

Pipeline Research Council International

The Pursuit of Geohazard Threat Management *Geotechnical and Hydrotechnical Hazards Research*

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PHMSA Public Meeting, Houston, Texas
December 13, 2022



LEADING PIPELINE RESEARCH

Pipeline Research Council International is...

PIPELINE

- Natural gas
- Crude oil & petroleum products
- Biofuels
- Hydrogen/renewable natural gas
- CO₂
- Related facilities

COUNCIL

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

PRCITM

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.

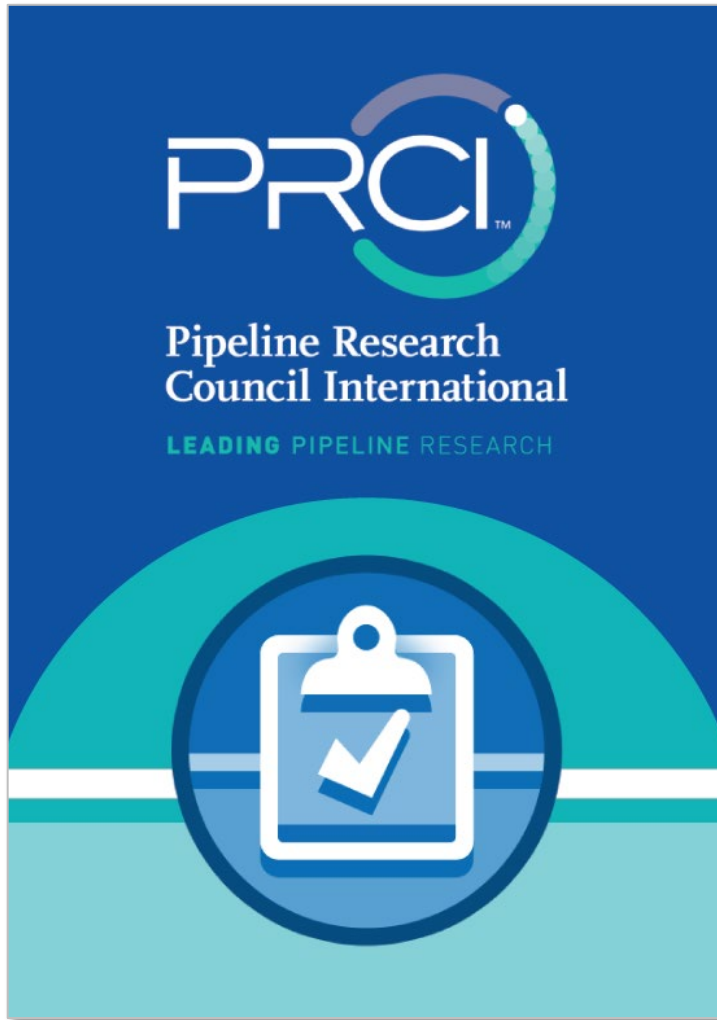
Our Members

- **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

PRCI Previous Research Consolidated

5



PR-000-18COMP-R04 Geohazards Compendium

Research in the Past Five Years

Completion Year	Research Title
2018	Field Validation of Surface Loading Stress Calculations for Buried Pipelines
2018	Guidance for Establishing Geohazard Integrity Performance Goals
2019	Guidance for Conducting Strain-Based Assessment of Buried Pipelines Subjected to Ground Movement
2019	Guidance on Predicting Pipeline Strains Induced by Slope Movement
2019	Evaluation of Current ROW Threat
2019	Modernization of River-X Software
2019	Use of Aerial LiDAR Data Collection for Geohazard Assessment
2021	Autonomous System for Monitoring Pipeline Integrity, ROW Geohazards, and Product Leaks at River Crossings
2022	Numerical Modeling and Full-scale Testing to Evaluate the Performance of Large Standoff Magnetometry (LSM)
2022	In-situ Instrumentation and Remote Sensing Methods for Slope Monitoring for Pipelines

Current Research

7



Completion Year	Research Title
2022	Modernize the assessment of water crossings*
2022	Pipeline Right-of-Way River Crossing Monitoring With Satellites
2023	Practical Girth Weld Evaluation Criteria Considering Weld Strength Mismatch and HAZ Softening
2024	Common River Assessment and Information Sharing Platform

*PHMSA Co-funded at \$386k

2023 Research

Appalachia Landslide Activity Characterization and Warning

- **Considerations**

- Regional proof-of-concept
- Operator geohazard inputs
- Remotely sensed data
- National science data and maps

- **Target Results**

- Localized integrity management
- Machine learning models
- Delineation of landslide classes and clusters
- Population of velocity condition state dataset

Knowledge Transfer: Model, White Paper, Webinar

2023 Research

Assessing Interactive Threats at Pipeline Waterway Crossings

- **Considerations**

- Hydrotechnical threats
- Geotechnical considerations

- **Target Results**

- Understand susceptibility
- Discern hydrotechnical from geotechnical threats
- Highlight best operator integrity practices

Knowledge Transfer: White Paper, Webinar

2023 Research

10

Operating Range of Strain Gauges for Pipeline Geohazard Monitoring

- **Considerations**

- Strain gauge investigations
- Strain gauge testing

- **Target Results**

- Determine operating range
- Understand out-of-range data
- Operator guideline

Knowledge Transfer: White Paper, Webinar

2023 Research

11

Pipeline Strain Demand Estimation

- **Considerations**

- IMU Reporting Standard
- Operator Data
- IMU Results
- Geological Conditions
- Pipe-soil Interaction Models

- **Target Results**

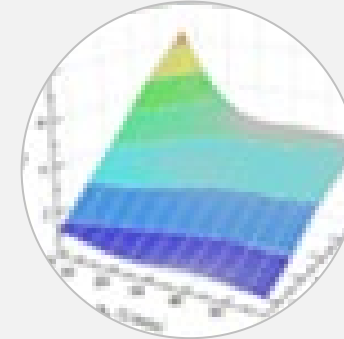
- Three-level analytical tool set to augment IMU ILI Data
- Support for API RP 1187

Knowledge Transfer: White Paper, Webinar, Application Guidance

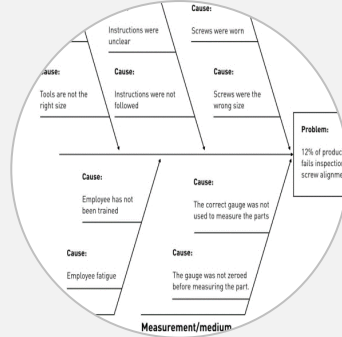
Development of a PRCI Strategic Research Priority



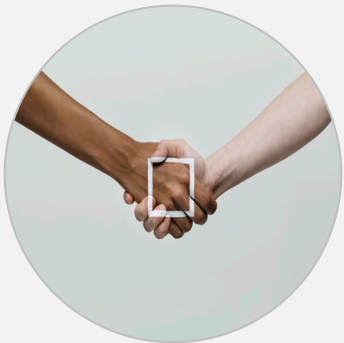
Leveraging Real Time Monitoring



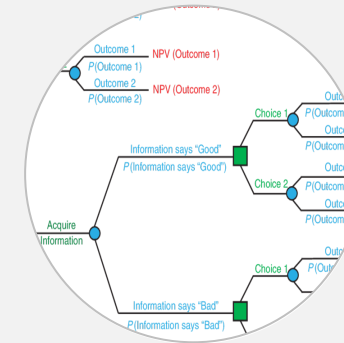
Hydrotechnical Geohazard Modelling



Root Cause Analysis



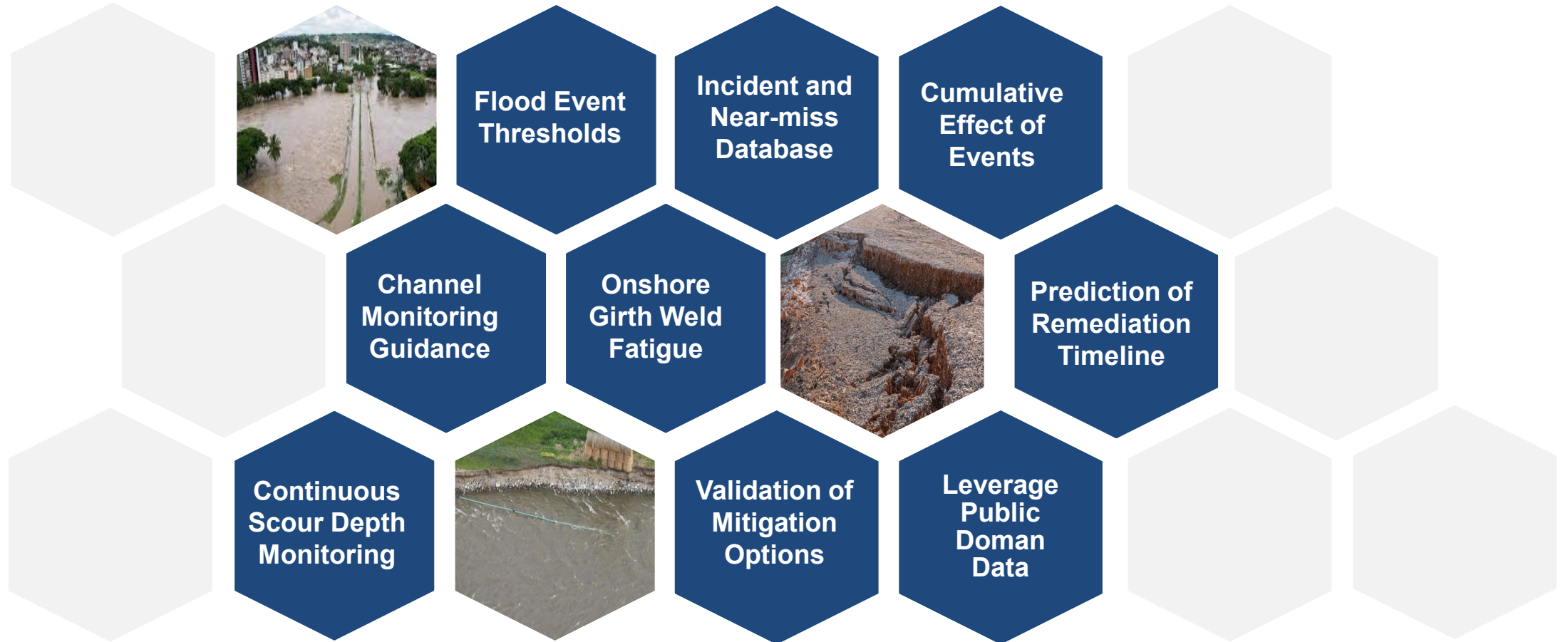
Data Sharing



Failure Mechanism Modelling

Hydrotechnical Hazards Scope

13



Thank you



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LEADING PIPELINE RESEARCH

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The logo features a large, stylized number '70' in a light grey color. The '0' is a thick ring with a teal-colored inner section. The letters 'PRCI' are in a bold, blue, sans-serif font, positioned over the '0'. A small 'TM' trademark symbol is located below the 'CI' part of the logo.

celebrating **PRCI** years

1952 - **LEADING PIPELINE** RESEARCH - 2022