Distribution Integrity Management
Risk Management for Natural Gas Pipeline Safety
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Agenda

1. Company Overview
2. DIMP Background
3. DIMP Challenges
4. Key Elements of DIMP
• Natural gas and electric distribution utility with **operations in three states** serving ~182,000 customers

• **Growing** operations and customer base
  • Robust natural gas system expansion
  • Nearly 500 full-time employees with dual storm roles

• **We provide energy for life**, safely and reliably delivering natural gas and electricity in New England
Genesis of Integrity Management

- Bellingham, WA Liquid Transmission Line Incident on June 10, 1999, caused the fatalities of 3 young men, (2 boys)

- Carlsbad, NM Gas Transmission Line Incident on August, 2000 caused the fatalities of 12 family members camping.

- These two incidents were the prime movers in the passing of IM for hazardous liquid pipelines in 2000 and then gas transmission pipelines ("TIMP") in 2003.
From 1986 to 2006 there were 63 fatalities resulting from transmission pipeline incidents.

From 1986 – 2006 there were 349 fatalities resulting from gas distribution incidents.

PHMSA concluded an investigation in 2005 and determined that TIMP regulation was impractical to apply and diversity amongst operators made prescriptive regulation also impractical.

PHMSA concluded an investigation in 2005 and recommended a risk-based integrity management program for distribution operators.
Timeline

- **May 2005** – Report to Congress titled “Assuring the Integrity of Gas Distribution Pipeline Systems”
- **June 5, 2008** – Notice of Proposed Rulemaking, Federal Register / Vol. 73 36015
- **December 4, 2009** – Final Rule Published, Federal Register /Vol. 74 63906 49 CFR § 192 Subpart P - Gas Distribution Pipeline Integrity Management
- **August 2, 2011** – Required gas distribution operators to have developed and implemented an integrity management program.
1. Inspection techniques used for transmission integrity management (TIMP) is not technically feasible for distribution.

2. Diversity amongst distribution operators and systems (1000 +) made it impractical to establish prescriptive requirements and instead focused on a high-level flexible regulation.

3. DIMP instead focused on a high-level flexible performance based regulation.
# Challenges with Implementation

## Regulators

1. **Inspection Challenges** - A High-Level Performance based regulation is challenging for regulators to inspect.

2. **Time Intensive** - Inspections are time consuming because it requires a comprehensive review.

3. **Judgement** – Inspectors are required to use judgement during inspections regarding compliance.

## LDC’s

1. **Compliance Complexity** – Ensuring compliance is more complex than adhering to prescriptive rules.

2. **Expectations** – State Jurisdictions having different expectations and DIMP requirements.

3. **Implementation** - The balance between the implementation of DIMP mitigation measures and the increasing prescriptive regulations on the State level.
Successful DIMP Programs

- Code Compliance for Subpart P is only the Starting Point!!
  - Evaluate the intent of the code
  - Requires Self Assessment.

- Everyone in the Organization Must be Involved – Top to Bottom

- Safety Culture is Relevant
  - Doing the right thing at all times
  - Employee Ownership & Engagement

- Continuous Improvement
  - Not a regulatory exercise or book on a shelf.
  - A tool to analyze needs and progress
Distribution Integrity Management requires natural gas distribution companies to develop, write, and implement a risk management plan with the following elements:

1. Knowledge of Infrastructure
2. Identify Threats
3. Evaluate and Rank Risks
4. Identify and Implement Measures to Address Risks
5. Measure Performance, Monitor Results, and Evaluate Effectiveness
6. Periodically Evaluate and Improve Program
7. Report Results
• § 192.1007: “An operator must demonstrate an understanding of its distribution system”

• The foundation of the program is **System Knowledge** which includes:
  – Asset Information (existing & new)
  – Environmental Factors (population, flood, wall to wall)
  – Past design, operations & maintenance

• Operators should use the intent of the code to determine what data should be collected.
• Compliance - § 192.1007 (a)(5) - Provide for the capture and retention of data on any new pipeline installed. The data must include, at a minimum, the location where the new pipeline is installed and the material of which it is constructed.

• Intent – Operators need to evaluate there system and ensure that the data that is being captured is sufficient for existing and potential (i.e., future) threats.
Knowledge Acquisition - Unitil

- Implemented GPD Data Collection
- All Newly Installed Components
- Existing Components when Exposed

<table>
<thead>
<tr>
<th>Key Data</th>
<th>Examples</th>
</tr>
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<tbody>
<tr>
<td><strong>Pipe Size &amp; Sizing System</strong></td>
<td>1” IPS</td>
</tr>
<tr>
<td>Wall Thickness</td>
<td>SDR 11</td>
</tr>
<tr>
<td>Product Name</td>
<td>Driscoplex</td>
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<tr>
<td>Series</td>
<td>8100</td>
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<tr>
<td><strong>Pipe Material Designation</strong></td>
<td>PE3408/PE4710</td>
</tr>
<tr>
<td>Manufacturing Standard</td>
<td>ASTM D 2513</td>
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<tr>
<td>Date of MFG</td>
<td>July 1, 2012</td>
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<tr>
<td>Plant Code &amp; Extrusion Line</td>
<td>KV-4 (Knoxville Tennessee)</td>
</tr>
<tr>
<td>Resin Code</td>
<td>RN-B53m1</td>
</tr>
<tr>
<td>Shift &amp; Operator No.</td>
<td>04-201</td>
</tr>
<tr>
<td>Unitil Installer</td>
<td>Employee No. 7066</td>
</tr>
<tr>
<td>Operator Qualification</td>
<td>Scans Fusion Qualifications</td>
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</table>
**Requirement - 2:** Categorize threats to each gas distribution pipeline.
Consider reasonably available information to identify existing and potential threats.

**Code Required Threat Categories**
- corrosion
- natural forces
- excavation damage
- material, weld or joint failure
- equipment failure
- incorrect operation

### Distribution System Annual 7100.1-1 Report

<table>
<thead>
<tr>
<th>Cause of Leak</th>
<th>Mains</th>
<th>Services</th>
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<tbody>
<tr>
<td>Corrosion</td>
<td>4</td>
<td>86</td>
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<tr>
<td>Natural Forces</td>
<td>93</td>
<td>0</td>
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<tr>
<td>Excavation</td>
<td>0</td>
<td>8</td>
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<tr>
<td>Other Outside Force Damage</td>
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<td>0</td>
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<tr>
<td>Material or Welds</td>
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<td>0</td>
</tr>
<tr>
<td>Equipment</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Operations</td>
<td>0</td>
<td>15</td>
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<tr>
<td>Other</td>
<td>9</td>
<td>20</td>
</tr>
</tbody>
</table>

**Number of Known System Leaks at End of Year Scheduled for Repair:** 29
Identification of Threats - Unitil

Primary DOT Cause
- Corrosion
- Natural Forces
- Excavation Damage
- Outside Force Damage
- Material Weld
- Equipment Failure
- Incorrect Operations
- Other

Secondary Cause
- Atm. Corrosion
- Snow/Ice/Frost/Flood
- Not Marked/One Call
- Vehicle
- Damage/Vandalism
- Aldyl A/Mech Coupling
- Operator Error
- Bell Joints

Third Cause
- No meter protection
- Inadequate Meter protection
- Snow removal
- Frost
- Falling Ice & Snow
Requirement - 3: Evaluate the risks associated with the distribution pipeline system.

- Determine the relative importance of each threat and estimate and rank the risks posed to the pipeline.
- Consider the likelihood of failure associated with each threat, and the potential consequences of such a failure.
- Must Consider Potential Threats.
**Requirement:** Identify and implement measures to address risks.

- Determine and implement measures designed to reduce the risks from failure of the gas distribution pipeline.
- These measures must include an effective leak management program (unless all leaks are repaired when found).
Risk Mitigation - What is it?

- Accelerated Actions “AA’s”
  - Increased Leak Survey
  - Active leak re-check
  - Leak clearing
- Pipe Replacement Programs
  - Cast Iron Models
  - Bare Steel Models
- Enhanced Damage Prevention
  - High Risk Tickets
  - Monitoring Third Party Excavations
- Public Education & Outreach
- Training & Procedures
**Requirement**: Measure performance, monitor results, and evaluate effectiveness.

- Establish a baseline to evaluate the effectiveness of the IM program.
- Identify any additional measures needed to evaluate the effectiveness of the IM program in controlling each identified threat.

> "What gets measured, gets done."

**Total Leaks by Material - Bare Steel**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Leaks</th>
</tr>
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<tbody>
<tr>
<td>2009</td>
<td>108</td>
</tr>
<tr>
<td>2010</td>
<td>63</td>
</tr>
<tr>
<td>2011</td>
<td>119</td>
</tr>
<tr>
<td>2012</td>
<td>112</td>
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</table>

**Hazardous Leaks by Cause**

- Outside Force Damage
- Other
- Operations
- Natural Forces
- Material, Weld, or Joint...
- Excavation
- Equipment
- Corrosion

- Baseline 2012
- 2012
- 2011
- 2010
6 & 7 Evaluate, Improve & Report

<table>
<thead>
<tr>
<th>Required frequency</th>
<th>Program Re-evaluation Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Annually</td>
<td>Update Baseline and on-going performance measures</td>
</tr>
<tr>
<td>Required Annually</td>
<td>Update Knowledge of System Characteristics, Environmental Factors and Threats</td>
</tr>
<tr>
<td>As needed*</td>
<td>Update Threat Identification Process</td>
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<tr>
<td>As needed*</td>
<td>Update Threat Identification</td>
</tr>
<tr>
<td>As needed*</td>
<td>Update Risk Evaluation and Ranking Process</td>
</tr>
<tr>
<td>As needed*</td>
<td>Update Evaluation of Risks</td>
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<tr>
<td>As needed*</td>
<td>Update Risk Evaluation and Ranking Validation</td>
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<tr>
<td>As needed*</td>
<td>Update Risk Evaluation and Ranking Process Improvement Action Plans</td>
</tr>
<tr>
<td>Required Annually</td>
<td>Update Leak Management Program Key Performance Metrics</td>
</tr>
<tr>
<td>As needed*</td>
<td>Update Action Plans</td>
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Performance Measures that Exceeded Baseline

<table>
<thead>
<tr>
<th>Region</th>
<th>Performance Measure</th>
<th>Actual Performance for Year</th>
<th>Established Baseline</th>
<th>Re-evaluation criteria</th>
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Existing Date for Complete Program re-evaluation: ____________

Is a shorter timeframe for complete program re-evaluation warranted? : ____________