Working Group #5
Methane Mitigation – Construction and Operations

Working Group Leaders:

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Top 5 Identified R&D Gaps

Gap #1 – Technologies to detect, accurately locate, and quantify methane emissions in diverse operating areas/environments
(Output type: Technology Development)(Infrastructure type: Pipelines)

Gap #2 – In-situ repair and rehabilitation technologies for pipes and components
(Output type: Technology Development)(Infrastructure type: Pipelines)

Gap #3 – Recompression of compressor station operations and capture and or incinerate fugitive methane emissions (Output type: Technology Development)(Infrastructure type: Pipelines)

Gap #4 – Pipeline Industry Best Practices or recommended practices and prioritization for Methane Mitigation in transmission, distribution, and gathering.
(Output type: General Knowledge)(Infrastructure type: Pipelines)

Gap #5 – Developing codes and standards including material testing and qualification of new and existing pipelines for usage in CO2 transport service (Output type: General Knowledge)(Infrastructure type: Pipelines)

NOTE: RED Text Means Possible Academic Focus

Gap #1 Associated Details

Title: Technologies to detect, accurately locate, and quantify methane emissions in diverse operating areas/environments

Main Objective: Ensuring a range of technologies can effectively detect, locate and measure methane emissions.

Technology Development

What operating environment(s) must the technology operate in?
Outside-pipe, above/under-ground, all land use types (i.e. urban and suburban-rural) natural gas pipelines & deployed by any platform type (i.e. hand-held, drones etc.).

Can any functionality and or performance requirements be identified?
Must improve beyond current locating capabilities. Differentiate between natural and human sources. Detection/quantification threshold must progress beyond current state of the art.

Does the gap address any regulatory, congressional, or NTSB drivers?
PHMSA proposed rulemaking, NTSB and EO #14008

What technical or regulatory roadblocks or barriers prevent the technology deployment?
Full validation under real and varying conditions. Regulatory acceptance of validated methods.

What are anticipated targets or timeframes to complete this research (months)? 12-18 mo. per tech type

What funding level is estimated to support such a topic? $500K to $2 million

Gap #2 Associated Details

Title: In-situ repair and rehabilitation technologies for pipes and components
Main Objective: To develop and validate effective solutions to repair all pipe configurations and components in-situ

Technology Development Note: Relevance with WG 1, ARPA-E and preventing blowdowns/purging

What operating environment(s) must the technology operate in?
Inside/outside-pipe, above/under-ground, natural gas pipelines (transmission, distribution & gathering).

Can any functionality and or performance requirements be identified?
New/improved technologies that can optimize the in-situ repair/rehabilitation process.

Does the gap address any regulatory, congressional, or NTSB drivers?
PHMSA proposed rulemaking, NTSB and EO #14008

Does the gap address any related consensus standards or best practices? No

What technical or regulatory roadblocks or barriers prevent the technology deployment?
Full validation under real and varying conditions. Regulatory acceptance of validated methods.

What are anticipated targets or timeframes to complete this research (months)? 12-18 per method

What funding level is estimated to support such a topic? $500K to $2 million

Gap #3 Associated Details

Title: Recompression of compressor station operations and capture and or incinerate fugitive methane emissions

Main Objective: Developing new solutions that decrease the time to achieve such action and prevent emissions with the possibility of re-using the captured emission.

Technology Development

What operating environment(s) must the technology operate in?
Compressor stations (i.e. ESD relief valves, liquid storage tanks, etc.

Can any functionality and or performance requirements be identified?
Must produce what data, must have a certain threshold of detection, etc. New/improved technologies that can optimize the capture/prevention and recompression process. Seeking the ability for quantification or monitoring of emissions.

Does the gap address any regulatory, congressional, or NTSB drivers?
PHMSA proposed rulemaking, NTSB and EO #14008

Does the gap address any related consensus standards or best practices? Subpart W by the EPA

What are anticipated targets or timeframes to complete this research (months)? 9-12

What funding level is estimated to support such a topic? $300K to $750K

Gap #4 Associated Details

Title: Pipeline Industry Best Practices or recommended practices and prioritization for Methane Mitigation in transmission, distribution, and gathering.
Main Objective: Best practices for reduction of methane emissions during construction, commissioning, and maintenance (ex: purging, packing)

General Knowledge

Does the gap address any regulatory, congressional, or NTSB drivers?
PHMSA proposed rulemaking, NTSB and EO #14008

Does the gap address related consensus standards or best practices?
AGA XK0101 - Purging Principles and Practice

What technical details or scope items are necessary and recommended?
Investigate strategies to reduce, eliminate or avoid methane emissions during construction, commissioning, and maintenance activities. Expand the knowledge within the AGA RP on Purging Principles and Practice to include best practices for minimizing emission and prioritizing considerations to avoid emissions.

What are anticipated targets or timeframes to complete this research (months)? 12

What funding level is estimated to support such a topic? $400K - $600K

Gap #5 Associated Details

Title: Developing codes and standards for material testing and qualification of new and existing pipelines for usage in CO2 transport service
Main Objective: Develop required material assessments and qualification for pipe and welds including for fracture toughness to arrest fractures, product quality, needed odorization for detection, operational integrity, and mitigation for blowdowns and venting.

General Knowledge

Does the gap address any regulatory, congressional, or NTSB drivers?
This gap informs new policy development where the current Code may not be comprehensive

Does the gap address related consensus standards or best practices?
The project would address gaps, since there are no consensus standards or best practices for designing CO2 pipelines.

What technical details or scope items are necessary and recommended?
Extensive metallurgical destructive testing in a CO2 environment to satisfy the project objective.

What are anticipated targets or timeframes to complete this research (months)? 12 - 18

What funding level is estimated to support such a topic? $500K to $1 million

Additional Identified Gaps

Methane:

1. Comparison of comparable practices/new technologies for reducing methane emissions caused by blowdowns in diverse environments
2. Quantification methods for methane emissions under the leak limit of detection
3. Optimization of design and operation of onsite equipment for reduction of methane emissions

CO2 Pipelines

1. Emission quantification of CO2 from pipelines
2. CO 2 pipeline construction requirements
3. Use of CO2 as a product to encourage capture and productive use so it is not released. For example: carbonic acid or transform to carbonates
4. CO2 detection and quantification technology
5. Better define specs for captured CO2 prior to transport in a pipeline, % chemicals, impurities etc. Given different types of CO2 capture technologies, further specs might be helpful to avoid unanticipated surprises in what is in the pipeline in the event of an incident
6. Impact radius and class location research for CO2 pipelines

NOTE: Highlighted RED Means Possible Academic Focus

Thank You!/Questions?