New England Pipeline Safety Representatives (NEPSR)

Capturing & Integrating System Information

“Trace & Traceability”
GIS & GPS

Unitil
Speakers

Mel Ciulla
Manager, Gas Distribution Operations

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Manager, GIS & CAD
Who is Unitil?

Public Utility Holding Company

- Unitil Energy Systems (NH)
  - 29,600 (E) Capital
  - 44,300 (E) Seacoast

- Fitchburg Gas & Electric Light Company (MA)
  - 28,500 (E)
  - 15,120 (G)

- Northern Utilities (NH and ME)
  - 54,200 (G)

- Granite State Gas Transmission
  - 87 miles of Interstate Pipeline
Overview

- GPS Program / Logistics
- Evolution
- GIS Data Processing
- Scanning / Construction Logistics
- Procurement Asset Management
- Data Risk Management
Objective

To develop an electronic Asset Management tracking system (i.e. “Trace and Traceability”) that would enable Unitil to establish a geospatial reference point for every component installed on our gas system(s) as well as the detailed data on each of the components attributes (e.g. size, material, SDR etc.).
GPS Data Capturing at Unitil

- New Mains & Services (steel / plastic)
- Existing Main & Service Locations
- Leak Repairs
- Leak Survey Program
- Critical & Distribution Valves
- Transmission Pipeline Support
- GPS Marker Ball

Leak Progression Maps

GPS Mobile Leak Survey
**New Installations**: § 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.

**IS THE MINIMUM ENOUGH TO ASSESS RISK??????**

### Data Capture by Unitil

<table>
<thead>
<tr>
<th>Key Data</th>
<th>Examples</th>
</tr>
</thead>
<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>
</tr>
<tr>
<td>Series</td>
<td>8100</td>
</tr>
<tr>
<td><strong>Pipe Material Designation</strong></td>
<td>PE3408/PE4710</td>
</tr>
<tr>
<td>Manufacturing Standard</td>
<td>ASTM D 2513</td>
</tr>
<tr>
<td>Date of MFG</td>
<td>July 1, 2012</td>
</tr>
<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>
</tbody>
</table>
GPS & GIS the Foundation of our DIMP

**Existing Components:** § 192.1007 (a) (3) Identify additional information needed and provide a plan for gaining that information over time through normal activities conducted on the pipeline (for example, design, construction, operations or maintenance activities).

How to identify and collect “missing data” on existing components

**Data Capture by Unitil**

**Known Data:**
- Pipe Size
- Material (e.g. Plastic, Coated Steel, Cast Iron etc.)

**Additional Data Captured**
- Plastic Pipe Material (HDPE, MDPE)
- SDR/Wall Thickness
- Type of Coating on steel (Pritec, FBE)
- Product Name
- Fittings & Couplings
GPS Program at Unitil

• Development
  • 2009
  • In-House / Contractor
  • Cost / Contracts
  • Process Data Collection

• Equipment

• Data Workflow – Contractor / In-House to GIS
GPS Barcode

• Barcode Accessibility:
  • Barcode Placement
  • Sticker Falling off
  • Barcode on pipe only one side
  • Barcode damaged
  • 1D vs 2D scanning

• Data Dictionary / Field Collection Issues
  • Repeat
  • Log Later – scanning feature before collecting point
Evolution

- Concept
- GPS
- One field Scanning Feature
Evolution
• **Evolution of GPS with Contractors / Company workforces**
  • Opposition to Learning Curve to Culture
    • Contractors, Multiple Year Contract, Massachusetts, Maine, New Hampshire
      • Mains & Services
  • Company Workforce
    • Union environment
      • Leak Investigation
      • Leak Repair
      • Relocations
      • Surveys
      • Valve Inspections

• **GPS / Scanning**
  • Supplier Resistance
  • Common Approach
  • NGA Fall Conference 2010
  • Pilot Main Renewal with Services
    • Recognize; PolyPipe, Central Plastics
  • Expectations
Multiple Feature GPS Scan Data
Feature Focused GPS Capture
Feature Focused GPS Capture

- GPS
  - Project Information
Feature Focused GPS Capture

- GPS
  - Feature
Feature Focused GPS Capture

- GPS
  - Main line Valve
Feature Focused GPS Capture

- GPS
- Coupling

![Image of GPS capture interface]
2015 Expectations

• Barcode, product availability

• Connections, GPS Photo Capture – Geotag photo to feature captured

• Existing Infrastructure Data Capture
  • GIS data validation
  • DIMP Support
Approve Material Database (SAM)

All materials used in Unitil’s gas systems are subject to Engineering approval. Specific characteristics of an approved item are stored in Unitil’s System Approved Material Database (SAM). Some of these characteristics include:

- Item Description
- Manufacture Part Number
- Design Pressure
- To be included Subset of the item’s 16 Character Bar Code

Record Details

- Stock Code: 61510
- Unit of Measure: FT
- Cat Code: 80 - GAS DISTRIBUTION
- Stock Description: PIPE 2 IN IPS PE3408 PLASTIC
- Long Description: PIPE 2 IN IPS PE3408 PLASTIC .216W (2.375 OD) SDR-11 350
- Class: Capital
- Seacoast: B
- Fitchburg: B
- NU NH: B
- NU ME: B
- GSG: B
- Last Update Date: 7/6/2012 2:33:13 PM
- Last Update By: besti

Approved Manufacturer(s):

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Cat No</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERFORMANCE PIPE</td>
<td>2 IN IPS SDR11 PE3406/4710 - Coil</td>
</tr>
<tr>
<td>Poly Pipe Inc.</td>
<td>1403897</td>
</tr>
</tbody>
</table>

Design Pressure:

- Value: 102.00
- Units: PSI
Future Expectations

- **Material Procurement / Validation / Traceability**
  - Unitil’s barcoding initiative has benefits that go beyond traceability and Distribution Integrity Management Program (DIMP). Various back office functions have the opportunity for streamlining based on the data collected in the field. The back office functions of inventory management, project closeout, and plant asset allocation all rely on data associated with components and their installation within Unitil’s gas systems.

- **Close out Process**
  - Material validation
  - Non-Approved Materials
GPS Program at Unitil

- **Equipment**
  - Trimble GeoXH sub-foot / pole-mounted Zephyr antenna
  - Pathfinder Office / Terrasync
  - Bluetooth enabled barcode scanner

- **Data Workflow – Contractor to GIS**
  - Post Processing (contractor / in-house)
  - GTI Program
GIS at Unitil

• GIS at Unitil
  • ESRI & ArcFM
  • Five full-time GIS staff
  • ArcGIS Desktop (GIS/Eng) / ArcReader (Field/Office viewers)
  • Integrated with many systems
  • GIS critical for DIMP & TIMP analysis