



# Technologies to Enhance Pipeline Safety

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October 20, 2016

New England Pipeline Safety Conference

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# Value of Gas R&D Programs

- > R&D Programs Help Gas Operators
  - Understand and mitigate risk
  - Enhance safety
  - Minimize operating and capital costs
  - Provide for more efficient operations



U.S. Department of Transportation  
Pipeline and Hazardous Materials  
Safety Administration

***Ensuring a safe and reliable  
natural gas delivery infrastructure***



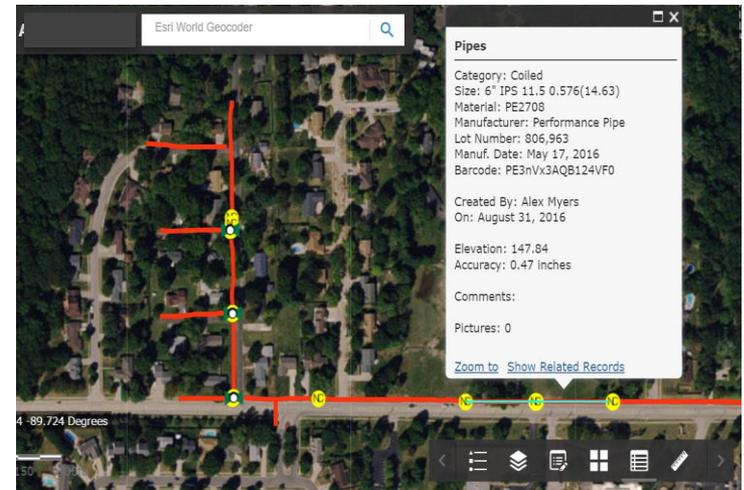
# R&D Sponsors


# Asset Tracking & Traceability

- > Provides comprehensive traceability for materials, fusions/welds, and OQ status
- > Component level material traceability with high accuracy GPS to locate specific fittings
- > Fusion and weld traceability to capture parameters
- > OQ traceability to ensure quality workmanship
- > Enables regulatory compliance
  - DIMP “Know Your System”
  - Plastic Pipe Rule NPRM
  - IVP NPRM, RTVC records
- > Benefits beyond regulatory compliance
  - Improves the quality & efficiency of data collection
  - Promotes quality and oversight through the use of technology



# Asset Tracking & Traceability



- > Streamlines the process of getting material traceability data from the field into the enterprise system
- > Increased the quantity and quality of as-built data collection

# Natural Gas Distribution Standard

## > Algorithm and ASTM Standard

- Unique identifier for distribution asset tracking and traceability
- ASTM F2897-11a
- Manufacturer implementation through barcoding
- ~75% vendor compliance

Information	Mfg. Values
Lot Number	1234567
Production Date	1/4/2010
Material Type	PE2708
Component Type	Electrofusion tapping tee with a stab outlet
Component Size	2" IPS SDR 11 x 1" IPS SDR11

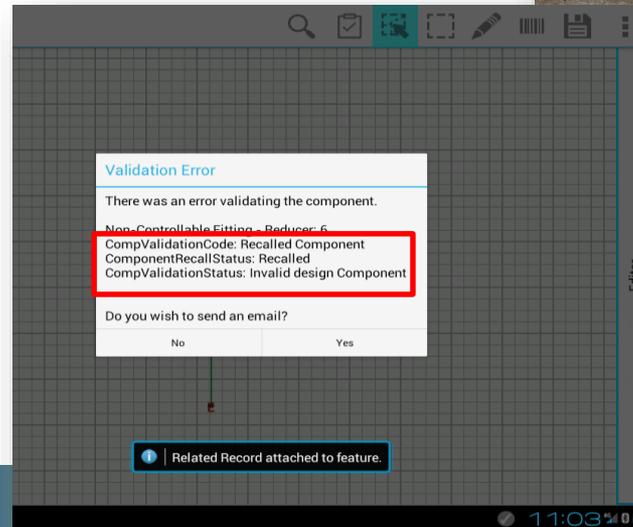
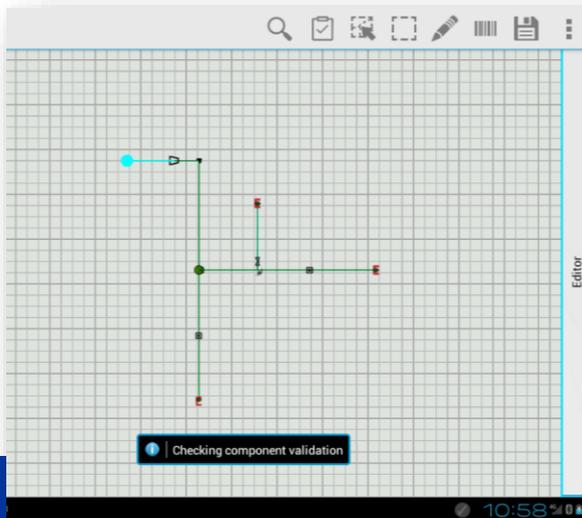


Character Number	Source	Description of Information	Character	Information
1	<a href="http://www.componentid.org">www.componentid.org</a>	Name of component manufacturer	A	Corresponds to list on <a href="http://www.componentid.org">www.componentid.org</a>
2			C	
3	Component Manufacturer's lot code	Information which can help ascertain relevant traceability information upon request	5	Corresponds to the mfg lot number input of 1234567
4			b	
5			a	
6			n	
7	Component production date code per 5.3	Date of manufacture of given component	0	Corresponds to production date of 1/4/2010
8			6	
9			C	
10	Component material type per Table 3	Material used for component	B	PE 2708
11	Component Type per Table 4	Component type	8	Electrofusion tapping tee with a stab outlet
12			F	
13	Component size per 5.6	Component size	2	Corresponds to size code of 2" IPS SDR11 x 1" IPS SDR11
14			m	
15			X	
16	<a href="http://www.componentid.org">www.componentid.org</a>	Reserved for future use	0	Default value

# Operator Qualifications, Recalled Assets, & Component Validation

> Developed software components for:

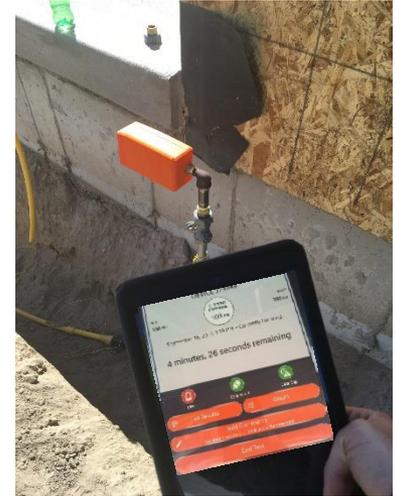
- **Operator qualifications (OQ)** – validate OQ during fusion process
- **Recalled assets** – in-field validation of gas system components being installed
- **Component validation** – validating components during installation against company approved materials list.



# Supporting Implementation



- > GTI spinout, LocusView Solutions, created to provide implementation services for advanced mobile and geospatial technologies customized for the natural gas industry
  - LocusMap for tracking & traceability of materials, fusions/welds, OQ status, and pressure tests for plastic and steel assets
  - LocusIQ for intelligent inspections of new construction quality using statistical quality control and risk-based models



# RFID Marker Ball Program

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- > Reduce excavation damage by enhancing the ability of locators to properly identify the location of underground facilities
  - Overcomes many of the issues of tracer wire including broken connections and limited access
  - No signal, interference from nearby structures, poor GPS signal
  - Provides a mechanism to locate facilities where traditional locating tools don't work

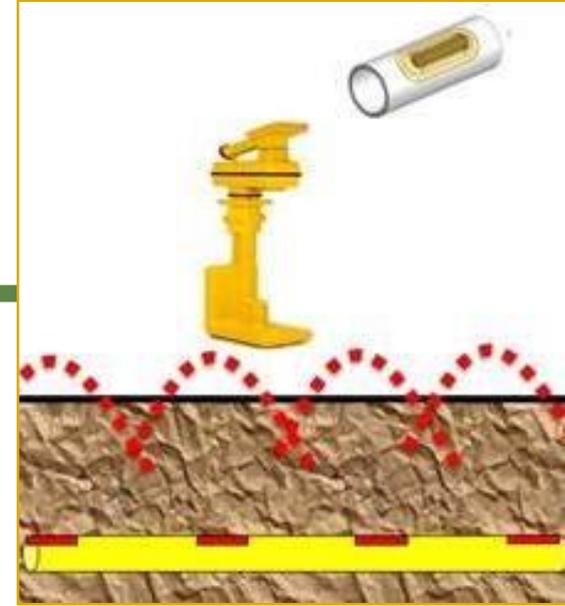
# Intrinsically Locatable Technology for Plastic Piping Systems

## > Objective

- Develop and test a viable solution for intrinsically locatable polyethylene (PE) materials with an integral electronic marking system
- Partner with 3M Company and a large pipe manufacturer to develop the electronic markers and attach the marker to PE pipe
- GTI will provide third party testing and analysis of the developed system

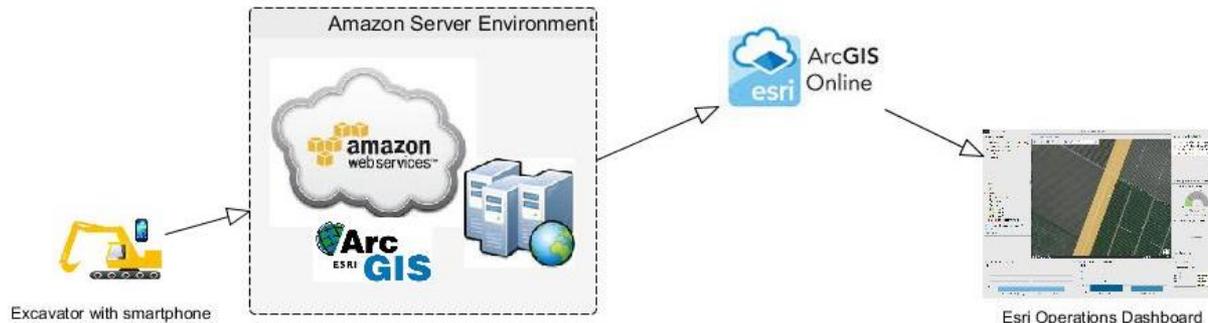
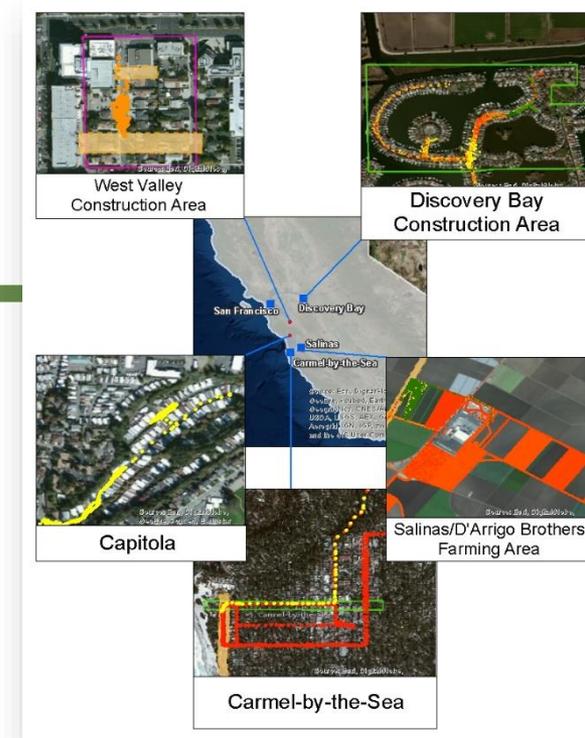
## > Focus

- Complete the development, define and test the electronic marker capability, validate the attachment design, and perform laboratory and field testing



# ROW Monitoring with GPS

- > **Value** – Provides situational awareness of potential excavation damage, allowing time for pre-emptive actions
- > **Objective** – Develop technology that uses GPS to track excavation activity and provide warnings of encroachment
- > **Deliverables** – Pilot projects in California, New York, and Texas; award pending with CEC for scaled deployment and evaluation



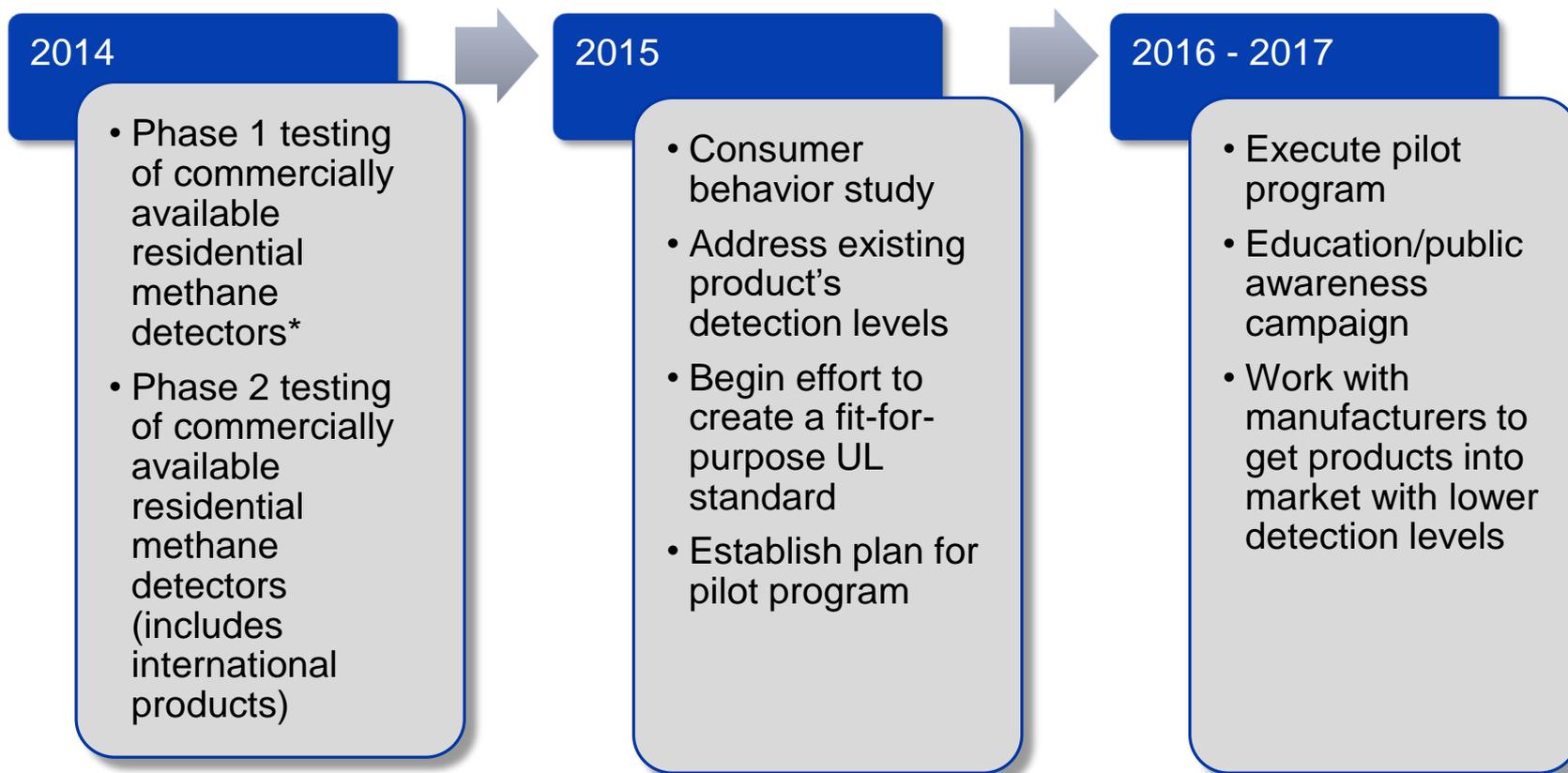
# Residential Methane Detector Program

- > Customer behavior suggests that odorant alone is not enough for customers to report leaks
- > Recent events have heightened the focus on how unreported leaks can result in tragic outcomes
- > Having an alert system such as a residential methane detector benefits both the customer and the utility



# Residential Methane Detectors

## Program and Timeline



\*Testing was done in 2010

## Residential Methane Detectors

# Phase 2 Testing (2014)

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- > 13 brands (US and international) were tested at methane levels ranging from 6% LEL to 25% LEL and for 19 interfering chemicals (typical household chemicals)
- > 11 of the 13 brands alarmed at 25% LEL (UL standard)
- > 7 of the 13 responded to interfering chemicals
- > 3 UL certified brands were selected for the pilot study based on performance in lab testing
  - 2 brands alarmed at 6% LEL
  - All 3 brands did not respond to any interfering chemicals

# Pilot Study - Test Plan

- > Three manufacturers selected based on previous lab testing/performance and market share
- > GTI will provide all detectors and components for installation; utilities will install in residential customer homes
- > Pilot study duration will be 12 months
- > Utilities will need to remove detectors from homes once pilot is complete and return to GTI for post testing

Manufacturer	Model 1	Model 2	Model 3
Residence	Single Family	Multi-family	
Location	Sleeping Area	Living Area	



# Remote Gas Sensing and Monitoring

- > Objective: To create a device to **remotely monitor the level of gases during emergency gas leak situations**
- > Need: First Responders need a tool that enables the monitoring of methane, CO, and other gases over a local area
- > Remote monitors can be placed in each home and confined space. The remote monitors would **transmit data to on-site personnel, providing concentration levels in real time**
- > This approach will enhance the safety of first responders and also the general public



# Breakaway Fittings for Meter Safety



- > Breakaway disconnect / shutoff fitting for meter set assemblies (MSA) and other aboveground gas systems
- > Reduce the risk from vehicle collision or ice/snow falling from a building
- > Beta prototypes available 2016
  - OPW Engineered Systems



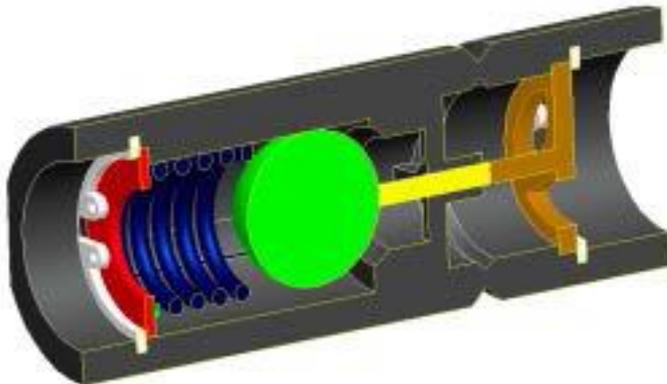
# Solution

- > EFV's can mitigate risk when installed on new and replaced services but cannot be easily installed on existing services to mitigate risk.
- > Other industries utilize breakaway disconnects. For example, gas stations utilize them on their fueling pumps.



# Designs and Prototypes

- > Several conceptual designs were created.
- > The design selected was due to:
  - Simple design
  - Minimal moving parts



# Breakaway Fitting Installed at Utility Site



Meter set "as found"

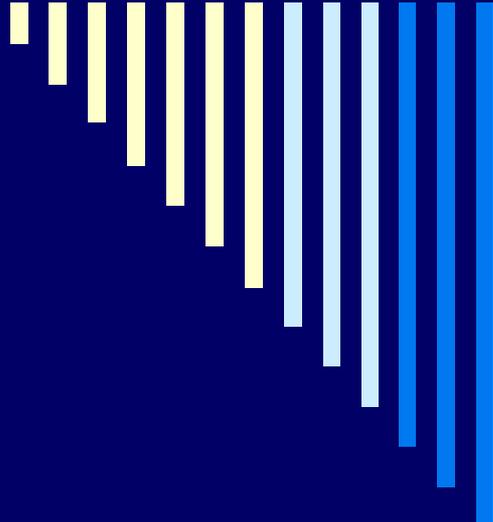


Meter set after breakaway installed 20

# Kleiss Flow Stopping System

- > **Inflatable Stoppers:** an alternative to currently employed stopping equipment for use on pipes **up to 18” in diameter and pressures up to 60 psig** for the following pipe types:
  - **Cast iron**
  - **Steel**
  - **PE**
  - **PVC pipes**
- > No-blow operations
- > Small fittings with taps up to 3”
- > **Lightweight** equipment
- > **Alternative to squeezing PE pipe**
  - Vintage PE susceptible to cracking
  - Large diameter thick-walled PE
- > **Commercially available through Mainline Control Systems (MCS) and Mulcare Pipeline Solutions (Northeast Distributor)**

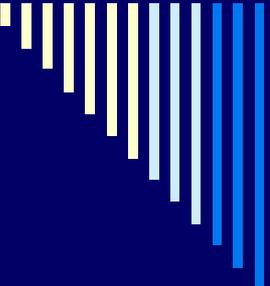




# Innovations that Provide Safety & Integrity Opportunities



**Daphne D’Zurko**  
**Executive Director, NYSEARCH**

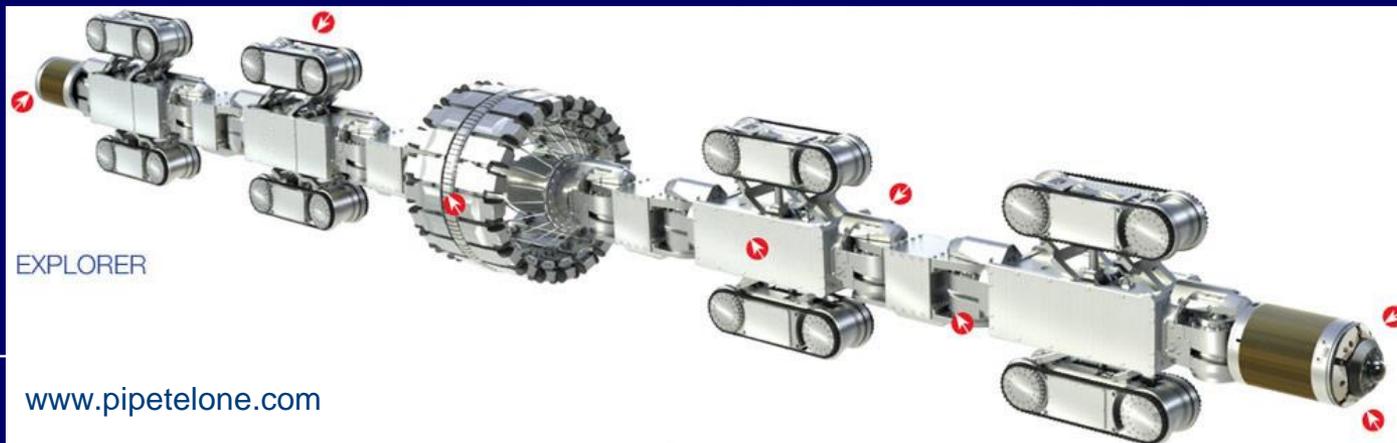


# Current NYSEARCH Members

- ❑ Alagasco
- ❑ BG & E
- ❑ CHG & E
- ❑ Con Ed
- ❑ Enbridge Gas
- ❑ NGrid/Keyspan
- ❑ National Fuel Gas
- ❑ NGrid/Niagara Mohawk
- ❑ NYSEG
- ❑ O & R
- ❑ PSE&G
- ❑ PECO Energy
- ❑ PG & E
- ❑ Questar
- ❑ RG & E
- ❑ SoCal Gas
- ❑ SouthWest Gas
- ❑ Union Gas
- ❑ Washington Gas
- ❑ Xcel Energy

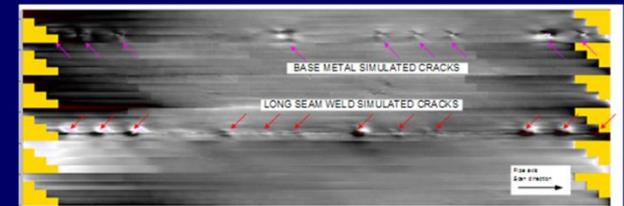
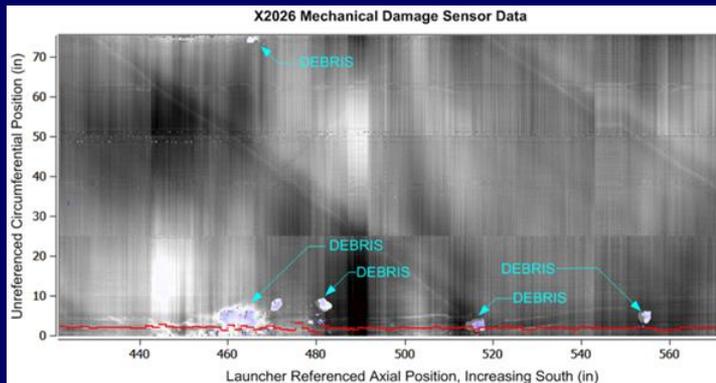
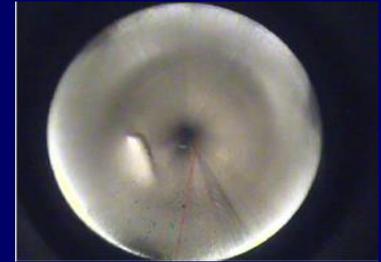
# Inspection of LDC-owned Transmission Pipes

- Have completed all planned Explorer robotic inspection platform sizes for un-piggable pipe
  - 6" – 36" pipeline sizes; up to 750 psig
  - Visual and MFL data; operate thru bends and plug valves
  - Tetherless, battery powered, wireless communication, operation under live conditions



# Supporting Technologies Enhance Inspection

- Addition of sensing functionality to Explorer platform
  - Mechanical damage/ovality
  - Crack sensor (TMFL/EMAT and EC)
  - Hardness Tester
  - Higher quality data in bends



# Scenes from Commercial Jobs



Over 30  
gas  
companies  
in N.  
America  
have used  
these tools





# Technologies Available or On the Horizon

- Live Electrofusion Repair Sleeves for PE



- Cased Pipe Vent Inspection



# Technologies Available or On the Horizon (cont.)

- Better Techniques/Tools for Non-Destructive Evaluation of PE joints
- sUAS (drones) for inspection & methane detection
- Next Generation Methane Detector for Use in Homes 



# Closing Remarks



- ❑ Implementation and market development of innovations in a regulated, risk-averse pipe environment are challenging!
- ❑ Experienced personnel are essential to support testing and secure variance from traditional work practices
- ❑ Thanks to the many gas companies that are proactive in innovations for safety and integrity

