

# ***Pipeline Research Council International***

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## **PRCI Efforts on Hard Spots**

*Past, Present, and Future*



**LEADING PIPELINE RESEARCH**

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# Pipeline Research Council International is...

## PIPELINE

- Natural gas
- Crude oil & petroleum products
- Biofuels
- Hydrogen/renewable natural gas
- CO<sub>2</sub>
- Related facilities

## COUNCIL

- Forum for ideas & opportunities
- Peer-based
- Industry-driven
- Source of research inventory

**PRCI**<sup>TM</sup>

## RESEARCH

- Knowledge
- Technology
- Deployment & transfer
- Innovation

## INTERNATIONAL

- Asia
- Australia
- Europe
- Middle East
- North America



Pipeline Research  
Council International  
LEADING PIPELINE RESEARCH

# Our Mission

To collaboratively deliver relevant and innovative applied research to continually improve the global energy pipeline systems.

# Our Members

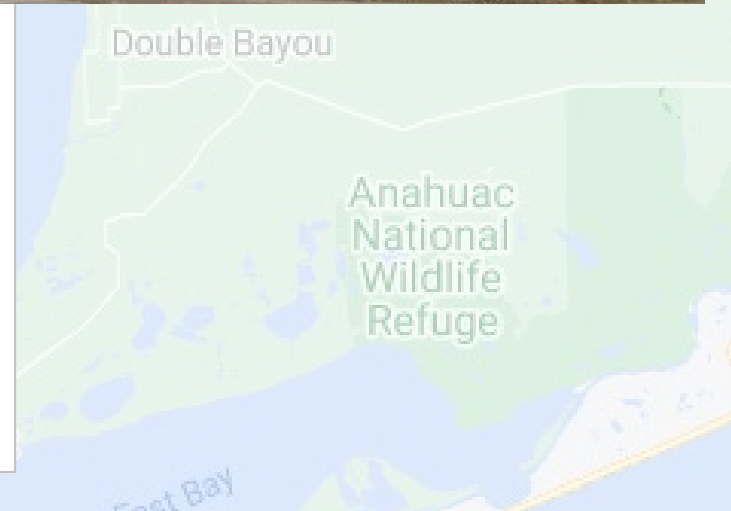
- **Worldwide Research Organization**
  - 45 North American Companies (U.S. & Canada)
  - 25 Non-NA (Australia, China, Europe, India, Japan, & Saudi Arabia)
- **36 Energy Pipeline Operating Companies**
  - 16 Natural Gas Transmission
  - 10 Liquid
  - 10 Liquid/Natural Gas
- **3 Pipeline Industry Organization (PIO) Members**
  - American Petroleum Institute (API)
  - Liquid Energy Pipelines Association (LEPA)
  - Operations Technology Development (OTD)
- **34 Associate Members & Technical Program Associate Members**
  - Australia, Canada, China, Europe, Japan, U.S.

**Australia**  
**Canada**  
**China**  
**France**  
**Germany**  
**India**  
**Ireland**  
**Japan**  
**Netherlands**  
**Norway**  
**Saudi Arabia**  
**United Kingdom**  
**United States**

# Technology Development Center



- **Established in 2015**
- **Located in Houston, TX**
- **20,000 sq. ft. of indoor workshop space**
- **9,000 sq. ft. of office and state-of-the-art meeting space with conferencing capabilities**
- **8 acres of test facilities and pipe storage**



# Pipe Sample Library

6



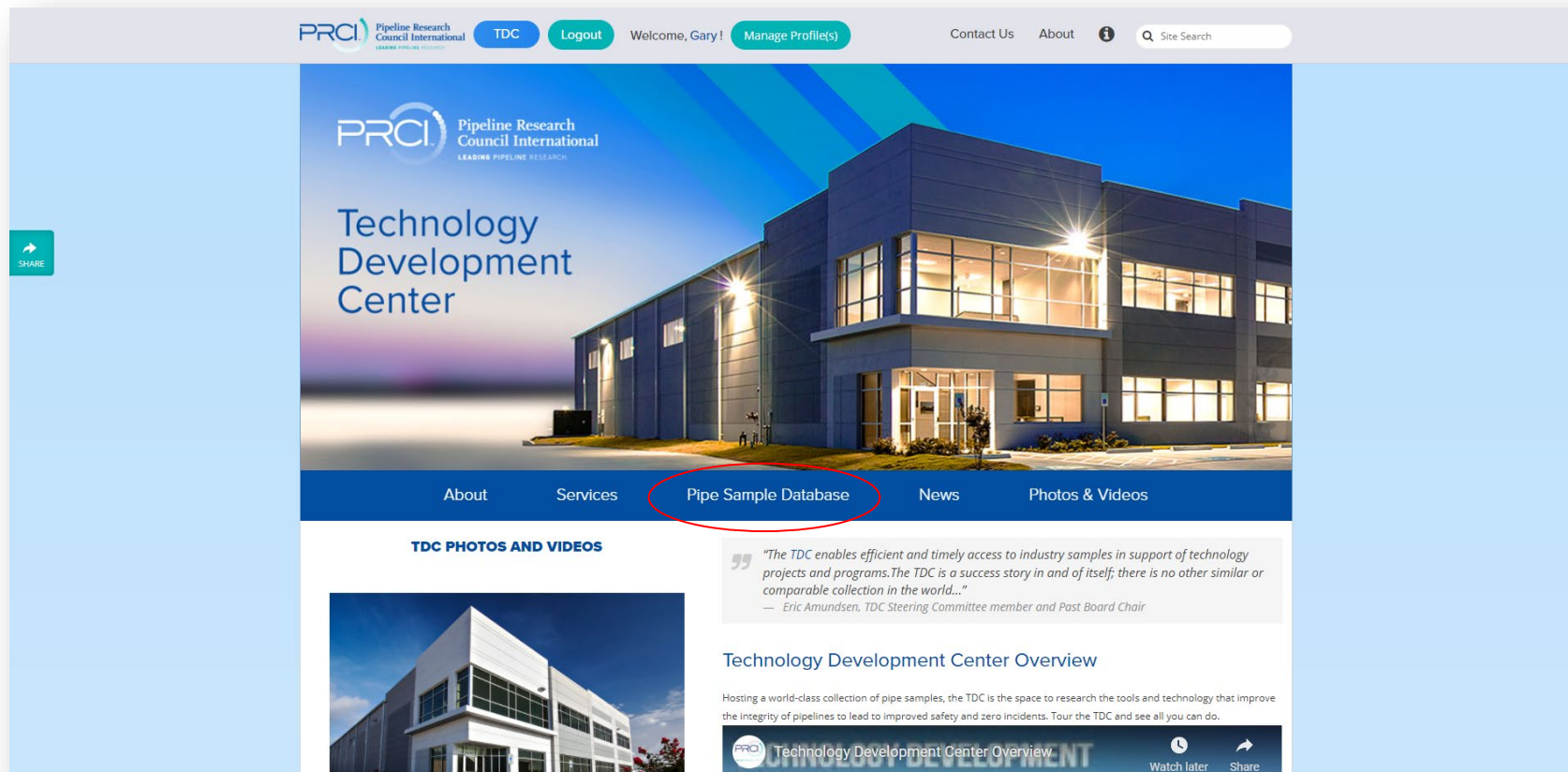
- Over 1,500 pipe samples & coupons with various real & manufactured defect types & dimensions from 6" and up to 40' in length.
- Samples and coupons can be crated and shipped directly to you.
- Work at the TDC and construct pipe strings for pull or flow loop testing.
- Third party pipe surface preparation, welding, cutting & moving services available upon request.
- Over 20,000 square feet of indoor warehouse space to conduct testing, NDE evaluations & storage.



# TDC Inventory Database

7

- New Searchable Database
- Linked on [PRCI.org/TDC](http://PRCI.org/TDC) website page (via Guest Login)
- We always welcome new samples! Contact [Lance Abney](#) for more information



# The Virtual Technology Development Center

8

## Data Sharing

- Third party data collection
- Data normalization
- Data structure standards
- Blinding of Data

## Benefits for the Industry

- Validation of ILI tools
- Greater understanding of how to use data for tool





# PRCI Previous Research Consolidated

9



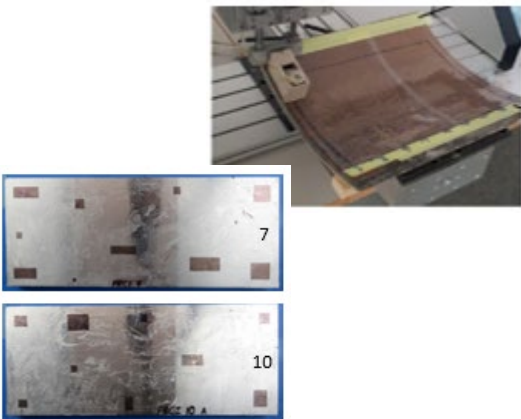
[PR-000-22COMP-R02](#)  
[Pipe Hard Spot](#)  
[Management Compendium](#)

## Research in the Past Five Years

Title	Year
Magnetic Flux Leakage of Small Defects in Line Pipe	2018
Calculation of Field Due to a Reluctance Variation Zone	2018
Multiple In-line Inspection Technologies	2018
Pipe Defects Detection Study with Status Reports	2018
Assessment of NDT Needs for Pipeline Integrity Assurance	2018

# Recent Research

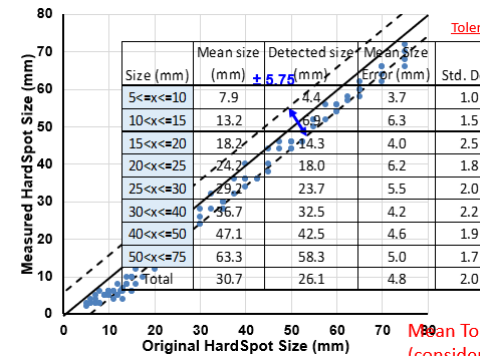
- **NDE-4-11 Hard Spot NDE Evaluation**
  - Review of technology available (2017)
  - Evaluate and assess performance (2018)
  - Statistical analysis



Calibration



Testing

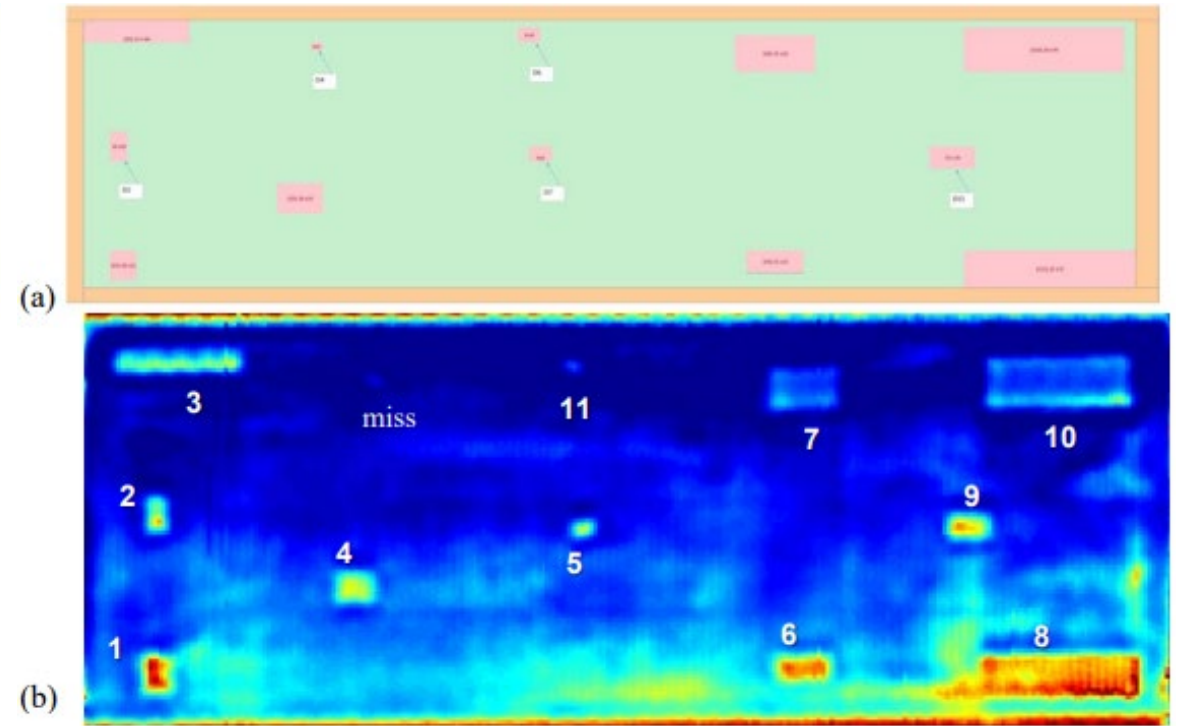
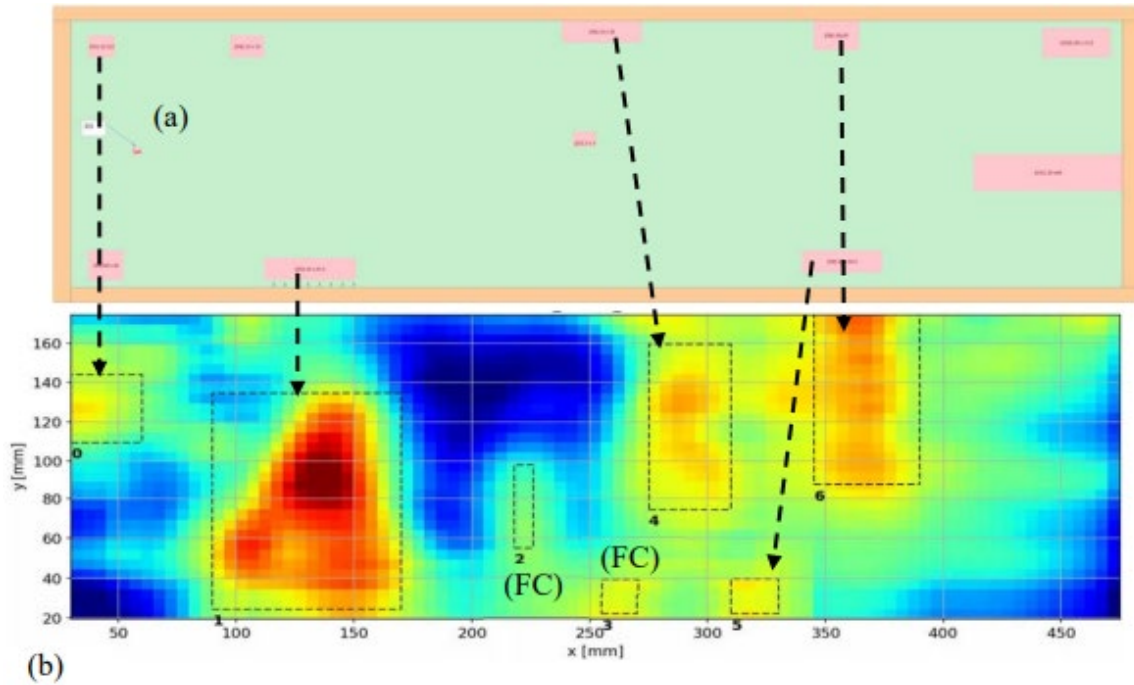


Analysis

Gaps

# NDE-4-11 Hard Spot NDE Evaluation

## Examples of Performance Evaluation – *Failures and Success*



## Current Research

### NDE-4-23 Tools and Methods to Assess Pipe Material Properties from Inside the Pipeline

- **Inputs**

- Literature review
- Operator survey
- Technology provider information

- **Outputs**

- Technology SOTA
- Technology readiness evaluation

**Knowledge Transfer: White Paper, Webinar**

# Current Research

14

## MAT-7-2 Hard Spot Susceptibility Review

### • Inputs

- Operator data and protocol
- ILI vendor experiences
- Pipe and steel mill practices
- Literature Review

### • Outputs

- Hard spot susceptibility guide for gas pipelines
- Hard spot susceptibility guide for liquid pipelines
- Guidance for hard spot threat management

**Knowledge Transfer: Update for INGAA doc, White Papers, Webinar**

# Future Research

## Technology

SOTA for Detection

Validation

Performance Analysis and Limitations

## Threats

Hydrogen Impact

Threat Interaction

Operational Changes

Susceptibility\*

## Cathodic Protection

Optimization of CP to Prevent Hydrogen Cracking\*

## Hard Spot Management

Reassessment

Response Criteria and Timing

In-ditch Assessment and Repair

# Leveraging Data and Collaboration





Thank you



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Council International

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