Quantifying Methane Emissions from Distribution Pipelines in California

CPUC Winter Workshop
January 21-22, 2021

California Pipeline Study

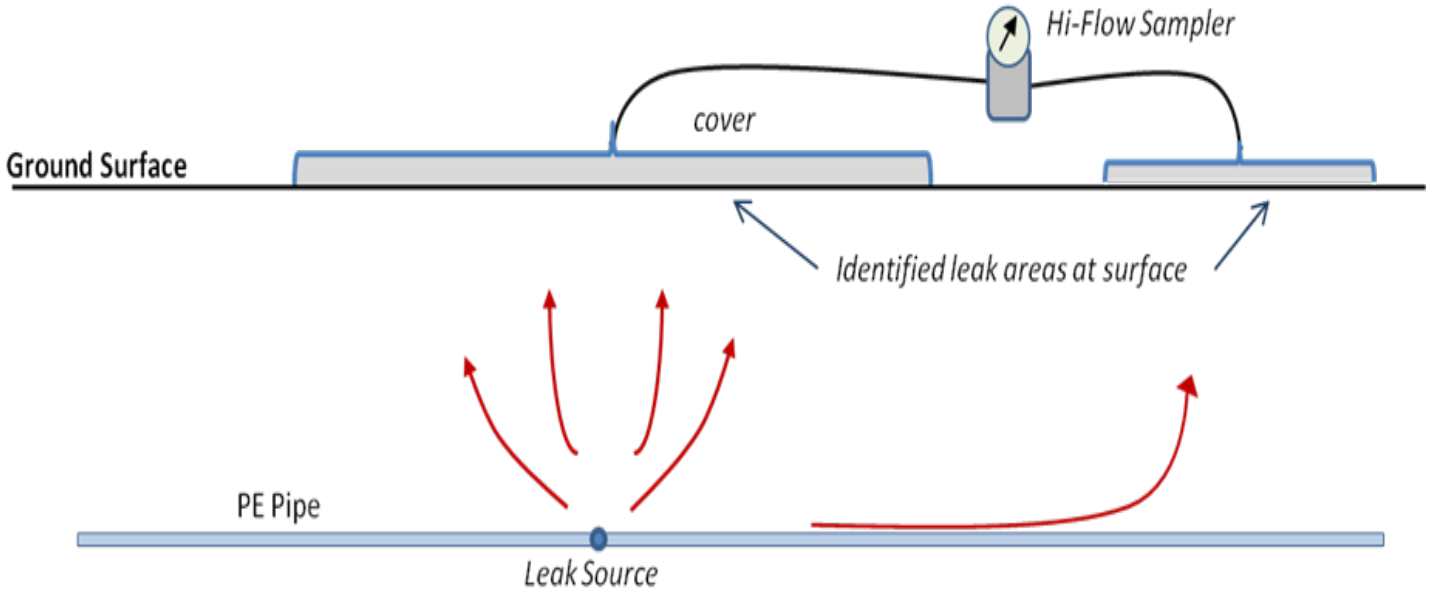
- Objectives
  - Update existing emission factors by material and facility
  - Compare above-ground with below-ground leak measurements
- 78 samples stratified by:
  - Utility company
    - PG&E 28, SoCal Gas 37, SDG&E 13
  - Material type and facility
  - Demographic factor
    - Various ZIP codes

Methods Used to Identify and Measure Emissions

- Emissions identification
  - Handheld CGI
- Emissions measurement
  - Hi-flow sampler
  - LGT methane analyzer

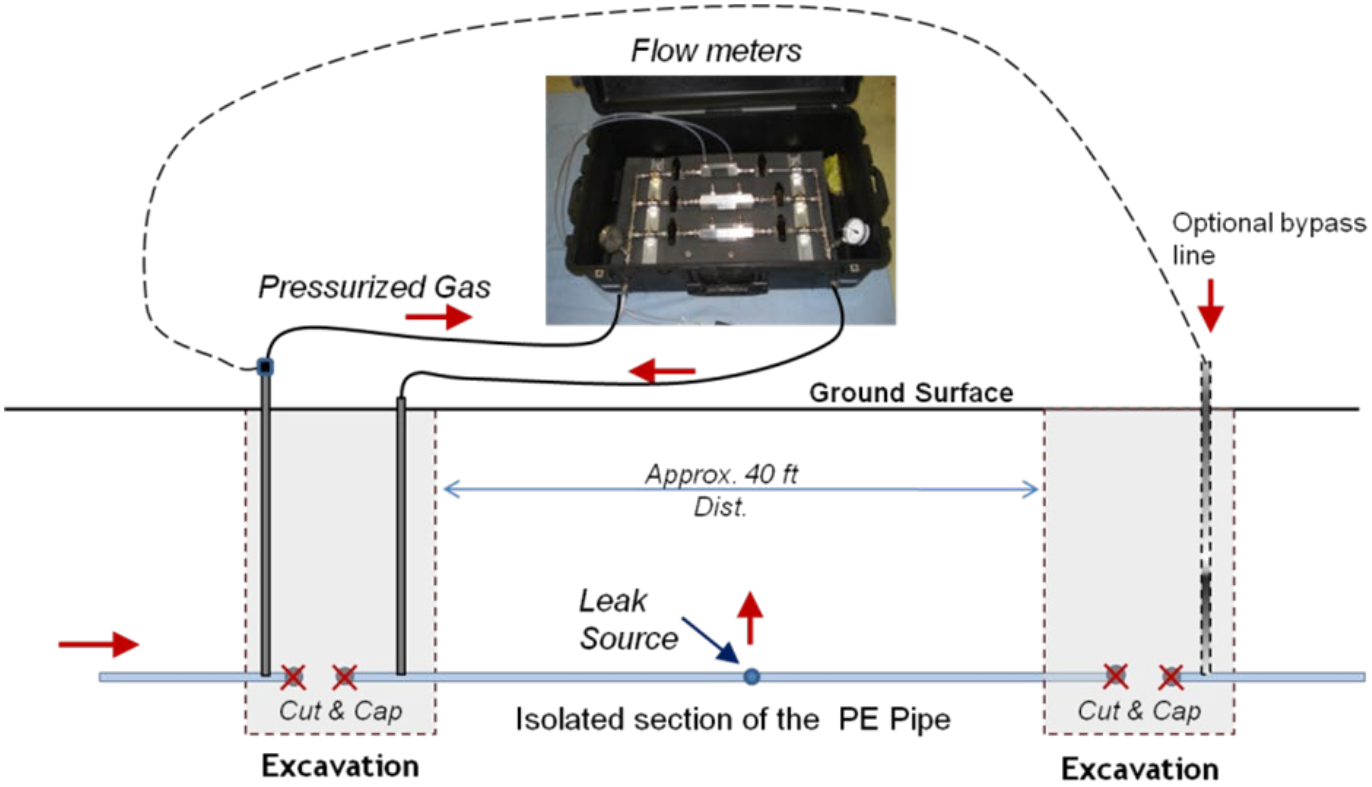
Handheld CGI

Above-Ground Leak Measurement Diagram



Above-Ground Leak Measurement

Below-Ground Leak Measurement Diagram



Below-Ground Leak Measurement

Repair Data Verification

- The study measured 78 underground pipe leaks from above-ground
- Two samples discarded
- Almost 60% of the data differed from the initial assumptions

	Unverified Leaks	Number and Percent Misclassified Based on Verification Digs				
		Non-Pipe	Non-Leaker	Facility Misclassified	Material Misclassified	>= One Misclassification*
Number	78	1	1	31	24	46
Percent		1%	1%	40%	31%	59%

* The number of 46 includes the valve leak that was misidentified as a pipe.

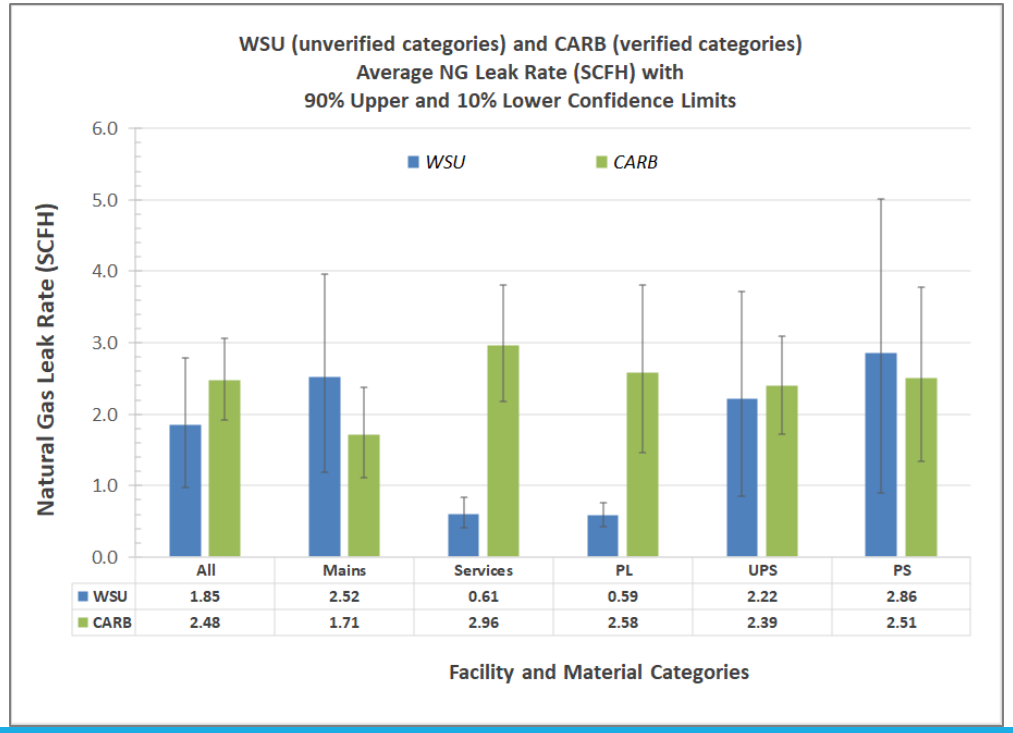
Descriptive Statistics of Samples

- Total 76 leaks analyzed
  - 29 leaks on main and 47 service pipes
  - 25 leaks on plastic, 32 unprotected steel and 19 protected steel
- Plastic service pipe leaks at a higher rate than other materials

Category	All	Mains	Services	PL	UPS	PS
N (count)	76	29	47	25	32	19
Min (scfh)	0.007	0.063	0.007	0.007	0.148	0.063
Max (scfh)	20.400	13.985	20.400	20.400	13.985	14.400
Sum (scfh)	188.542	49.689	138.853	64.535	76.441	47.566
Mean (scfh)	**2.481**	**1.713**	**2.954**	**2.581**	**2.389**	**2.503**
Std. error (scfh)	0.448	0.510	0.646	0.938	0.544	0.966
Variance ($scfh^2$)	15.221	7.535	19.631	22.009	9.474	17.731
Stand. dev (scfh)	3.901	2.745	4.431	4.691	3.078	4.211
Median (scfh)	0.827	0.617	1.000	0.600	1.034	1.000
25 prcntil (scfh)	0.479	0.407	0.600	0.336	0.600	0.462
75 prcntil (scfh)	2.328	2.022	3.900	3.150	2.924	2.154

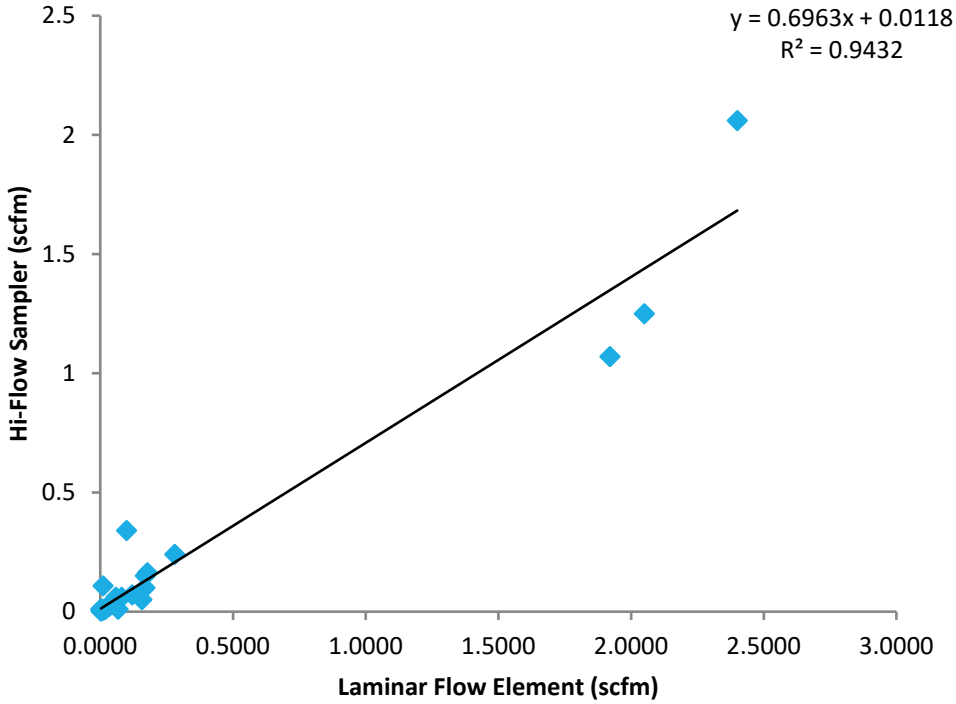
Comparison of Leak Rates

- Leak rates across material type or facility are not statistically different
- Direct comparison between CARB and WSU study results is difficult due to different study methodologies



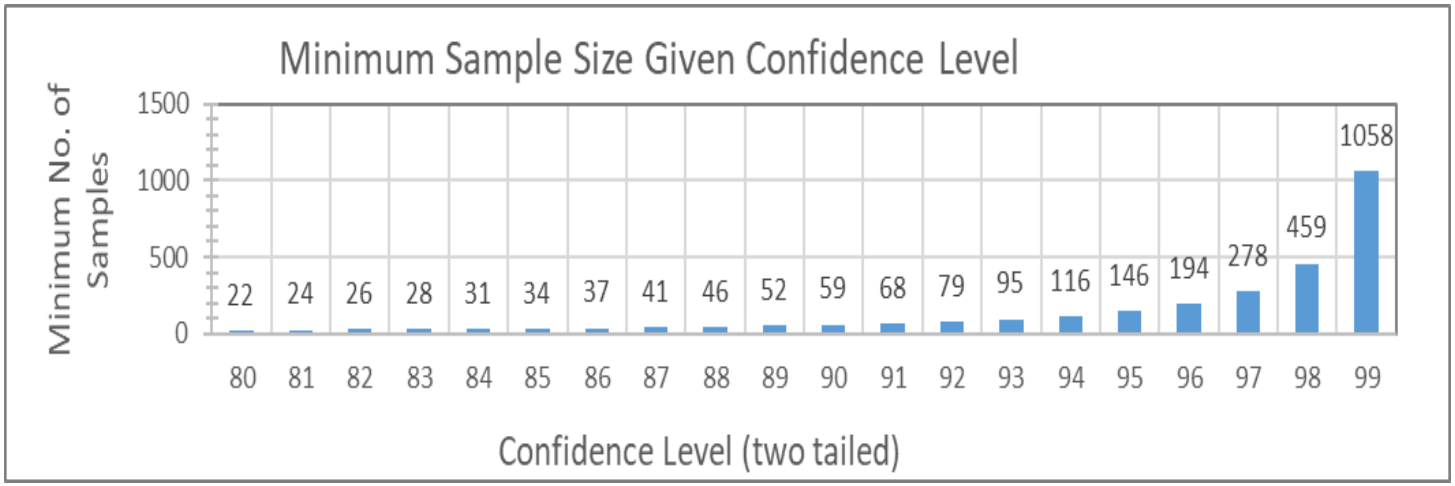
Leak Rate Correlation

- Strong correlation between above- and below-ground leak measurements
- Above-ground measurements tend to be lower compared to below-ground



Study Limitations

- Certain material types and/or facilities are underrepresented in the samples
- Comparison of leak rates by multiple factors is not possible



Next Steps

- Propose a single emission factor for all material types and facilities
- Assess the impact of the emission factor on:
  - 2015 baseline emissions
  - Other calendar year emissions

Discussion

Questions?