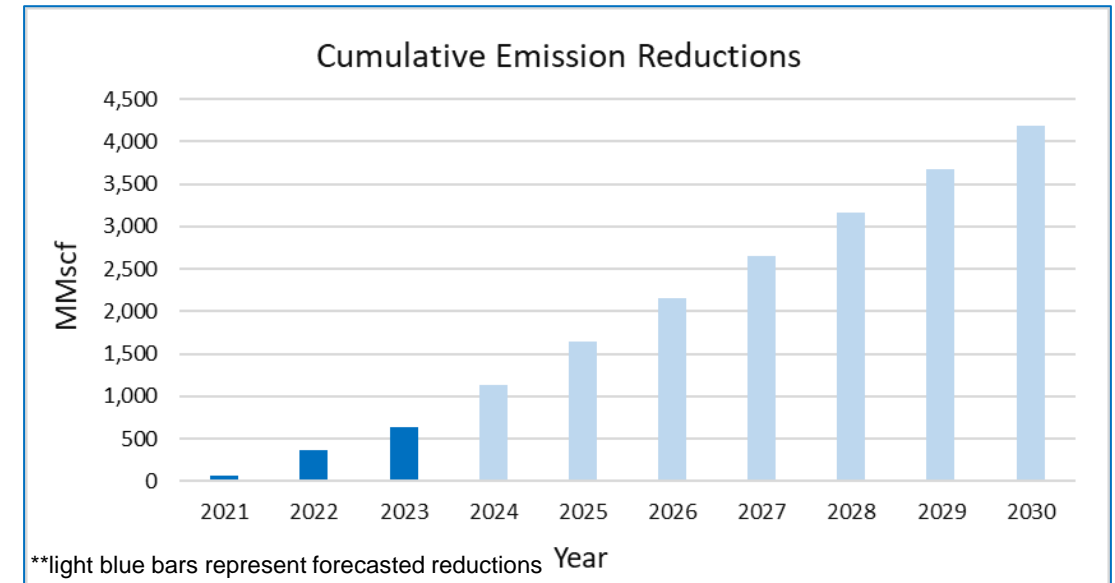


- » 62% reduction in pipeline blowdown emissions during 2023
  - » 17 MMscf of reductions from blowdowns during 2018 through 2023
- » Estimating 39 MMscf of cumulative reductions by 2030



# SoCalGas - Aerial Methane Mapping (AMM)

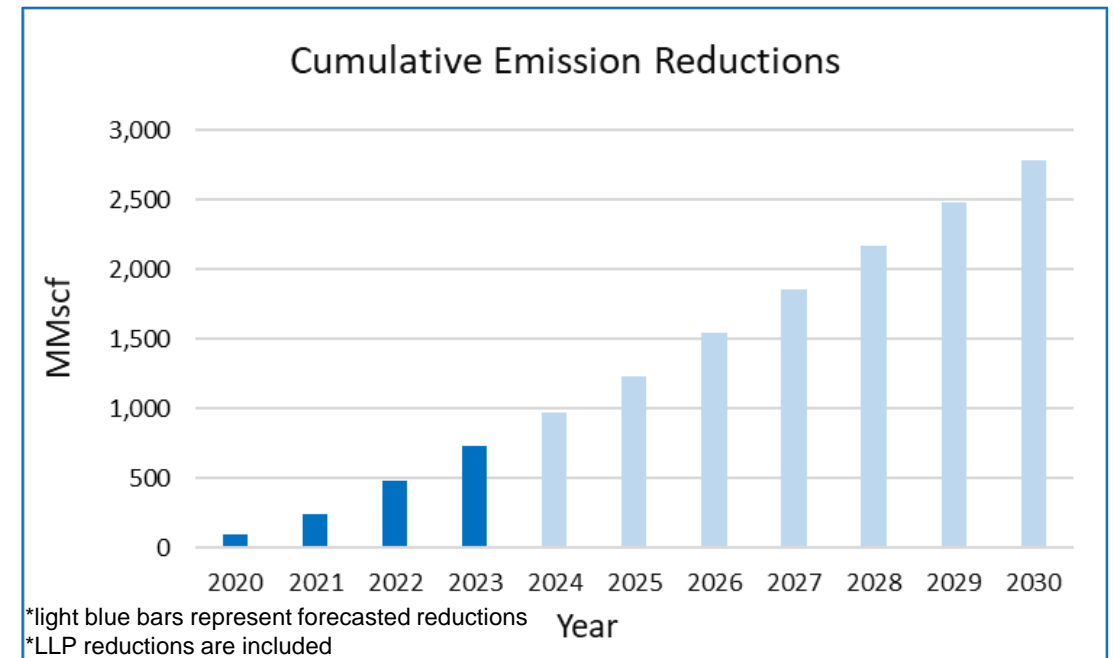
- » Program is benefiting from past 4 years of investments
  - 2021-2022 (Std cost-effectiveness of \$70\*/Mscf - \$48/Mscf)
    - Increased coverage 4x, which improved efficiency of fixed program costs
  - 2022-2023 (Std cost-effectiveness of \$48/Mscf - \$29/Mscf)
    - Successfully negotiated pricing with vendor
    - Introduced new sensor that can detect more emissions per square mile
    - Completed capital investment to develop data management systems
    - Enhanced data processing efficiency to reduce costs
  - 2023-2024 (Std cost-effectiveness of \$29/Mscf - \$28/Mscf)
    - IT capital costs completed
    - Covered 1.8x more area in 2024 (due to 2023 pause), which improved efficiency of fixed program costs
  - 2025-2030 (Forecasting std cost-effectiveness of \$25/Mscf)
    - Negotiated price reductions for 2024 Compliance Plan scope
    - Potential to improve cost-effectiveness further
      - Implementation of “ferry scans”
      - Reduction of incomplete combustion emissions



# SoCalGas – Leak Inventory Reduction



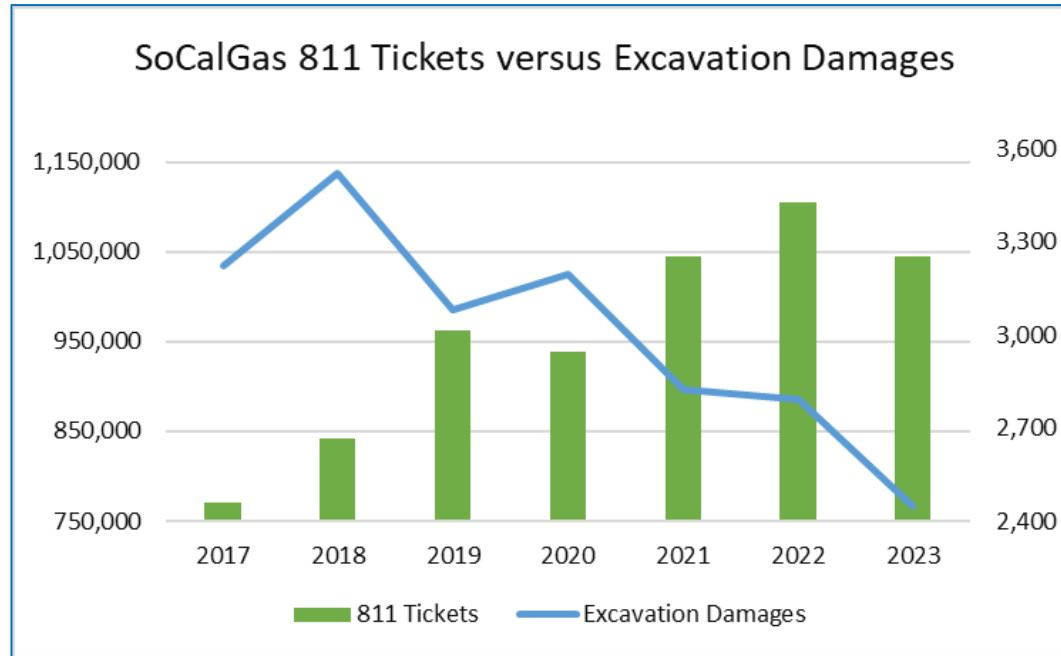
- » 727 MMscf of reductions from 2020 through 2023
- » Estimating 2.8 Bscf of cumulative reductions by 2030
- » Cost reduction strategies:
  - » Negotiating paving cost reductions
  - » Ongoing analysis of costs to identify workforce efficiencies





# SoCalGas - Damage Prevention Public Awareness

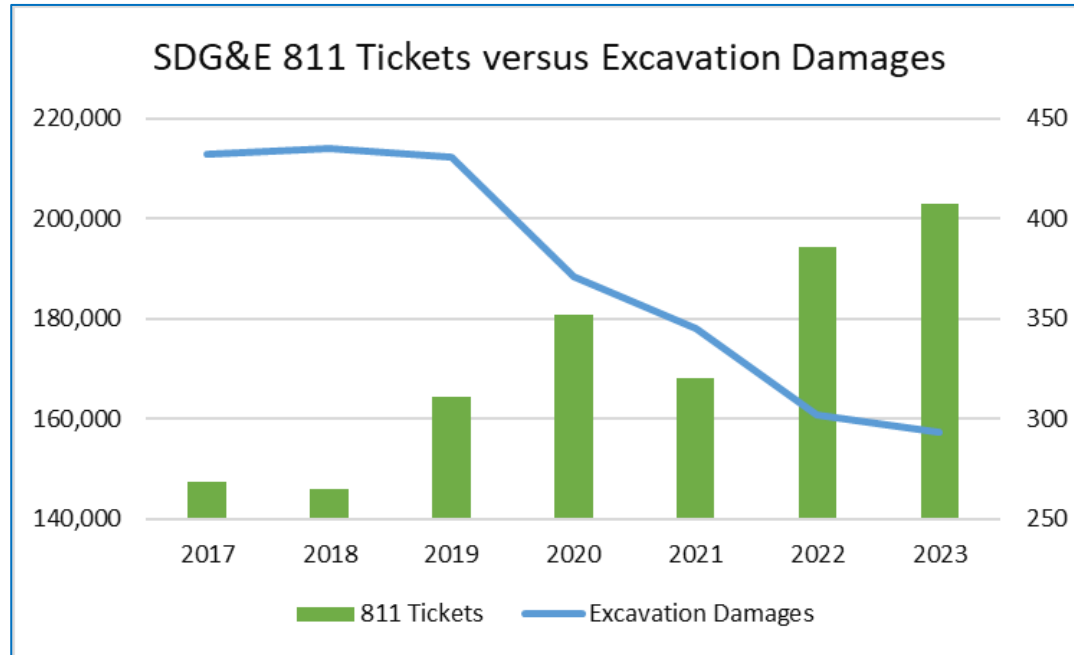
- » Damage prevention program continues to reduce excavation damages





# SDG&E - Damage Prevention Public Awareness

- » Damage prevention program continues to reduce excavation damages



# Emerging Opportunities - SoCalGas

- » Pilot program to increase frequency of MSA surveys
  - Estimated to reduce additional 81MMscf per year
- » Drawdown infrastructure to mitigate pipeline blowdown emissions
  - Expected to decrease costs by reducing the need for high-powered cross-compression
- » Advanced data analytics to identify leaks
  - Exploring new algorithms to identify consumption anomalies
- » Strategic implementation of vapor recovery systems at Compressor Stations
  - Estimated to reduce compressor emissions by 25% from 2023 levels
- » Quality and maintenance plan for Transmission compressor rod packing
  - Estimated to reduce compressor emissions by 20% from 2023 levels
- » Development of AMM Emission Factors to complement Large Leak Prioritization Program
  - Supports prioritization of leaks with the greatest flow rates

# Emerging Opportunities - SDG&E

- » Implementation of Aerial Methane Mapping (AMM)
- » Advanced meter consumption analytics to identify leaks
  - Exploring new algorithms to identify consumption anomalies
- » Enhanced pipe fittings specifications
  - Published standards to confirm manufacturers' thread fabrication processes conform to National Pipe Thread (NPT) standards
  - Implemented stringent material inspection standards

# Roadmap to 40% Emission Reductions

## » Maintenance of projects and reductions

- Maintaining reductions is critical
- Program costs may increase while emission reductions remain level

## » Exploration of new methods and technologies

- R&D efforts are focused on cost-effective emission reductions

## » Implementation of diverse projects

- Emissions can vary year-to-year
- A diverse project portfolio helps to hedge against unexpected increases in emissions

## » Providing a buffer

- Should target to reduce past 40% because emissions can vary year-to-year

# Questions?

# Closing and Next Steps


CARB and CPUC



California Public  
Utilities Commission



# Final Questions?

- Click the hand next to your name in the participant list 
- The host will call on your name when it is your turn to speak
- Or, type question into the chat



# THANK YOU

For more information and today's slides:

<https://www.cpuc.ca.gov/about-cpuc/divisions/safety-policy-division/risk-assessment-and-safety-analytics/natural-gas-leak-abatement>



California Public  
Utilities Commission