Pipeline Research Council International, Inc.

The Future of the Pipeline Industry

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President
NAPCA Summer Workshop
August 16, 2012
Outline

- PRCI Overview
- State of the Pipeline Industry
- Changing the game through R&D
- Moving Forward
PRCI OVERVIEW
## Pipeline Research Council International, Inc.

### Pipeline
- Natural Gas
- Crude Oil & Petroleum Products
- Biofuels
- CO₂
- Related Facilities

### Research
- Knowledge
- Technology
- Deployment & Transfer
- Innovation

### Council
- Forum for Ideas & Opportunities
- Peer-based
- Industry-driven
- Source of Research Inventory

### International
- North America
- Europe
- South America
- Middle East
- Asia
- Australia
PRCI Membership

- **36 Energy Pipeline Operating Companies**
  - 22 Natural Gas Transmission; 9 Liquid
  - 5 Liquid/Natural Gas

- **2 Pipeline Industry Organization (PIO) Members**
  - Association of Oil Pipe Lines (AOPL)
  - Operations Technology Development (OTD)

- **28 Associate Members & Technical Program Associate Members**
  - Australia, Canada, China, Europe, Japan, Mexico, U.S.
  - Special Membership – Australian Pipeline Industry Association (APIA)

- **Worldwide Research Organization**
  - 39 U.S. Companies
  - 27 Non-U.S. (Australia, Brazil, Canada, China, Europe, Mexico, Saudi Arabia)
PIPELINE MEMBERS (36)

PIPELINE INDUSTRY ORGANIZATION MEMBERS (3)
Pipeline Technical Committees & Focus

- **Design, Materials & Construction**
  - Materials & Metallurgy (line pipe materials)
  - Welding & Weld Inspection
  - Design & Construction (geo-hazards, offshore, extreme environments)
  - Structural Integrity Assessment

- **Corrosion**
  - Detection, Assessment, Prevention, & Management of Galvanic Corrosion & SCC; Coatings
  - Improvement & Enhancement of Cathodic Protection; Design & Operations
  - Quantitative Risk Assessment

- **Operations & Integrity**
  - Threat Analysis & Damage Prevention
  - ROW Management – Environmental & Third-party Interference
  - Leak Detection (liquids)
  - NDE Technology Development & Inspection Methods
  - ROW Protection & Monitoring
Facilities Technical Committees & Focus

- Compressor & Pump Station
  - Cost-effective Emissions Reduction and Emissions Monitoring
  - All Equipment in Stations – Engines, Turbines & Drives
  - Equipment Reliability, Availability & Life Extension
  - Improve Fuel Efficiency and Greenhouse Gas Emissions Mitigation & Reporting

- Measurement
  - Improve Custody Transfer Accuracy and Reduce Metering Errors and Bias
  - Support the Technical Underpinnings of Measurement Standards
  - Reduce Lost & Unaccounted For Gas and Reduce Measurement O&M Expenses
  - Expand the Operating Range of Existing Equipment

- Underground Storage
  - Storage Reservoirs, Bedded Salt Structures & Salt Caverns
  - Wellbore and Cavern Integrity and Inspection
  - Field Deliverability and Facility Integrity & Reliability
STATE OF THE PIPELINE INDUSTRY
The State of the Energy Pipeline Industry

- Recent high profile incidents – gas & liquids
- A Call to Action by the public, legislators and regulators
- Heightened awareness of the need for a Step Change
- PHMSA ANPRMs and NTSB reports and hearings
- Timely execution and R&D deployment needed
- Lack of a comprehensive, unified industry plan
  - Better coordination, communication across R&D organizations
  - Lack of focus or commitment on top priorities
  - Dilution of resources – people and financial
- Multiple Industry initiatives underway – gas & liquids
The Current State of the Energy Pipeline Industry

- A Mature Infrastructure in Key Demand Areas
- Broad Infrastructure Development
  - Emerging markets globally
  - Oil sands, shale gas, and other energy sources
  - Off-shore E&P pushing new frontiers
- Energy pipelines are the only viable option for energy transportation on the scale required
Current State of Energy Pipeline Industry R&D

- US Government funding retreats
- Pure pipeline R&D investment lacking to address industry needs
- Collaborative efforts through PRCI, individual company and R&D organization efforts not optimized
- Timely execution and deployment of deliverables needed
- Lack of a comprehensive, unified industry plan
  - Better coordination, communication across R&D organizations
  - Lack of focus or commitment on top priorities
  - Dilution of resources – people and financial
CHANGING THE GAME THROUGH R&D
What is next?

- Interstate Natural Gas Association of America (INGAA) created the Integrity Management Continuous Improvement effort.

- American Petroleum Institute (API) & American Oil Pipe Lines (AOPL) establish the Pipeline Safety Improvement effort.

- Each group has led by stating that their goal is to zero pipeline incidents.

- Each of these efforts identified a key area that they wanted to address - the common thread was Research.
Pipeline Industry R&D Puzzle

Awareness & understanding of the R&D universe
Multiple parties and interests
R&D funding constantly challenged
Instant gratification society
Many competing interests
Staying the course and managing emerging issues
Changing role of industry-government relations

Collaborative model is key to achieving success – identify and manage barriers
Developing the Industry R&D Roadmap

INGAA IMCI

AOPL/API
R&D for Pipeline Safety Improvement

Common Goals

PRCI

INGAA IMCI

IMCI Action Plans
INGAA Foundation

OTG
API Technical Committees

Four R&D Summits
May 2012 – European Summit
IPC 2012 – Roadmap Roll-out

PRCI is Conduit for Industry
- Gas, liquid, industry associations

Owner of R&D Roadmap

Continuous Feedback Loop

Large Programs with Substantial Funding Commitments

Identify R&D Partnerships
- NYSEARCH, OTD, etc.

Monitor PHMSA R&D Program
Information Sharing & Repository
Communication & Deployment
Synergy between IMCI and PSIA

- **Top R&D Needs**
  - Unpiggable Pipelines
  - ERW/Longitudinal Seam Welds
  - Leak Detection
  - Data Integration & Decision-making Processes/Tools
  - SCC &Cracking – welds and pipe body
  - Anomaly Assessment
  - Mechanical Damage
  - Damage Prevention
  - Improvements in ILI capabilities
  - Facility Integrity
  - Risk Assessment

Consistent with PRCI Programs and Roadmaps
R&D Process & Summit Alignment

Drivers &
Strategic Goals

Research Objectives
& Outcomes

Roadmaps & Programs
Deployment

Ballot Development &
Voting

Project
Execution &
Deliverables

Pipeline Research
Council International

INGAA IMCIs and
AOPL/API PSIAs
EPRG Roadmap
JTM Output

Industry R&D
R&D Organizations
Government

Contractors/Academia

R&D Funnel – integrating and aligning strategic and tactical requirements
R&D and Technology Roadmaps

- A plan for achieving Research Objectives
- Basic Elements
  - Clear Statement of Desired Outcome
  - A survey of the landscape for the outcomes targeted – what currently exists and why isn’t it effective? What changes need to be made for improvements or replacement?
  - Identifying Technology Gaps and the necessary steps to fill the voids
  - Practical metrics to support decision-making and identify and recognize when alternative pathways are needed or that the desired outcomes can’t be achieved and the program is terminated
- Living Documents
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<tr>
<th>PRCI Coating projects</th>
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<tr>
<td><strong>Table</strong></td>
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<tr>
<td><strong>Project Title</strong></td>
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<tr>
<td>Augmenting NDE Tools with Sensors that Assess Coating Condition</td>
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<tr>
<td>Investigate Cost-Effective Methods for Addressing and Mitigating Corrosion Effects Under Failed Shrink Sleeves and Other Disbonded Coatings</td>
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<tr>
<td>Performance of Above Ground Coating Evaluation Survey Method</td>
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<tr>
<td>Field Applied Coatings: Short- and Long-Term Performance, Phase IV</td>
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<tr>
<td>State of the Art: Review of nine Failure Modes and Effects</td>
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<td>Development of a Self-Healing Coating for Pipelines for the Prevention of External Corrosion Damage</td>
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<tr>
<td>Effect of Test Voltage on IBE Coatings</td>
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<tr>
<td>Evaluate Alternative Techniques for Detecting Disbondment and Shielding</td>
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Moving Forward

- **Partnerships**
  - Develop models to increase stakeholder collaboration
  - Increase partnerships with standards associations, industry associations and government agencies

- **Funding**
  - Broaden research funding base
  - Utilize private and public funding to leverage research dollars

- **Research**
  - Leverage PRCI Technical Committees to target additional research
  - Utilize PRCI’s collaborative model to focus research on common interests
  - Gain Consensus on Priorities – Topically, Sector-based, Regionally

- **Implementation**
  - Assure Transfer of Knowledge – Products, Standards, Best Practices, Rulemaking, & Regulations
Questions?

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