Causes of Liquids Pipeline Releases

2012-2016 TOTAL RELEASES (2,100 Releases)

- CORROSION: 21%
- ALL OTHER CAUSES: 79%

Information provided by API Data Mining Team
2012-2016 ONSHORE PIPELINE CORROSION RELEASE DATA:

BY LOCATION (403 Releases)
- Facility 51%
- Mainline 49%

FACILITIES (204 Releases)
- Internal 83%
- External 17%

MAINLINES (199 Releases)
- Internal 39%
- External 61%

Information provided by API Data Mining Team; Excludes releases from tanks and offshore pipelines
Internal and External Corrosion

**Internal Corrosion**

**External Corrosion**
Creating layers of defense requires identifying “the holes in the cheese.”

ILI technology is a significant layer of defense.
Applying In-line Inspection (ILI) to mitigate corrosion

Strong partnership between Operators and technology providers is key to success
Selecting Technology: Matching Tools to Threats

- **Select Technology**
- **Inspect Pipeline (ILI)**
- **Analyze Raw Data**
- **Assess Anomalies**
- **Integrate Data Sets**
- **Inspect Anomalies (NDE)**
- **Determine ILI Accuracy**

**Apply Technology**

**Magnetic Flux**
- DFMFL: Dual Field Magnetic Flux Leakage
- MFL/HMFL: Magnetic Flux Leakage/Helical Magnetic Flux Leakage
- CMFL: Circumferential Magnetic Flux Leakage

**Ultrasonic**
- UTCD: Ultrasonic Crack Detection Tool
- UTWM: Ultrasonic Wall Measurement Tool
- EMAT: Electro Magnetic Acoustic Transducer

**Geometry**
- GEO

**Defect Categories**
- DENTS: ROUNDED/PLAIN
- METAL LOSS: LOSS/CIRCUMFERENTIAL
- CRACKS: WELD/BODY
- DISBONDED COATING

**Process Flow**
- Select Technology
- Inspect Pipeline (ILI)
- Analyze Raw Data
- Assess Anomalies
- Integrate Data Sets
- Inspect Anomalies (NDE)
- Determine ILI Accuracy
Using Technology: Putting Tools to Work

1. Select Technology
2. Inspect Pipeline (ILI)
3. Analyze Raw Data
4. Assess Anomalies
5. Integrate Data Sets
6. Inspect Anomalies (NDE)
7. Determine ILI Accuracy

APPLY TECHNOLOGY

ANALYZE & INTEGRATE DATA

VALIDATE PERFORMANCE

Magnetic Metal Loss Sensors

Magnetic Flux Leakage Tool

Ultrasonic Sensors

Ultrasonic Wall Measurement Tool

Used with permission from:
- Rosen Group
- NDT GLOBAL
**Data Integration: GIS Data**

**GIS**
- Pipe Properties
- Foreign Line Crossings
- Coatings
- Casings
- MOP
- Depth of Cover
- Line Survey Data

Other Data Sources
- Close Interval Survey Data
- AC Power Co-locations
- Span Locations
- Waterway Crossings
- Land Use Data
- Aerial Imagery
- Operational Data
- Topography

**MPL**
- Apply Technology
- Analyze & Integrate Data
- Validate Performance
Validate Performance: Tool Tolerance and Specifications

- Field investigation and repair
- Determine other mitigation requirements
- Evaluate tool performance vs. specifications
- Compare as found to as called
Feedback & Continuous Improvement

- Leverage technology
- Working with vendors to improve ILI
- Research and development participation
- API and NACE