

EPRI

ELECTRIC POWER
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EPRI Buried Pipe NDE Technology Update

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NRC - Industry Meeting

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NDE Technology Update

- Reference and training resources
- Guided Wave Work
- Other research & support work
- EPRI-developed hardware



Key Published EPRI Buried Pipe NDE Documents

Buried Pipe NDE Reference Guide (Published 8-2010)

- Overview of available buried pipe NDE technologies
 - Eleven NDE technologies
- In-line and outside pipe application
- Guidance on technology selection
- Identifies
 - Capabilities and limitations of technology (does not assess capabilities)
 - Limiting conditions and configurations
 - Technology gaps
- Additional resources provided
- Living Document – 2011 revision planned

Key Published EPRI Buried Pipe NDE Documents (cont)

In-line	In-line or outside	Outside pipe
Remote ultrasonics	Manual ultrasonics	Guided wave
Remote field testing	Eddy current techniques	Radiography
Magnetic flux leakage	Acoustic leak monitoring	
Remote visual	Electromagnetic acoustic transducer	
	Laser profilometry	

In-line Delivery Methods

- Robotic Crawlers
- Flow through
- Pull through

Key Published EPRI Buried Pipe NDE Documents (cont)

Buried Pipe Guided Wave Examination Reference Document (Published August 2009)

- Resource for a plant implementing guided wave technology
- Basic guided wave theory
 - Data acquisition and analysis variables
 - Capabilities and limitations
- Project management
 - Utility and vendor responsibilities
 - Communication protocol
 - Examination plan
 - Procedure and reporting requirements
- Literature study
- Living document – revision planned

EPRI Guided Wave Technology Development

Flaw sizing Development (joint funding with PRCI and TWI)

- Mockups built, flaws inserted
- FEM modeling (laser imaging)
- Guided wave data collected
- Validation of FEM model

Develop techniques for inspection around elbows and bends

- R & D contract with Penn State

Buried Pipe Guided Wave Seminar

- ~60 nuclear industry including regulatory participants



2011-13 EPRI Guided Wave Technology Development

Personnel guided wave resource development

- Develop a resource for guided wave personnel
 - Acquire field obtained guided wave data and associated documentation
 - Peer review
 - Provide for training and potentially personnel testing use
- Develop guidelines for utilities and for vendor guided wave personnel

Buried Pipe Guided Wave Data Analysis Development

- Resource to improve guided wave reliability

Standardization of Pipe Guided Wave Procedures

- Define necessary procedure contents

Buried Pipe Guided Wave Structural Health Monitoring

- Trending and permanently installed technology

Assessment and Development of Buried Pipe NDE Technology (2011-13)

- Benchmark and develop NDE capabilities
 - Assess technologies listed in Reference Guide
 - 18 new mock-ups built for assessment
 - Significant vendor engagement
 - Identify capabilities and limitations
- Document results in Reference Guide
- Industry support
 - Provide utility support in implementing technology
- Strategic partnerships
 - Identify and transfer developments from other industries



Mockups for NDE research



2011-13 Additional EPRI Technology Development

In-line NDE Depth Sizing Development

- Development of improved flaw characterization capabilities for RFT

Leak Monitoring Technology

- Identify and report on existing leak monitoring technology
- Assess capabilities
- Utility field trial



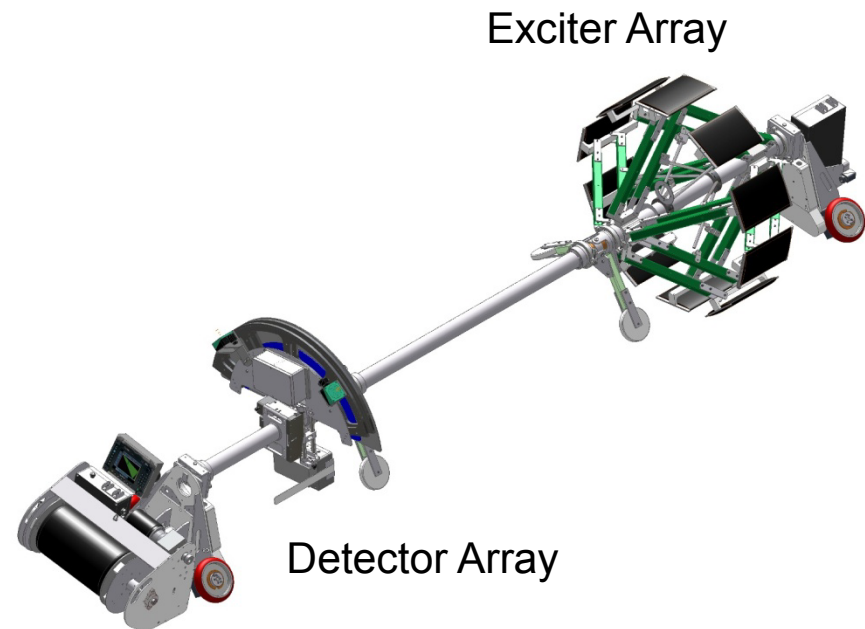
Completed Large Diameter Pipe Vehicle

Large diameter inspection vehicle developed and field tested 2008

Detect

- Internal and external pits
- Circumferential weld degradation
- Longitudinal weld degradation

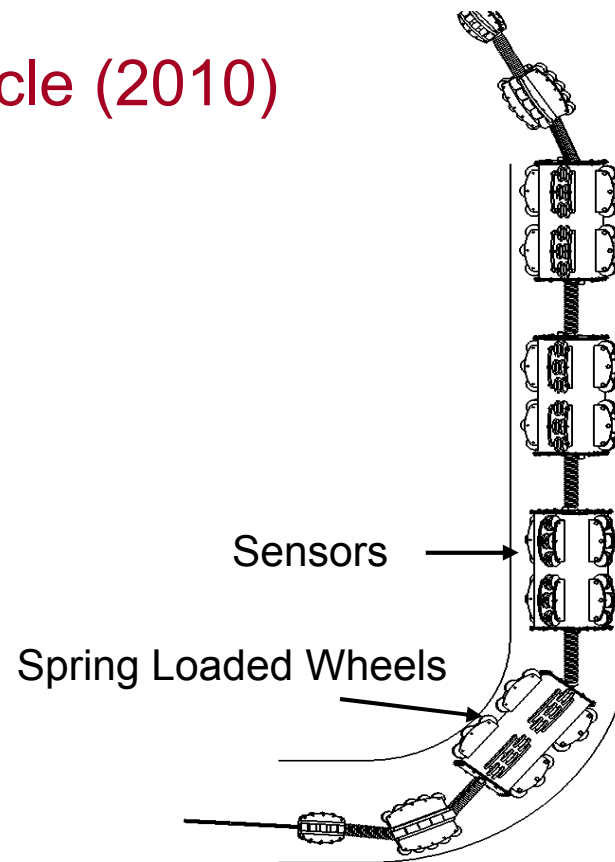
Install through 24" diameter man-way



Completed Medium Diameter Pipe Vehicle

Medium diameter inspection vehicle (2010)

- 12" to 30" diameter pipe
- Runs along a guide wire
- 1" of radial clearance to allow for mud, tubercles, coatings, etc
- Can traverse
 - Change of elevations
 - Branches, tees
 - Multiple elbows (at least 6)
- Working with a utility to arrange for field demo
- Employs remote field technology



Buried Pipe NDE Mock-ups





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