Content

1. Introduction
2. ILI and Integrity Threats
3. Existing Technologies
4. Summary
Introduction

• ILI is a mature industry.
• Vast strides have been made in the past 15 years.
  – Development and Introduction of new and more advanced technologies/techniques.
• ILI development efforts continue based on input/needs of the Operator/Industry.
ILI Methodologies are well-proven and established in helping Pipeline Operators ... ensure Safe, Reliable and Economic operation of their pipelines and pipeline systems.
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2. ILI and Integrity Threats
3. Existing Technologies
4. Summary
ILI and Integrity Threats

a) Time Dependent
1) External Corrosion.
2) Internal Corrosion.
3) Stress Corrosion Cracking.

b) Stable
4) Manufacturing Related Defects
   Defective pipe seam.
   Defective pipe.
5) Welding/Fabrication Related
   Defective pipe girth weld.
   Defective fabrication weld.
   Wrinkle bend or buckle.
   Stripped threads/broken pipe/coupling failure.
6) Equipment
   Gasket O-ring failure.
   Control/Relief equipment malfunction.
   Seal/pump packing failure.
   Miscellaneous.

c) Time Independent
7) Third Party/ Mechanical Damage:
   Damage inflicted by first, second, or third parties (instantaneous/immediate failure).
   Previously damaged pipe (delayed failure mode).
   Vandalism.
8) Incorrect Operations
   Incorrect operational procedure.
9) Weather Related and Outside Force
   Cold weather.
   Lightning.
   Heavy rains or floods.
   Earth Movements.

Reference:
ASME B31.8S
ILI and Integrity Threats

• What is the definition of mechanical damage?
• or, What are the definitions of mechanical damage?
  – Key physical parameters of defect.
  – Operational characteristics of pipeline.
  – Other characteristics, such as environment.
• Different categories of mechanical damage.
ILI and Integrity Threats

The New Regulations and Prescription (ref. 49 CFR 195)

**Immediate repair conditions**
• A dent located on the top of the pipeline (above the 4 and 8 o’clock positions) that has any indication of metal loss, cracking or a stress riser.
• A dent located on the top of the pipeline (above the 4 and 8 o’clock positions) with a depth greater than 6% of the nominal pipe diameter.

**60 day repair conditions**
• A dent located on the top of the pipeline (above the 4 and 8 o’clock positions) with a depth greater than 3% of the pipeline diameter (greater than 0.250 inches in depth for a pipeline diameter less than Nominal Pipe Size (NPS) 12).
• A dent located on the bottom of the pipeline that has any indication of metal loss, cracking or a stress riser.

**180 day repair conditions**
• A dent with a depth greater than 2% of the pipeline’s diameter (0.250 inches in depth for a pipeline diameter less than NPS 12) that affects pipe curvature at a girth weld or a longitudinal seam weld.
• A dent located on the top of the pipeline (above 4 and 8 o’clock position) with a depth greater than 2% of the pipeline’s diameter (0.250 inches in depth for a pipeline diameter less than NPS 12).
• A dent located on the bottom of the pipeline with a depth greater than 6% of the pipeline’s diameter.

• *Dents ≥ 0.250” in depth*
• *Dents containing a Stress Riser (corrosion, gouge, crack, etc.)*
• *Critical Strain Analysis (ref. 49 CFR 192, B31.8S)*
Content

1. Introduction
2. ILI and Integrity Threats
3. Existing Technologies
4. Summary
Existing Technologies

• How can mechanical damage be detected?

  – Physical characteristics of defect dictate what types of tools and technologies can be applied.
  – Understand the capabilities and limitations.
  – Understand susceptibility to mechanical damage, based on industry definition(s)
  – Choose tool(s) appropriately.
Existing Technologies

- Multi-Channel Geometry (or Caliper)
- High Resolution MFL
- High Resolution Circumferential MFL
- Ultrasonic: Metal Loss
- Ultrasonic: Crack Detection
- EMAT: Crack Detection
- Inertial Navigation
- Combination/Multi-Purpose Tools
Existing Technologies

• Data Integration and Analysis
• Introduction of new standards

New environment with IMP means New and Enhanced Standards;

• ILI Systems Qualification, API 1163
• ILI Personnel Qualification, ASNT ILI-PQ
• ILI Process, NACE RP0102

1. Improved Communication
2. Improved Understanding
3. Improved Transparency
4. Improved Confidence

• R&D: ILI Service Provider and Industry Sponsored
Content

1. Introduction
2. Pre-Inspection
3. Applicability to Known Threats
4. Existing Technologies
5. Summary
The New Regulations have changed the demand placed on ILI products and services.
There are ILI tools and technologies available to address outlined threats to integrity.
Combination/Multi-Purpose tools are becoming more common place.
Continue working together to understand the requirements for Pipeline Integrity Management and the application of ILI;
  • Public Meetings, like this one.
  • R&D, internal to ILI and industry, e.g. PRCI and DOT funded
Implement ILI Products and Services that are a direct result of the Pipeline Industry’s requirements and commitment to meet their objectives.
Thank you.

www.ILIAssociation.org