GTI’s Pipeline Infrastructure R&D Program

>Presented to

U.S. Department of Transportation
Joint Government – Industry
Pipeline Research and Development Forum

December 11, 2003
GTI’s Pipeline Infrastructure R&D Program

> Industry Issues and Needs

> Program Structure

> Future Needs and Opportunities
GTI’s Pipeline Infrastructure R&D Program

> *Industry Issues and Needs*

- Enhanced Safety
- Assured Integrity
- Improved Deliverability
- Improved Reliability
- Cost Reduction / Containment
GTI’s Pipeline Infrastructure R&D Program

> Program Structure
– Transmission Operations and
– Distribution Operations, including
  ✓ Compressor Stations*
  ✓ Storage*
  ✓ Measurement*

* PRCI/GTI Joint Technology Development Program
GTI’s Pipeline Infrastructure R&D Program

> Program Structure

– Transmission Operations
  ✓ Pipeline Right of Way Management
  ✓ Third Party Damage Detection
  ✓ Improved Field Applied Coatings Performance
  ✓ Inline Inspection of “Unpiggable” Pipelines
  ✓ Microbially Influenced Corrosion Prevention
Buried optical fiber is used to detect the presence and locate the position of construction equipment in pipeline ROW before it can damage a buried pipeline.
Third Party Damage Detection

Real-time third party damage detection, to monitor and alert in the event of unauthorized hard contact.

Acoustic Real-Time Pipeline Monitoring for third-party damage
Improved Field Applied Coatings Performance

> 3,000 feet of pipe in clay, sand and rock
> 504 buried coated joints, plus 70 “control” joints for immediate testing
> 65 field applied coating systems from 20 North American and International vendors
> Removed for 1, 2 and 5 year performance evaluation
Inline Inspection of Unpiggable Pipelines

- Remote Field Eddy Current Sensor Development

- Simple exciter coil, less than 50% of pipe diameter

- Sensor array adjusts to match pipe diameter while passing small openings

- Accuracy comparable to MFL

- Bypass valve and bore restrictions

- Inspect multi-diameter pipes

- Go through back to back bends

- Go around tight bends and miter bends
GTI’s Pipeline Infrastructure R&D Program

> Program Structure
  – Distribution Operations
✓ Field Operations & Mechanical Engineering
  • Plastic and Metal Piping Systems
  • Improved Construction and Maintenance Tools and Equipment
  • “Trenchless Technologies”
  • Pipe and Leak Locations
“Trenchless” Technologies

> High Pressure Pipe Liner

The HPL will be made for a full range of gas pipeline diameters and pressures to 1000 psi. Depending on the diameter, the HPL will install in 1500 ft of pipe with a single inversion.
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> Program Structure

– Distribution Operations (cont.)

✓ Electronics and Telecommunications

  • Remote Monitoring and Control
  • Systems Automation
  • Communication Encryption and Security
  • Data Acquisition and Processing
Predictive Control System for District Pressure Regulation

- Real-time automatic pressure regulation based upon predicted future demand
- Adaptive Control algorithms predict future demand based upon historical demand and experience
- Commercially available as the Fisher “GridBoss” system

All Components Are Manufactured, Assembled, and Warranted By a Single Supplier
GTI’s Pipeline Infrastructure R&D Program

Program Structure

– Distribution Operations (cont.)

✓ Civil and Geotechnical Engineering
  • Soil excavation and backfilling
  • Pavement Reinstatement
  • Site Restoration
  • “Keyhole” Operations
Soil Nailing

- Technique commonly used in supporting large excavations
- It involves drilling steel nails to increase the strength and stability of the soil mass, eliminating or reducing shoring requirements

Example of the use of Soil Nailing in stabilization of cuts.
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> Program Structure

– Distribution Operations (cont.)

✓ Materials Testing and Evaluation

  • Material Property Testing
  • Failure Analysis
  • New Product Evaluation
  • Gas Quality Examination and Fuel Characterization
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> **Future Needs and Opportunities**

– Significant ongoing R&D to address safety, integrity, reliability
– PSIA will result in need for additional technology development
– GRI / FERC R&D Program ending in 2004
– Competitive energy market will restrict availability of T&D company R&D funding
– Continued robust technology development will require additional/new collaborative research funding, and federal/state support.
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