Working Group 2
Leak Detection/Fugitive Methane

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Attendance Breakdown

	Aug 6th	Aug 7th
Approximate total attendance	28	23
Federal Regulators	2	1
State Regulators	0	0
International Regulators	0	0
Pipeline Industry/Service Providers	13	9
Standard Developing Organizations	0	0
Researchers	12	11
Academics	0	1
Other	1	1

Top 3 Identified R&D Gaps

Gap #1A –Establish verification and validation framework for assessing the viability and performance of new gas/liquid leak detection and quantification technologies and methodologies.

- Physical characteristics / operational
- Regulatory
- "Fit for Purpose"
- Operator Considerations
- Risks/environmental impact
- Performance
  - Reliability
  - Repeatability
  - Robustness
  - Sensitivity
  - Accuracy

Gap #1B –Conduct field validation studies to verify gas/liquid leak detection and quantification technologies and methodologies.

Top 3 Identified R&D Gaps

Gap #2 – Refine/enhance/develop leak survey technologies and methodologies to <u>quantify detected emissions</u> from non-hazardous leaks to prioritize for remedial action.

Gap #3 – Develop a "Decision Support System" that integrates leak detection, quantification and integrity related data to enable predictive response.

Gap #4 – Residential Methane Detectors
- Evaluate existing and/or develop low cost sensor – stand alone or networked
- Define/refresh minimum performance standards
- Review existing standards to ensure "fit for purpose"
- Field trials – protocols and pilot programs
- Pre-deployment education protocols

Associated Details
(Gap #1A)

Establish verification and validation framework for assessing the viability and performance of new gas/liquid leak detection and quantification technologies and methodologies.

New or Revised Consensus Standards

2. New or Revised Consensus Standards (standards, guidelines or recommend practices)

a. Does the need address safety or specification related consensus standards?   API 1149

b. Which standard developing organization and which consensus standard name and number is affected? API 1149

c. What scope items should be completed to help improve the standard? Leak Detectors

d. What pipeline type(s) does the need or consensus standard target? All gas and liquids

e. What operating environment(s) does the consensus standard target? All climates, onshore/offshore

f. Can any targets or timeframes be identified to complete this research? 1-2 years

Associated Details
(Gap #1B)

Gap #1B –Conduct field validation studies to verify gas/liquid leak detection and quantification technologies and methodologies.

Creation and Dissemination of General Knowledge

3. Creation and Dissemination of General Knowledge
a. What pipeline type(s) does the new knowledge target? All gas and liquids
b. What operating environment(s) does the new knowledge target?
All climates
c. What technical details or scope items are necessary and recommended?
In conjunction of Gap 1A
d. Can any targets or timeframes be identified to complete this research?
2-3 years

Associated Details
(Gap #2)

Refine/enhance/develop leak survey technologies and methodologies to <u>quantify detected emissions</u> from non-hazardous leaks to prioritize for remedial action.

New or Improved Technology

1. New or Improved Technology
a. What pipeline type(s) does the technology target? Gas distribution and regulated gathering
b. What operating environment(s) would the technology operate? All climates, rural and urban
c. What are any functionality and or performance requirements? Volumetric quantification to enable risk ranking (development of emissions risk factor), GHG reporting
d. What road blocks or barriers prevent the technology deployment? Costs, ease of use, precision, regulatory considerations, adaptability
e. What are anticipated targets or timeframes to complete this research? 2 years

Associated Details
(Gap #3)

Develop a "Decision Support System" that integrates leak detection, quantification and integrity related data to enable predictive response.

New or Improved Technology/ General Knowledge

1. New or Improved Technology
a. What pipeline type(s) does the technology target? All pipelines
b. What operating environment(s) would the technology operate? All climates
c. What are any functionality and or performance requirements? Appropriate confidence levels
d. What road blocks or barriers prevent the technology deployment? Availability of data, operator acceptance
e. What are anticipated targets or timeframes to complete this research? 2 years

Associated Details
(Gap #4)

Residential Methane Detectors
- Evaluate existing and/or develop low cost sensor – stand alone or networked
- Define/refresh minimum performance standards
- Review existing standards to ensure "fit for purpose"
- Field trials – protocols and pilot programs
- Pre-deployment education protocols

New or Improved Technology , New or Revised Consensus Standards , Creation and Dissemination of General Knowledge

1. New or Improved Technology
a. What pipeline type(s) does the technology target? Distribution
b. What operating environment(s) would the technology operate? All climates, residential, inside/outside
c. What are any functionality and or performance requirements? To be determined
d. What road blocks or barriers prevent the technology deployment? Public knowledge/acceptance, costs barrier
e. What are anticipated targets or timeframes to complete this research?   1 to 3 years
 2. New or Revised Consensus Standards (standards, guidelines or recommend practices)
a. Does the need address safety or specification related consensus standards?   UL standards
b. Which standard developing organization and which consensus standard name and number is affected? UL
c. What scope items should be completed to help improve the standard? Evaluate existing UL standard for fit for purpose application
 3. Creation and Dissemination of General Knowledge

Additional Identified Gaps

- Technology Gaps
    - Solutions and regulatory framework for rehabilitation of large diameter vintage pipe – cross over to Vintage Materials work group
    - Develop state-of-the-art solution to monitor system safety performance during extreme environmental conditions; example is reducing cycle times of winter patrols for cast iron winter survey.
    - Enhanced leak pinpointing capability for gas distribution
    - Measurement and validation of sub-surface attenuation of emissions
    - Utility specific methodology to quantify methane emissions
    - Understand the power and payload requirements for leak detection/monitoring with UAVs; could be an information exchange with NASA
    - Continuous monitoring of leaks for various applications
    - One leak survey device for gas and liquids

Additional Identified Gaps

- Technology Gaps - continued
  - New technologies for leak source attribution; examples include adding color to gas; bio-engineered plants for rapid leak detection and source validation based on gas composition (isotopes).
  - Facility Integrity (compressor stations, etc.)
    - Seals with sensors that predict a failure prior to leaking; sensors to validate leak progression and detection
    - Redundant sealing systems

Additional Identified Gaps

- Policy Gaps
  - Adoption of methane emissions best practices and/or EPA Natural Gas STAR or Gold STAR program. Example is use of a compressor and capture process vs. blowing down gas mains to atmosphere. This includes the adoption of appropriate regulatory frameworks which incentivize these practices.
  - Similarly, broader adoption of regulatory frameworks which incentivize accelerated pipe replacement programs
  - Public awareness, education and outreach regarding the importance of reporting natural gas leaks when a gas odor is smelled along with understanding the human/behavioral aspect of why leaks are not always reported; intent is to influence behavior.