Overview of PECO’s Distribution Integrity Management Plan

PUC Gas Safety Seminar
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Agenda

- PECO Distribution System Overview
- DIMP Pillar #1 – DIMP Culture
- DIMP Pillar #2 – Knowledge of the Distribution System
- DIMP Pillar #3 – Risk Ranking
- DIMP Pillar #4 – Preventative and Mitigative Measures (PMMs)
- DIMP Pillar #5 – Continuous Improvement
- Key Takeaways
- Questions
PECO Service Territory
PECO Distribution System Overview

**Serving:** 513,088 natural gas customers

**Via**
- 6,825 miles of distribution main
- 30 miles of transmission pipeline

**And**
- 447,470 services
- 365 reg stations
- 10,263 valves
PECO Distribution System Overview

Mains by Material
- Plastic: 42%
- Coated Steel: 42%
- Bare Steel: 5%
- Cast or wrought Iron: 10%
- Ductile Iron: 1%

Services by Material
- Plastic: 89%
- Coated Steel: 4%
- Bare Steel: 6%
- Copper: 1%
PECO Distribution System Overview

**Age of Mains**
- PRE-1970: 37%
- 1970s: 15%
- 1980s: 11%
- 1990s: 20%
- 2000s: 13%
- POST-2010: 4%

**Age of Services**
- PRE-1970: 14%
- 1970s: 16%
- 1980s: 20%
- 1990s: 23%
- 2000s: 16%
- POST-2010: 11%
PECO Distribution System Overview

Total Leaks on Mains

- Corrosion: 52%
- Pipe, Weld or Joint: 33%
- Natural Forces: 7%
- Damage: 3%
- Other: 5%

Total leaks on Services

- Corrosion: 45%
- Pipe, Weld or Joint: 14%
- Other: 7%
- Damage: 34%
- Other: 7%
PHMSA DIMP Elements

- Knowledge of the Distribution System
- Identify Threats
- Evaluate and Rank Risk
- Identify and implement measures to address risks
- Measure performance, monitor results, and evaluate effectiveness
- Periodic Evaluation and Improvement
- Report Results
DIMP Pillar #1: DIMP Culture

✓ Establish Executive Sponsorship
✓ Define Roles and Responsibilities
✓ Identify SMEs
DIMP SMEs and Risk Council

Regional Engineering/Methods
Damage Prevention
System Control and Plant Operations
Construction and Maintenance
Asset Management and Performance
Regulatory and Compliance
Work Management
Enterprise Risk Management

#1: Culture
#2: Knowledge
#3: Risk Ranking
#4: PMMs
#5: Improvement
Risk Council Annual Activities

1. Develop PMMs
2. Develop annual goals
3. Discuss procedural changes
4. Review advisory bulletins
5. Evaluate risk model results
6. Evaluate new threats
7. Evaluate effectiveness

#1: Culture
#2: Knowledge
#3: Risk Ranking
#4: PMMs
#5: Improvement
DIMP Pillar #2:
Knowledge of Your Distribution System

✓ Utilize all available data sources
✓ Review data sources regularly to identify trends
✓ Formulate a plan of action to address data gaps
Knowledge of the System

✓ Data Sources
  • Asset Management System
    – Work/Asset Management System • Main/Service Replacement Software • Leak Management • Compliance Programs • Regulator Station Database • Corrosion
  • Damage Prevention
  • Component Failure Database
    – Failure Investigation • Apparent Cause Evaluation • Root Cause Investigation
  • Outage Management

✓ Inaccurate or Incomplete Data
  • Targeted areas of data improvement
    – Data acquisition • Data management
## Threat Identification

<table>
<thead>
<tr>
<th>Primary Threat</th>
<th>No. of Sub-threats</th>
<th>Example(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Corrosion</td>
<td>3</td>
<td>External, Internal, Atmospheric</td>
</tr>
<tr>
<td>2. Natural Forces</td>
<td>13</td>
<td>Earth Movements, Earthquakes, Landslides</td>
</tr>
<tr>
<td>3. Excavation Damage</td>
<td>13</td>
<td>No Locate Request, Expired Dig Ticket, Dug Early</td>
</tr>
<tr>
<td>4. Other Outside Force Damage</td>
<td>4</td>
<td>Fire First, Vehicular Damage, Blasting</td>
</tr>
<tr>
<td>5. Material/Weld/Joint Failure</td>
<td>11</td>
<td>Faulty Welds, Defective Pipe Seams, Defective Pipe Wall</td>
</tr>
<tr>
<td>6. Equipment Failure</td>
<td>3</td>
<td>Regulator Station Equipment Malfunction, Valve Leaks, Other Equipment Failure</td>
</tr>
<tr>
<td>8. Other</td>
<td>7</td>
<td>Blockage, Encroachment, Unknown</td>
</tr>
<tr>
<td>9. Electrical Arcing (Common Trench)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
DIMP Pillar #3 – Risk Ranking

✓ Customize risk model
✓ Review periodically
✓ Communicate risk model results
Risk Assessment

Risk potential = risk frequency x consequence

• Risk frequency
  – Rolling 10 years of leak data
  – Normalized to leaks/mile for asset type and material

• Consequence factors
  – Pressure
  – Incident
  – Hazardous leak
  – Average service length
  – Penetrations
  – Common trench
Risk Prioritization

Risk scores above a certain criteria are considered to be primary threats to PECO’s distribution system

1. Cast Iron Main – Natural Force (Breaks)
2. Bare Steel Main – Corrosion
3. Bare Steel Service – Corrosion
4. Plastic Service – Excavation Damage
DIMP Pillar #4 – Preventative and Mitigative Measures (PMMs)

- Develop PMMs for each primary threat
- Develop meaningful metrics
- Review and update PMMs after each risk model update
Risk Mitigation Business Practices

✓ Risk council reviews PMM forms for all threat categories per DOT (general)
✓ Each PECO primary threat require
  • PMMs
  • Risk Trending (from baseline)
  • Annual goals
Preventative and Mitigation Measures

Based on primary threats, PECO has initiated a number of risk mitigation activities

- Pipe Replacement Programs
- Damage prevention activities
- Increased leak survey frequency
- Excess flow valve policy and deployment
- Leak management
- Electric fault investigations
Pipe Replacement Program

✔ Material replacement rates are correlated to the DIMP Risk Model results

✔ Cast Iron Pipe Maintenance and Replacement
  • Program established prioritization criteria for choosing mains to be replaced based on
    – Pipe pressure
    – Pipe size
    – Number of breaks
    – Wall to wall paving

✔ Accelerated Gas Infrastructure Modernization Program
  • Retire all bare steel services by 2022
  • Retire all bare steel, cast iron, wrought iron and ductile iron main by 2035
  • Retirements will be prioritized based on potential risk

#1: Culture
#2: Knowledge
#3: Risk Ranking
#4: PMMs
#5: Improvement
Damage Prevention Initiatives

- Represent Gas Industry on the PA One Call Board of Directors
- On-going coordination to work in conjunction with third-party contractors performing municipal and state road improvement projects and outside utility work
- Conduct enhanced awareness education
- Inspect targeted excavation and backfill activities
- Underground utility verification pre-construction
- Utilization of vacuum excavation
- Maintain track and analyze damage data to identify trends and improvement opportunities, then implement corrective actions to reduce damages
- Marker balls are installed to track location of installed infrastructure
Plastic Service – Excavation Damage

2016 Goals established via

- Trend line
- PMM’s established by SME and approved by Risk Council
- Other DIMP related metrics
DIMP Pillar #5 – Continuous Improvement

- Determine methods to evaluate effectiveness
- Monitor results
- Perform periodic reviews
Plan Element Review

✓ Measuring performance
  • Annual performance metrics
  • Mechanical fitting failures
  • Integrity performance analysis
  • Baseline performance measures

✓ Monitoring results
  • Risk Council agenda item

✓ Evaluating effectiveness
  • Data trending/statistical analysis
  • Review of annual goals
Program Review

Annual DIMP Update

- Updated DIMP Metrics
- Risk Council Evaluation
- Audit Results
- PMM Analysis
- Incident/Advisory Evaluation
- Risk Model Results
- DIMP Goals
Data Improvements

✓ Data acquisition
  • Piloting geocoded electronic data entry solution
    – GNSS coordinate utilization
    – Domain driven data entry fields
    – Secure cloud hosted data
    – Material barcode utilization for tracking and traceability

✓ Data management
  • GIS conflation
    – Adjust alignment of current maps to match impervious surface features
    – Converting legacy raster images to GIS features with associated asset data
  • GIS conversion
    – Moving to GE Smallword Gas Distribution Office
    – Utilize the GE Gas Office tools to better manage asset data
DIMP Maturity

2010 - Baseline
2011 - Implementation
2011 - PUC Audit
2014 - External Audit
2015 - PUC Audit
Current
Key Takeaways

Five Pillars of DIMP

1. DIMP Culture
2. Knowledge of Your Distribution System
3. Risk Ranking
4. Preventative and Mitigative Measures
5. Continuous Improvement
Questions?

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