

PHMSA R&D Forum

Opening remarks and Industry Perspective on the Use of Inline Inspection Tools on Hydrogen Pipelines

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Inline Inspection of Hydrogen or Blended Hydrogen Pipelines

Operators expect that Inline Inspection will provide solutions for various requirements for design or conversion of pipelines or be impacted by the change in service fluid to pure or blended hydrogen.

- Regulation – ILI supporting engineering assessment approach to an application.
- Construction – Weld inspection of vintage pipelines,
- Materials- Pipe grade, weld and body toughness, material quality
- Operations and Integrity- Anomaly monitoring, material property changes
- Process Safety – Flammability limits, purging, venting, working in proximity to hydrogen gas.

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Operational Challenges for ILI Activities and Equipment

- Barrel purging to manage flammability and reduced ignition energy relative to methane.
- Venting stacks and potential for flaring requirements to manage static electrical energy.
- ILI tool compatibility with hydrogen gas, specifically hardness limits.
- Potential for increased wear on cups and components due to hydrogen reducing length of runs. Potential to require launchers and receivers to be moved closer together in order to successfully complete the ILI assessments.

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Data Challenges

- More frequent assessments (i.e. assessment cycle frequency increases) to be conducted to account for anomaly changes caused by hydrogen in the pipeline system?
- Data requirements for conversion, including yield strength and hardness.
- Ongoing monitoring for changes in hardness.
- Different type of anomalies, including planar weld defects, laminations, increased focus on cracking.

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Analysis Challenges

- Detection and sizing algorithms for hydrogen blisters or swelling of laminations caused by hydrogen being introduced into the pipeline system.
- Destabilization of current threats that will now need additional scrutiny in assessments (e.g. different types of manufacturing anomalies changed by the addition of hydrogen).
- Need for changes to detection and sizing algorithms of internal corrosion morphologies altered by the presence of hydrogen (e.g. higher acidity caused by mixing hydrogen with potential water and/or oxygen content in pipelines or bacteria growth changes caused by the addition of hydrogen). Basically, do the algorithms of ILI tools need updated to reflect these potential corrosion changes for better detection and more accurate sizing?