



LEADING PIPELINE RESEARCH

● PHMSA 2009 R&D Forum  
● WASHINGTON, DC • June 24 & 25, 2009

# **TRACK 5 - CHALLENGING ENVIRONMENTS – SUBSEA PIPELINES**

## **R&D for Opportunities**

## **PRCI Member Targets**

**John O'Brien**  
**Vice Chair Pipeline Research Council International, Inc.**  
**Operations & Integrity Committee**

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## Presentation Topics

- **Subsea Operations & Integrity Targets PRCI Member Brainstorming February 2009.**
- **Focus for new thoughts received from multiple operators.**
- **Lets think big 3 year short term, 10 year long term.**



## Research Scoping Process

- Following items were identified as potential R&D opportunities.
- Items tested for compliance with our subsea ‘fishbone’ roadmap Subsea Integrity Management – all comply.
- Projects are ranked based on number of votes obtained in the meeting. (54 total possible votes)
- We will use a similar approach at the end of today to ‘rank’ our ideas.



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- 1) **Topic:** Pipe In Pipe Pipeline Inspection. Ranked Joint No 1 (9 Votes)
- 2) **Objective:** Design an inspection solution applicable to inner pipe from the outside and outer pipe from the inside.
- 3) **Benefits To Industry:** Provide an IM solution in areas where we currently face challenges and no inspection capability.

4) **Source:** Subsea Strategy  
Session



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1) **Topic:** Non Piggable Pipelines - Access Issues . Ranked Joint No 1 (9 Votes)

2) **Objective:** Develop methodologies/guidance on geometric challenges for non piggable pipelines i.e pipeline configurations, telescoped pipelines, subsea launching and receiving challenges..

3) **Benefits To Industry:** Understanding the configuration challenges and reliability in design of items such as subsea connectors is a critical element of an effective IM strategy and these areas are currently gaps in our knowledge.

4) **Source:** Subsea Strategy Session



1) **Topic:** Extreme Weather Loading – What To Do? Joint No 3 (7 Votes)

2) **Objective:** As an enhancement to the strain based design approach develop guidance and tools to incorporate extreme weather & or other events i.e hurricane, typhoons & mudslides into both design and post incident analysis/responses.

3) **Benefits To Industry:** Initial review of the API 1111 document seems to leave gaps in handling these important issues that affect the industry around the world.

4) **Source:** Subsea Strategy Session – look into possible JIP work in Australia for leverage.



1) **Topic:** Standardized Test methods for Establishing Tensile & Strain Loads?  
Joint No 3 (7 Votes)

2) **Objective:** A review of API 1111 raised an issue that datasets may not be comparable as there is no industry standard approach to establishing these loads either in the lab or the field.

3) **Benefits To Industry:** Inability to compare data sets may mislead the industry – common approaches adds confidence to our methodologies.

4) **Source:** Subsea Strategy  
Session – API 1111



1) **Topic:** Accuracy of Subsea Survey Techniques. Joint No 5 (6 Votes)

2) **Objective:** We currently do not fully appreciate the limitations of a strain based assessment in terms of displacement due to inaccuracies in subsea surveying techniques. This program will seek to determine and publish the performance capabilities of relevant techniques.

3) **Benefits To Industry:** Understanding limitations and accuracies improves assessments and reduces conservatism avoids undue risk..

4) **Source:** Subsea Strategy  
Session – Links To SPDA-1-2 &  
Strain Based Design Usage.





- 1) **Topic:** Non-piggable Pipelines - Inspectability. Joint No 5 (6 Votes)
- 2) **Objective:** Non Piggable pipelines crosses over onshore and offshore pipelines but subsea adds new challenges based on access, external barriers and cost of intervention. This work will look at developing philosophy/strategy out of SPIM 1-1 to handle implementation challenges.
- 3) **Benefits To Industry:** Understanding capabilities of techniques, deployment costs, challenges and gaps in our abilities is essential to our IM programs.
- 4) **Source:** Subsea Strategy Session – Chevron Seed Funding.



1) **Topic:** Non-piggable Pipelines - Cleaning. No 7 (5 Votes)

2) **Objective:** Non Piggable pipelines is a function of geometry (access) and inspection capability. However an additional challenge is simply cleaning the lines for a range of needs not just inspection. Challenges with excessive sand deposits, waxing etc. can pose significant challenges to which we need industry best practice guidance.

3) **Benefits To Industry:** Failure to clear lines can promote under deposit corrosion and make inhibition programs ineffective.

4) **Source:** Subsea Strategy  
Session



1) **Topic:** Design For Inspection. No 8 (4 Votes)

2) **Objective:** Failure to design for inspection has cost the industry millions over the years. There is no one reference source on guidance to design engineers to facilitate inspection. This approach might link good corrosion guidance and inspection knowledge into directions as things to avoid or encompass in design to facilitate inspection of subsea pipelines.

3) **Benefits To Industry:** Get it right first time is normally lowest cost approach – re work costs money. Designing in improves our life cycle costs.

4) **Source:** Subsea Strategy  
Session



- 1) **Topic:** Composite Repairs Techniques For Offshore Risers. No Rank
- 2) **Objective:** Develop guidance on reinforcement of offshore pipeline risers subject to pressure, tension & bending loads using composite repair materials
- 3) **Benefits To Industry:** Provides industry best practice.
- 4) **Source:** Mech. Damage Session

## Previous Challenges

- SMART Pigs for ultra deepwater pipeline inspection (Petrobras).
- External Flowline Inspection (BP)
- High temperature Wet Insulation Flowline Coatings (BP)
- Welding and NDE solutions for heavy wall pipe 2" wall plus large D/t ratios (6 and greater).
- Multi diameter pigging capability 8" ID variations.
- No hydrotest (alternate integrity verification) on commissioning acceptable to regulators.



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- Higher pressure flex joints at the top of risers
- Decommissioning guidelines.
- Pipeline sea lanes situational awareness.



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— That's got us started .....