Working Group #1
Rehabilitation of Aging Cast Iron Pipelines

Working Group Leaders:

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Top 3 Identified R&D Gaps

Gap #1 – Same day lining with service re-instatement - For Cured In-Place Liners (CIPL), Reduced Customer Outage Time: Develop a Rapid Cure Process to be able to line mains with services to ensure renewal in 1 day; Same day installations targeting 16-inch and less gas mains; and target more cost-effective technology for pipes less than 16". (Technology Development)(Infrastructure type: Pipeline)

Gap #2 – Decision Tool for Replacement/Rehabilitation - Support decisions for replacement or rehabilitation considerations. DIMP should tell operator that risks have exceeded acceptable limits and actions should be forthcoming. Develop a tool for assessing the suitability of pipe for re-habilitation in a risk assessment format that may include GIS-based, web-based, decision-making tool including cost analysis and risk attributes (threats and consequences). Account for breakage failures due to ground movement threats and seismic settlements or faulting hazards. (Output type: General Knowledge)(Infrastructure type: Pipeline)

Gap #3 – Development of Structural Liner Materials - For cast iron and steel pipelines, develop a rehabilitation process that could count as a pipeline replacement for the purpose of PHMSA regulations. The rehabilitated pipe would not rely on the original cast iron or steel pipe for structural purposes. (Output type: Technology Development)(Infrastructure type: Pipeline)

Gap #1 Associated Details

Title: Same day lining with service re-instatement
Main Objective: For Cured In-Place Liners (CIPL) - Reduced Customer Outage - Developing a Rapid Cure Process to be able to line mains with services to ensure renewal in 1 day (may be with Ultra-Violet curing like being used in Sewer CIPP). Same day installations targeting 16-inch and less gas main - Should develop more cost-effective technology for smaller pipes, less than 16".

a. What operating environment(s) must the technology operate in inside/-pipe, above & under-ground, natural gas service, full length of segment is rehabilitated.
b. Can any functionality and or performance requirements be identified must produce demonstrated time savings from improvements in installation technology.
c. Does the gap address any regulatory, congressional, or NTSB drivers? Methane Emissions reductions, typically conducted in inner cities which may be under privileged.
d. Does the gap address any related consensus standards or best practices? ASTM F2207 (&-06)
e. What technical or regulatory roadblocks or barriers prevent the technology deployment? No.
f. What are anticipated targets or timeframes to complete this research (months)? 36 months
g. What funding level is estimated to support such a topic? $1.5 million

Gap #2 Associated Details

Title: Decision Tool for Replacement/Rehabilitation

Main Objective: Support decisions for replacement or rehabilitation. DIMP should tell operator that risks have exceeded acceptable limits and actions should be forthcoming - Standardize pipe selection for rehabilitation or replacement - Develop a tool for assessing the suitability of pipe for re-habilitation in a risk assessment format that may include GIS-based, web-based, decision-making tool including cost analysis and risk attributes (threats and consequences). Account for breakage failures due to ground movement threats and seismic settlements or faulting hazards.

a. Does the gap address any regulatory, congressional, or NTSB drivers? Methane Emissions reductions, typically conducted in inner cities which may be under privileged, DIMP risk assessment improvement.
b. Does the gap address related consensus standards or best practices? ASTM F2207 (&-06)
c. What technical details or scope items are necessary and recommended? DOE ARPA-E REPAIR Program that included …, Build on previous work performed by PHMSA and Industry Stakeholders.
d. What are anticipated targets or timeframes to complete this research (months)? 36 Months
e. What funding level is estimated to support such a topic? $500K

Gap #3 Associated Details

Title: Development of Structural Liner Materials
Main Objective: Development of Structural Liner Material for cast iron and steel pipelines - The development of a rehabilitation process that could count as a pipeline replacement for the purpose of PHMSA regulations. The rehabilitated pipe would not rely on the original pipe for structural purposes.

a. What operating environment(s) must the technology operate in (inside pipe, above/under-ground, natural gas service.
b. Can any functionality and or performance requirements be identified? Participate with DOE APRA-E on TTSP group evaluating requirements for structural liners, test various liners, review service applications, identify testing requirements for consideration and approval of materials as a structural pipe.
c. Does the gap address any regulatory, congressional, or NTSB drivers? API 15S (?) and ASTM Standard(s) to be developed. Work from water industry may need to looked at.
d. Does the gap address any related consensus standards or best practices? No,
e. What technical or regulatory roadblocks or barriers prevent the technology deployment? Technology - Unknown at this time. Standards development and Regulatory incorporation.
f. What are anticipated targets or timeframes to complete this research (months)? 36 months.
g. What funding level is estimated to support such a topic? $2.0 million

Additional Identified Gaps

1. Testing for Hydrogen - Performance evaluation of rehabilitated CI pipes (both for leakage control and structural repairs) with methane- Hydrogen mixes. The specific compatibility of irons (cast, ductile, and wrought) with hydrogen needs to be researched – specifically embrittlement issues. Currently ASME B31.12 excludes cast iron. Permeation of Methane-hydrogen mixes through rehabilitated cast iron and steel may get into annulus and affect host pipe.

2. Criterial for in-line inspection of cast iron pipes. TIMP requires periodic ILI. It seems tools are or will soon be available for ILI graphitization, wall thickness, visual inspection for gross defects/joint displacement. Is it time to formalize ILI inspection processes? (PIPES Act of 2020, section 122 work kicking off)

3. Live insertion of cured in-place liners could avoid expensive by passes

4. Quantification of emissions through rehabilitated cast iron and steel

5. Investigation of assigned leakage rates by EPA to rehabilitated cast iron and steel. Permeation of Methane hydrogen mixes through rehabilitated cast iron and steel is assumed to be zero as it based a pressure test, based on operational experience.

Thank You!/Questions?