

# Inspection of Cased Pipe in HCAs

- All transmission lines in HCAs must be inspected through DA, pressure testing, ILI, or ‘other technology’
  - NYSEARCH has been investigating and developing ‘other’ technologies
- Most cased pipes are unpiggable and poor candidates for pressure testing because of gas supply interruptions or alternative supply considerations

# Casing Assessment Considerations

- Differences between Cased Pipe & Line Pipe
  - Corrosion is a different time-dependent threat inside a casing
  - Time independent threats might be lower inside a casing
- Risk is a basis to compare cased and uncased pipe allowing resource optimization
- Robotic platforms and other technologies are being developed that can aid casing assessment

# Long Range Guided Ultrasonics

## Objectives and Benefits

- To further develop and validate the capabilities and applications of TWI/Petrochem and SwRI MsS Guided Wave Ultrasonic Technologies
  - Extend test range and flaw discrimination capabilities
  - Improve capability in complex pipe networks
  - Improve application of LRUT to coated pipe
  - Engineer new LRUT techniques into robust field-hardened package
- Benefits
  - Address hard-to-reach areas
  - Meet requirements for ECDA and ICDA under OPS rules
  - Avoid extremely high costs associated with inspection by excavation or removal of pipe features such as casings
    - Estimated cost (upstate) for standard casing removal, inspection, re-instatement: \$400/ft

# Long Range Guided Ultrasonics Results and Status

- Results
  - TWI/FBS advances have been made on focusing and on better application to coated pipe
  - MsS for LT monitoring has completed proof-of-concept and software development
- Status
  - Advantages and Limitations defined
  - Collaborative Test demonstration in 2006 also evaluated similar technologies from other guided wave vendors
  - Additional Multi-Technology testing is in the program in second year
    - gathering more data from various guided wave vendors and novel technologies



# Collaborative DOT/PHMSA GWUT Demo at NYSEARCH/NGA Test Bed



# SwRI Magnetostrictive Sensing LT Monitoring using Guided Wave

- Goal – Evaluate and demonstrate effectiveness of MsS-based guided-wave technique for long-term monitoring of cased lines at road crossings for ECDA and ICDA



- Technical objectives
  - Develop capability of defect characterization and long-term condition monitoring of cased sections of lines at road crossings
  - Evaluate and validate capability in the field

# MsS Technology Gaps

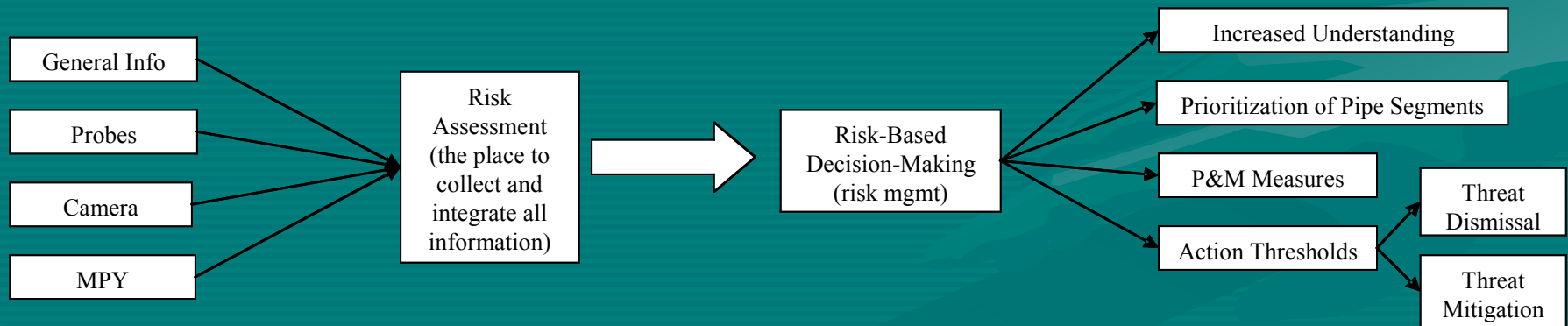
- **New Signal Calibration Methods Required**
  - Signal calibration is currently weld-based
  - Corrosion at welds prevents adequate calibration & leads to missed defects
- **New Signal Processing Methods Required to Compensate for Coatings**
  - Coal Tar (TGF-3) and Pritec coated pipes are highly attenuative depending on temperature
  - Thick coatings absorb guided wave signal (especially during warm temps)
  - Limit scanning range and sensitivity to defect detection

# Cased Pipe Integrity Assurance Model

- Objective
  - Develop an overall risk assessment algorithm to support risk and integrity management of encased pipe
- Benefits
  - Allow threats within casings to be evaluated differently than threats outside of casings; helps to balance opportunity to reduce risk and prioritize threats
  - Provide a means for assessing cased pipe that would otherwise not be possible or would be cost prohibitive
  - Provide a formal, technically defensible consensus-based process for assessing risk on cased pipe



# The Cased Pipe Integrity Assurance Process

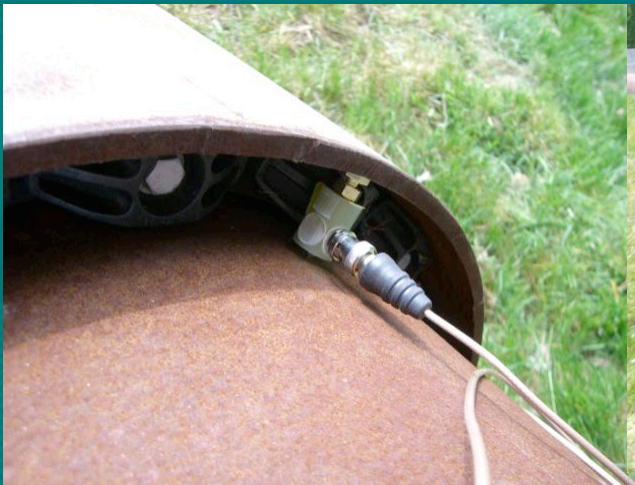
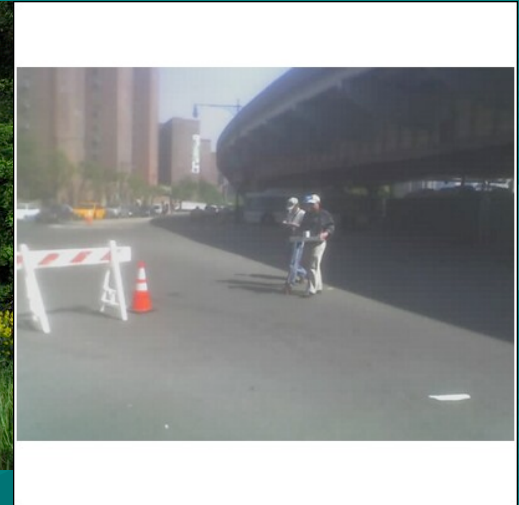


# Annular Space Inspection Robot

- Purpose: To develop a platform for inspection of the carrier pipe in the annular space
- Ph I: development, testing & implementation of visual inspection camera
- Ph II: add'l protos/field testing, devt of moisture sensor & ultrasonic NDE sensor
- Video Inspection can provide data
  - Integrity of Coating
  - Physical placement & condn of insulators
  - Presence of Electrical contacts
  - Environmental Conditions
  - Risk Assessment



# Novel Methods for Corrosion/Anomaly ID



# Technology to Assess Condition/Change in Material Strength

- Concept of Magnetic Tomography
- Remote Measurement that requires “calibration” digs
  - Passive Technique that measures magnetic fields from pipeline
  - No signal is imparted on line
  - Measures stress concentrators on pipelines
  - Stress concentrators exist in areas where there are anomalies, delaminations, pipe bends, cracks, dents
  - Question of limitations by nearby interference

