



Delivering Fitness for Service Through Technology – INGAA Technology Development (ITD)

PHMSA/NAPSR Pipeline R&D Forum

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A multi-year commitment to deliver short and long term technology needs of the industry and enhance our ability to actively manage pipeline integrity:

- Manage a technology R&D roadmap in support of Integrity Management Improvement Initiative (IMCI) efforts
- Enhance existing tools and develop new platforms
- High level of collaboration with PRCI, GTI, NYSEARCH and hazardous liquids pipeline industry to leverage resources and optimize R&D efforts
- Stage gated management and implementation process
- High level of involvement with and communication to stakeholders and technology vendor community to gain acceptance and deploy developed technology

INGAA Approach To Driving Technology Development



- Initially for critical technology development needs
 - Matrix of pipe characteristics and threats versus test history defines technology needs
 - High value (safety and business) and time critical R&D in support of Fitness for Service (FFS) assessments
 - Provide clarity and focus for R&D managers and service providers on INGAA's needs
- Four technology development work stream elements:
 - Regulatory/Standards Development
 - Safety and Business Case Assessment
 - Technology Development
 - Implementation
- INGAA member executive is leading each work stream
- Leadership and engagement needed from R&D Managers, ILI vendors, and integrity services consultants

- Provide sustainable technology and processes to:
 - Establish and maintain a factor of safety consistent with or greater than that achieved in a pressure test.
 - Create a sustainable new platform of tools to contribute to future management of pipeline integrity.

Advances in ILI technology achieved - gaps remain for gas transmission pipelines



- Progress over the last 15 years:
 - Advanced MFL technology to identify, characterize, and evaluate metal loss anomalies
 - Higher resolution geometry tools to detect and characterize smaller deformations
 - Combination sensors yield more robust capability to detect and better characterize anomalies
 - Robotic platforms for “unpiggable” pipelines
- Technology gaps remain:
 - Detection and characterization of cracks and crack-like anomalies:
 - Surface and non-surface breaking
 - Anomalies coincident with longitudinal weld seams and girth welds and other potential interacting threats
 - Identifying, modeling and quantifying external forces such as soil movement and subsidence

Current focus on pressure testing pipelines that are lacking records & ILI technology



The pipeline incident at San Bruno and other events are helping to drive the focus and effort:

- Pipeline Safety Act reauthorization provisions regarding pipeline records and validation of MAOP of pre-regulation pipe
- PHMSA Advisory Bulletins regarding records verification and plans to establish regulations for pressure testing of pre-regulation pipelines
- NTSB recommendation to pressure test all previously untested pipelines, eliminate the grandfather clause, and make all lines piggable
- NTSB San Bruno report recommendation P-11-32 to INGAA & AGA to report progress and timeline for technology improvement

INGAA proposed a FFS process specifically applicable to pre-regulation pipelines



- Pre-regulation pipelines comprise two-thirds of the gas transmission on-shore mileage ($\approx 179,000$ miles)
 - Estimates are 70 to 100K miles of untested pipe
- The INGAA FFS process prescribes a rigorous evaluation for those pipelines lacking traceable, verifiable, and complete test records.
- Provides assessment/mitigation alternatives that are dependent on the pipeline's characteristics:
 - Pressure test to $1.25 \times$ MAOP
 - Run ILI that identifies and characterizes long seam and pipe body anomalies – seeking “alternative technology” acceptance
 - Reduce pressure
 - Replace pipe

Near-term technology priority is to support FFS assessment for pre-regulation pipe



- Joint Industry R&D Project - verify pipe material properties
 - Diameter, wall thickness, seam and possibly gross differences from expected grade (as might be derived from magnetic permeability)
 - Phase 1 jointly funded by AOPL/API and INGAA member companies
 - PRCI is managing the project and companies are engaged
- ITD R&D Roadmap is enabled by the PSA reauthorization and PHMSA Advisory; both support alternative technologies
 - Development of alternative technologies such as ILI will take advantage of the additional information gained from ILI as compared to pressure testing
 - Integrated into the INGAA FFS process for pre-regulation pipelines
- GTI Project – Inspection Technology Strategy Tool
 - Leverages knowledge and data sets from 3 industry projects

Long-term focus is a new set of tools to support integrity management



- Technology development focus:
 - Sensors to identify & characterize injurious pipe body and weld seam features
 - ILI platforms to deliver sensors to the pipeline
 - Defect characterization through analytics/signal processing and tools for “in the ditch direct measurement”
 - Metal loss, dents, crack and crack-like feature evaluation including integration and assessment of interacting threats
- Lead to improvements that continue to enhance the ongoing management of integrity threats
- Will enable INGAA’s goal of zero incidents

Thank You

Questions?