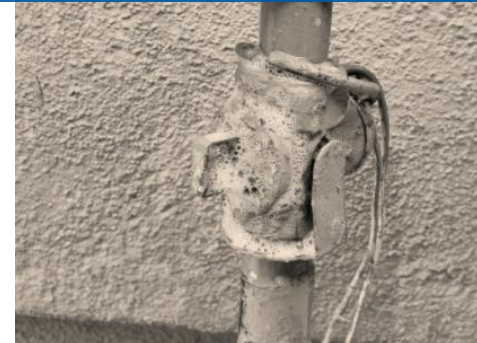




MSA STUDIES, CALCULATIONS PROPOSAL AND EF'S SOAP BUBBLE EMISSION FACTORS R&D

Company-Specific Leaker-Based Emission Factor Development for Customer Meters
2021 Winter Workshop (R.15-001-08)— Jan 21, 2021



Development of Soap Bubble Emission Factors

Proposed Methodology:

- » Replace Population-Based EFs with Leaker-Based EFs based on currently reported PHMSA “Hazardous” and “Non-Hazardous” above ground leak categories.
 - PHMSA Categories are currently based on Soap Test Criteria when soap is blown-off preventing formation of bubbles
- » Add Sub-Category of “Foam” type leaks to facilitate deferring repair of small leaks to bundle with future work.
 - Improves cost-effectiveness and helps to reduce vented emissions due to tear-down and rebuild of Customer Meter facilities
- » Calculate emissions based on DM&S approach of calculating number of Unknown leaks based on “un-surveyed” Customer Meters
 - Define “Leak Survey” verses “O&M” leak record origination work types

R&D - Develop Customer Meter Leaker-Baser Emission Factors

- » **Objective:** evaluate a methodology of using soap test to estimate leak flow rate and develop Leak-Based Emission Factors for Distribution above-ground leaks (Pressures > 60 PSIG). Research Projects:
 - OTD 7.17.d Quantification of Small Leaks and Define Practical Lower Emission Threshold
 - OTD 7.19.e Study Framework for Developing Company-Specific Emission factors
 - CARB/GTI Residential MSA Study
 - DOE/OTD Industrial Meter Study
 - SoCalGas/SDG&E Develop Company-Specific Above Ground EFs based on Soap Test Categories
- » **Milestone Reached:**
 - OTD: Laboratory study and Field trial confirmed feasibility of the approach for quantifying leak rates based on soap test criteria. Public report submitted to CARB & CPUC. Phase 2 project proposed
 - SoCalGas/SDG&E: Soap Test EF Field Study commenced in December 2020
- » **Next Steps:** Complete SoCalGas/SDG&E study to develop Company-Specific Emission Factors.



Miniscule
(>0.02 SCFH)

Small to Medium
(0.02-4.0 SCFH)

Large
(>4+ SCFH)

Leak Category	Soap test description/criterion	Boundaries (scfh)
3	Soap solution produces foams with little or no bubbles	≤ 0.02
2	Soap solution produces a cluster of small bubbles up to medium bubbles	> 0.02 to ≤ 4
1	Soap solution is blown off	> 4

Table 7. Alternative set of 3 leak classification categories

Framework to
develop and
refine emission
factors

1. Select which emission factors to develop

- For example, above ground Customer meter sets, below ground Distribution Main & Service

2. Establish population characteristics and categories

- Identify historical population and leak data on target assets to establish expected mean and leak rate distribution
- Categorize assets according to available system information

3. Establish random sample methodology and sample size

- Utilize stratified random sampling for efficient, smaller sample size
- Determine sample size using precision and sample size (PrSS) analysis

4. Conduct pilot studies

- Collect measurements and calculate statistical means and confidence bands for each category

5. Establish company-specific emission factors

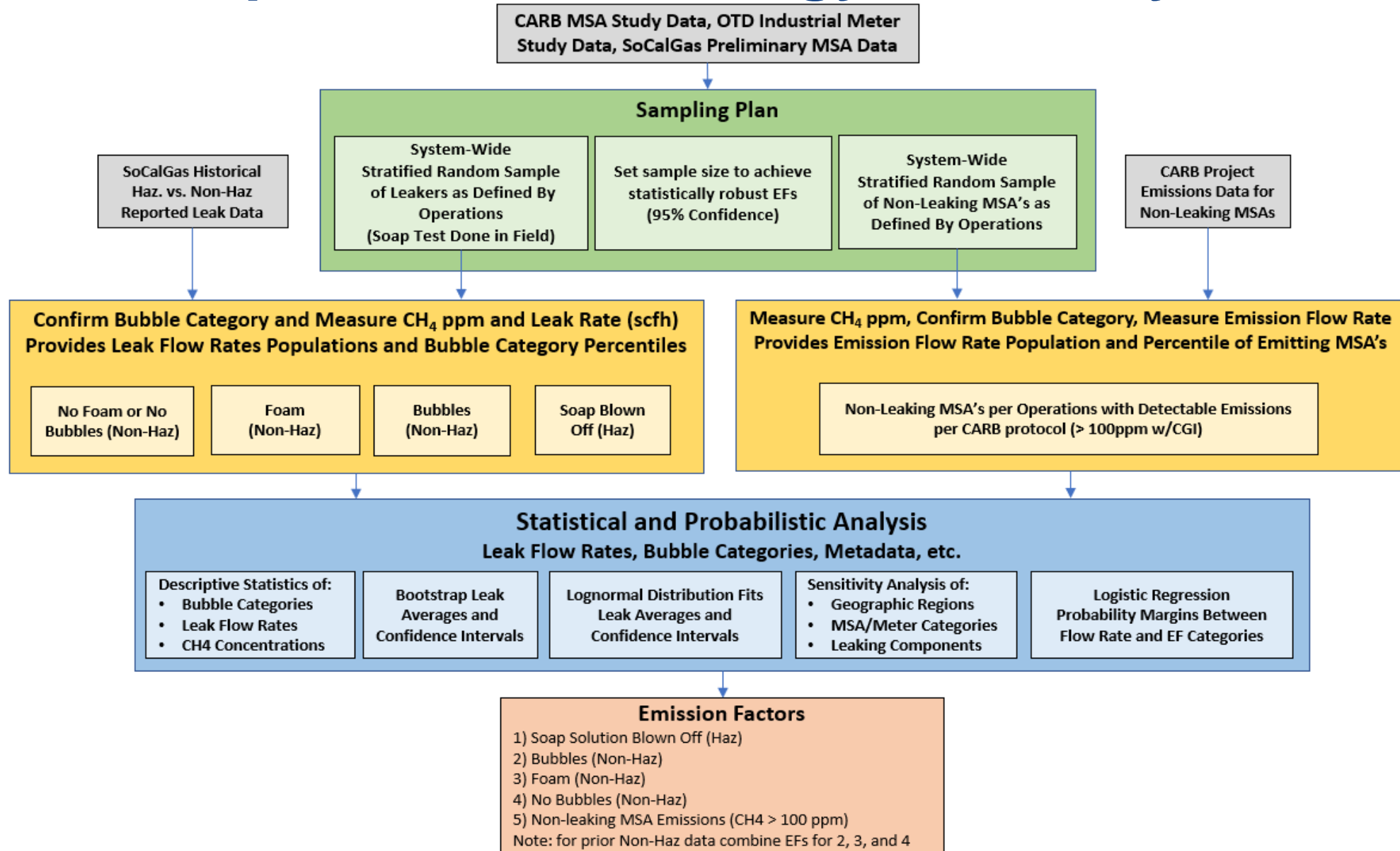
- Calculate uncertainty associated with emission factors

6. Continuous refinement of emission factors

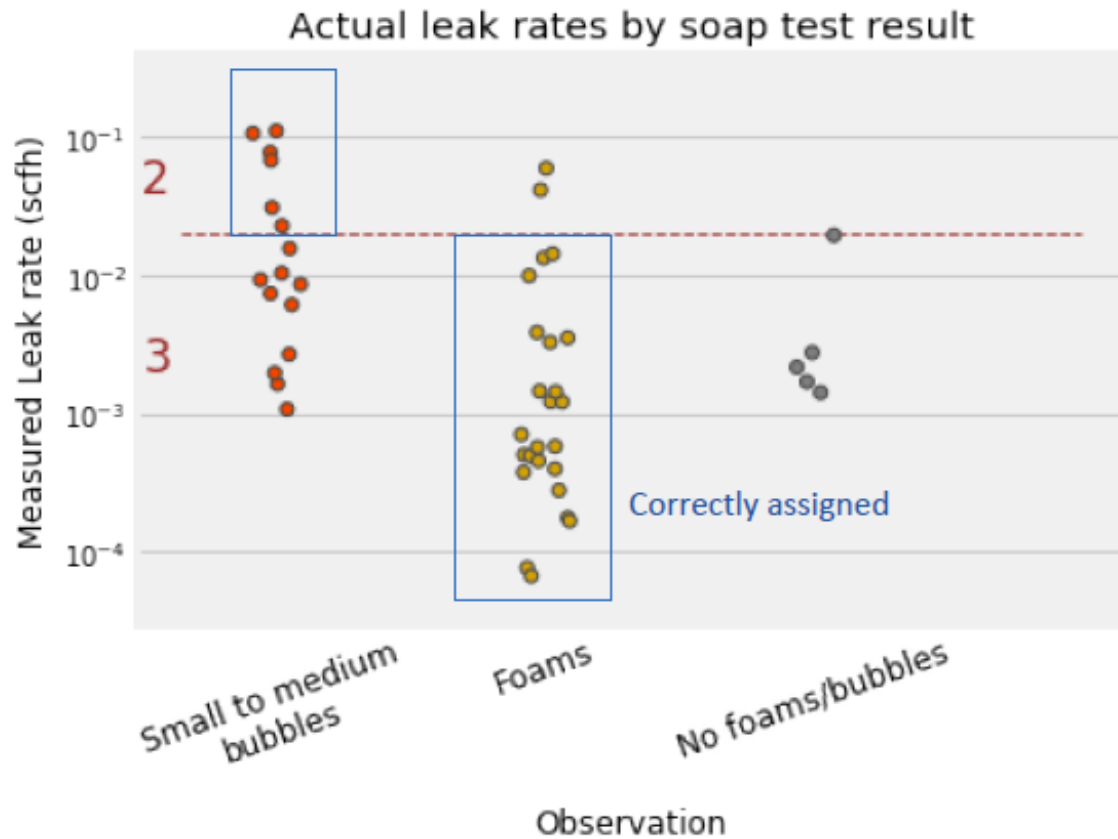
- Incorporate additional field data to lower uncertainty of emission factors

Note: based on project OTD 7.19.e. *Developing a Framework for Company Specific Emission Factor Development*

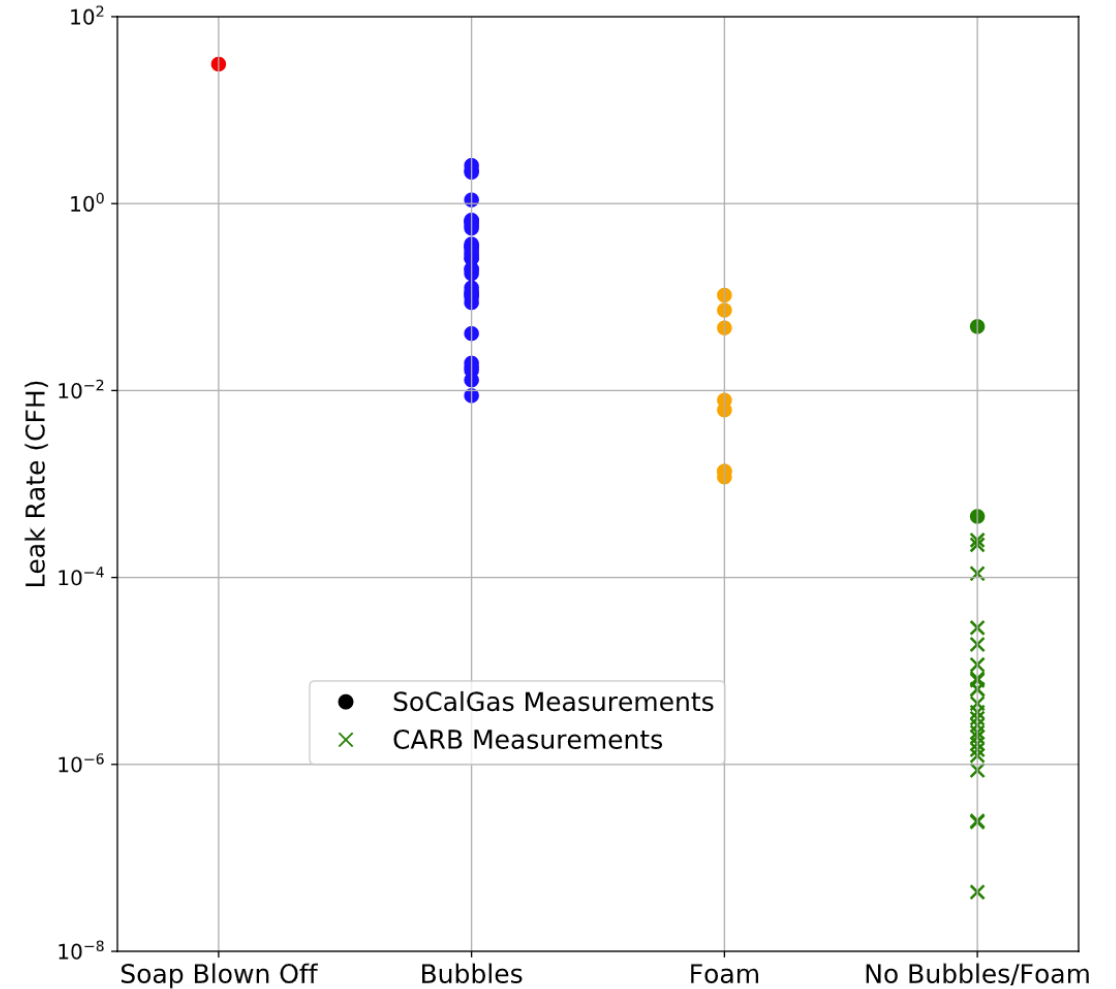
EF Development Methodology Summary Flowchart



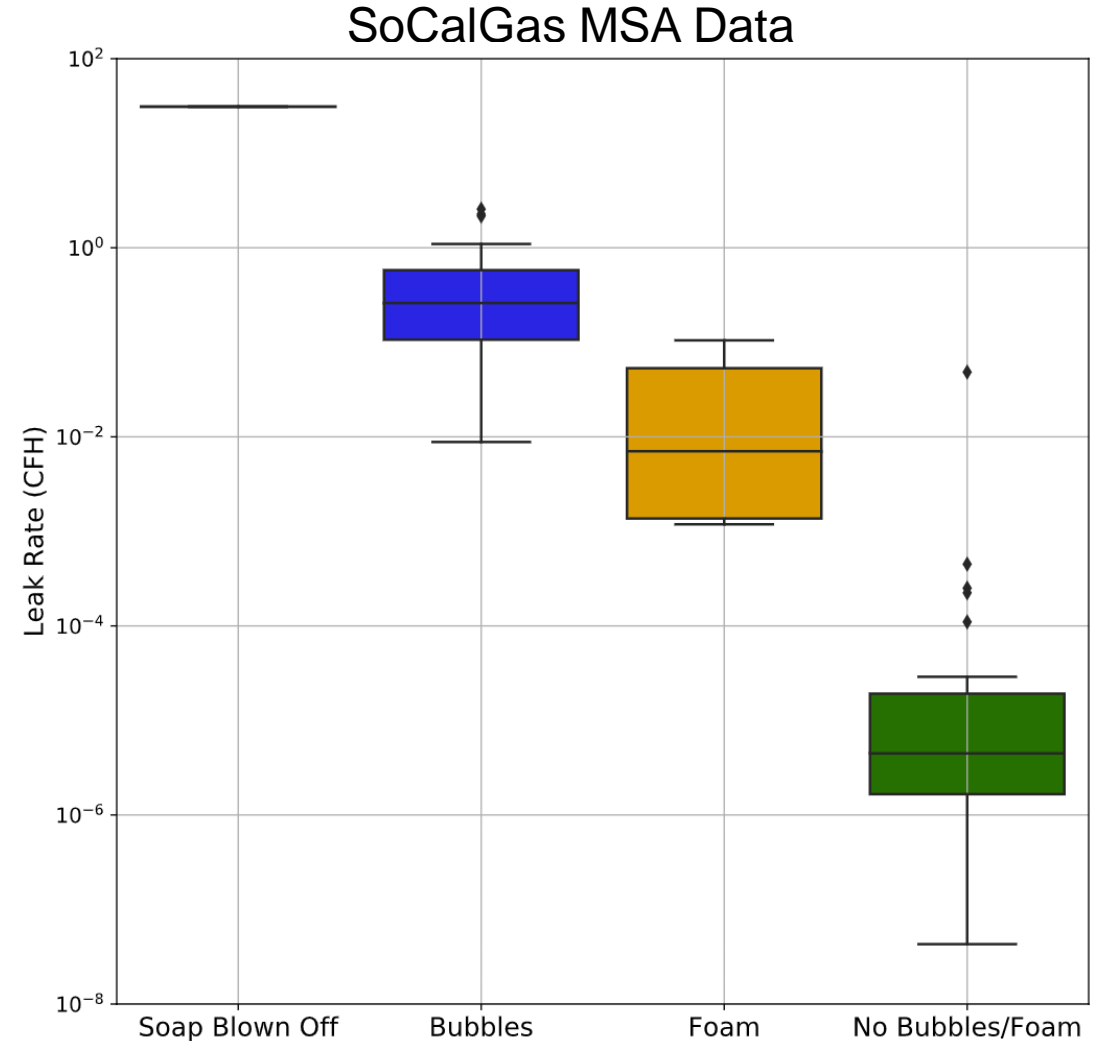
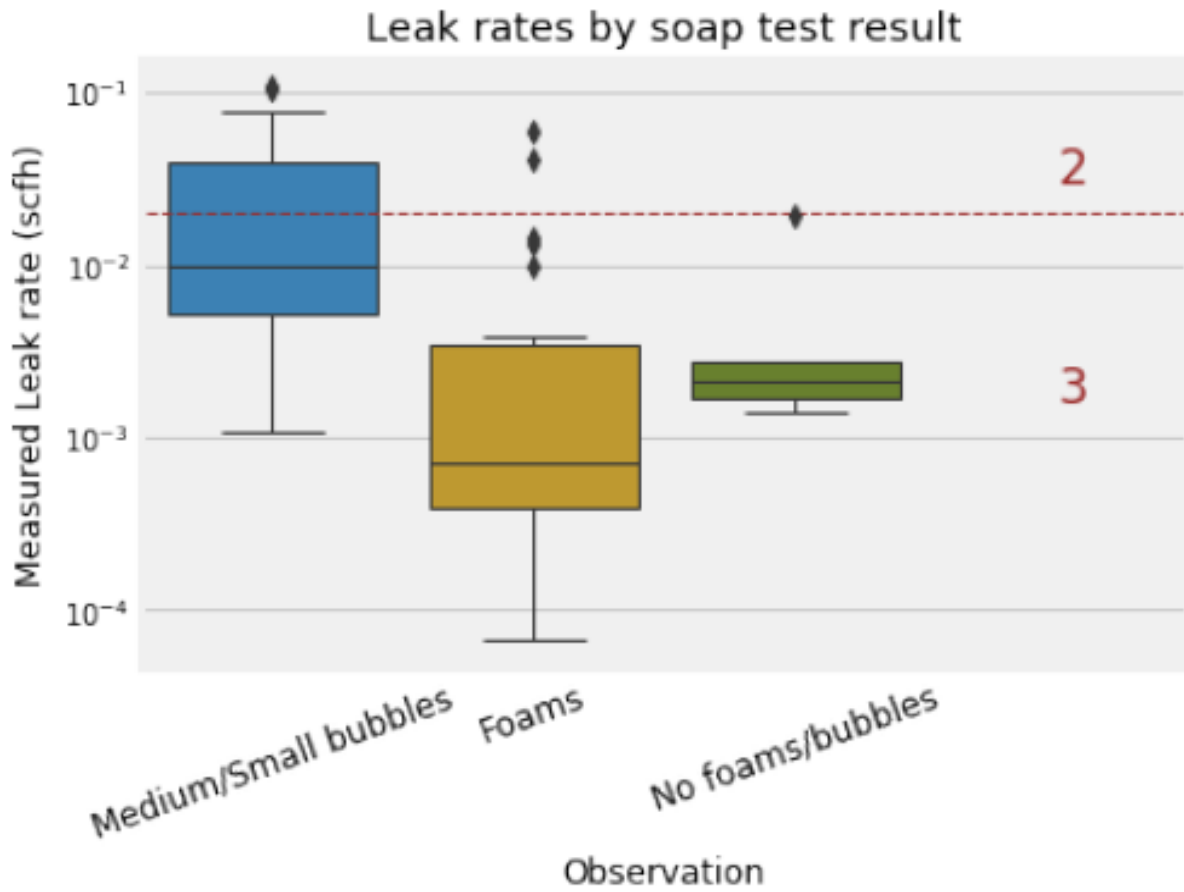
SoCalGas Preliminary MSA Leak Data compared to OTD 7.17.d Study



SCG MSA Data



SoCalGas Preliminary MSA Leak Data compared to OTD 7.17.d Study



Questions?

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