

## Pipeline R&D Challenges Detection and Assessment - 3

	<b>Challenges</b>	<b>R&amp;D Gaps</b>	<b>Consensus</b>	<b>Why Worth Pursuing</b>
LD	<ul style="list-style-type: none"> <li>• Small leak detection</li> </ul>			PC
3PD	<ul style="list-style-type: none"> <li>• Real-time or frequent detection of third party intrusion (<u>e.g.</u>, aerial drone inspections)</li> </ul>	aerial drone inspections		Longterm
DA	<ul style="list-style-type: none"> <li>• Stronger technologies to determine reassessment intervals following direct assessment</li> </ul>			PC
PA	<ul style="list-style-type: none"> <li>• Techniques to schedule assessments to minimize impacts on throughput of assessment in HCAs</li> </ul>	develop techniques to minimize impacts	Yes	Cheaper
RM	<ul style="list-style-type: none"> <li>• Improved risk management techniques to process large volumes of data to evaluate pipe integrity concerns</li> </ul>	Improved risk management techniques	Yes	Data Integration
RM	<ul style="list-style-type: none"> <li>• Setting levels /criteria for acceptable risk associated with pipelines and facilities</li> </ul>	How Low is Low	Yes	Better
ILI	<ul style="list-style-type: none"> <li>• Methods to improve turnaround times for ILI data processing &amp; analysis</li> </ul>	ILI data processing & analysis	Yes	Better, Safer

		process improvements		
DC	<ul style="list-style-type: none"> <li>Improved techniques for defect analysis and characterization</li> </ul>		Yes	High Issue
DC	<ul style="list-style-type: none"> <li>Mechanical damage assessment criteria (e.g., for dents, gouges and for wrinkle bends)</li> </ul>		Yes	High Issue
DC	<ul style="list-style-type: none"> <li>Assessment of corrosion and other damage in fittings, seams, welds, fabricated branches and other components; analysis of implications where outside the scope of RSTRENG or B31G</li> </ul>	outside the scope of RSTRENG or B31G	Yes	PC
MC	<ul style="list-style-type: none"> <li>Improved methods of in-situ, nondestructive assessment of pipeline properties, particularly low toughness or other characteristics that influence the selection of appropriate flaw evaluation methods</li> </ul>	nondestructive assessment of pipeline properties: Knowing Material Props.	Yes!	Better, cheaper
DC	<ul style="list-style-type: none"> <li>Improved characterization of anomalies detected via ILI so that unnecessary digs are minimized</li> </ul>	Improved characterization of anomalies detected via ILI	Yes	Better, PC
DC	<ul style="list-style-type: none"> <li>Improved flaw growth rate predictions (SCC, internal corrosion, external corrosion, etc.). This is needed in order</li> </ul>	Improved flaw growth rate predictions	Yes	Better

	for operators to set meaningful re-inspection intervals	(SCC, internal corrosion, external corrosion, etc.).		
	<ul style="list-style-type: none"> <li>Flaw acceptance criteria for less than 30% smys.</li> </ul>		Yes	Cheaper
	<ul style="list-style-type: none"> <li>Flaw acceptance criteria for various Pipe characteristics (Metallurgy &amp; Ops.)</li> </ul>		Yes	Cheaper
	<ul style="list-style-type: none"> <li>Certification of ILI tools beyond 1163</li> </ul>	Science behind 1163	Yes	Safer,
	<ul style="list-style-type: none"> <li>Certification of Inspection Personnel (Outside of Asnt ILI )</li> </ul>		No	
ASSESSMENT	<ul style="list-style-type: none"> <li>Ability to rapidly detect wall thinning, without exterior surface preparation, on both piggable and unpiggable lines.</li> </ul>	Detection of disbondment, Lamination and or corrosion.	Yes	Better, Cheaper

**Red is a.m. session**

**Blue is p.m. session**

**Black is registration survey**

# Pipeline Research & Development Forum (Detection & Assessment) Track Summary

Identified Challenges	R&D Opportunities	Consensus	Why Worth Pursuing
<p>1. To be able to assess the safety, risks, and reliability of offshore pipelines</p>	<p>1. Offshore pipelines</p> <ul style="list-style-type: none"> <li>1. Corrosion</li> <li>2. Repair</li> <li>3. Risk assessment and Reliability</li> <li>4. ID &amp; Mitigation of Geo-hazards</li> <li>5. Operational development issues.</li> <li>6. Leak detection</li> <li>7. Hydrogen Cracking for thick wall pipe</li> </ul>	<ul style="list-style-type: none"> <li>1. Yes / No</li> <li>2. Yes / No</li> </ul>	<ul style="list-style-type: none"> <li>1. park</li> </ul>

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<b>Identified Challenges</b>	<b>R&amp;D Opportunities</b>	<b>Consensus</b>	<b>Why Worth Pursuing</b>
<b>1. Unpiggable Pipelines</b>	<b>1. Unpiggable</b> <ul style="list-style-type: none"><li>1. Risk Assessment</li><li>2. DA (ICDA, ECDA, SCCDA, MDDA)<ul style="list-style-type: none"><li>1. Demonstration</li><li>2. Validation</li><li>3. Tool/method Development</li></ul></li><li>3. Robotics<ul style="list-style-type: none"><li>1. Demonstration</li><li>2. Validation</li><li>3. Tool/method Development</li></ul></li><li>4. Other Non Intrusive Techniques</li></ul>	<b>1. Partial</b>	<b>1. Yes/Liquid?</b>

# Pipeline Research & Development Forum (Detection & Assessment) Track Summary

Identified Challenges	R&D Opportunities	Consensus	Why Worth Pursuing
<p><b>1. Develop safe, environmentally responsible, cost-effective and reliable solutions for the design, construction, and operation of energy pipelines (Onshore, Artic,Offshore)</b></p>	<p><b>1. Damage Prevention, Detection, Assessment &amp; Notification</b></p> <ul style="list-style-type: none"> <li>1. Third party</li> <li>2. Determination of Max. Safe Surface Loads</li> <li>3. Critical Pipeline Strains</li> <li>4. Improved FEM Tech.</li> <li>5. Sensors</li> <li>6. Reduced False Calls</li> <li>7. Case studies</li> </ul> <p><b>2. Reliability-Based Operation</b></p> <ul style="list-style-type: none"> <li>1. Alternatives</li> <li>2. Solution for Adverse Crossings</li> </ul> <p><b>3. Integrity Practice Standards</b></p> <ul style="list-style-type: none"> <li>1. Implementation</li> </ul> <p><b>4. Leak Detection &amp; Notification</b></p>	<p><b>1. Yes /</b>  <b>2. Yes /</b>  <b>3. Yes</b>  <b>4. Partial</b></p>	<p><b>1. Highest safety consequence</b>  <b>2. Safety/\$</b>  <b>3. Based on Knowledge/ Science</b>  <b>4. Gas Transmission? Prefer prevention</b></p>

# Pipeline Research & Development Forum (Detection & Assessment) Track Summary

Identified Challenges	R&D Opportunities	Consensus	Why Worth Pursuing
<ul style="list-style-type: none"> <li>• Lower the costs of pipeline construction, operation and maintenance</li> <li>• Enable a 25% reduction in the frequency, consequences and associated costs of all types of in-service degradation and damage by 2006</li> <li>• Improved approaches to damage assessment, damage remediation and the overall framework for damage management by 2006.</li> </ul>	<ol style="list-style-type: none"> <li>1. Assessing and managing in-service damage (Prevent, Assess, Detect&amp;Categorize)               <ol style="list-style-type: none"> <li>1. Corrosion</li> <li>2. SCC</li> <li>3. Mech. Damage/Geo-Hazards</li> <li>4. IM Framework</li> </ol> </li> <li>2. Reducing the cost of pipeline construction through new materials and welding processes</li> <li>3. Maintenance Welding</li> <li>4. Integrity issues in advanced materials design.</li> <li>5. Integrity of corroded seam &amp; girth welds</li> <li>6. Improved Remaining strength assessment (corroded pipelines)</li> <li>7. DA approaches for Mech. Damage</li> </ol>	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. no</li> <li>3. No</li> <li>4. No</li> <li>5. Yes</li> <li>6. Yes</li> <li>7. Yes?</li> </ol>	<ol style="list-style-type: none"> <li>1. S,B,C,F</li> <li>2. Move</li> <li>3. Move</li> <li>4. Move</li> <li>5. Safer/Cheaper</li> <li>6. Safer/Cheaper</li> <li>7. Cheaper?</li> </ol>

# Pipeline Research & Development Forum (Detection & Assessment) Track Summary

Identified Challenges	R&D Opportunities	Consensus	Why Worth Pursuing
<ol style="list-style-type: none"> <li>Sponsoring research and development projects focused on providing near-term solutions that will increase the safety, cleanliness, and reliability of the Nation's pipeline system</li> </ol>	<ol style="list-style-type: none"> <li>Developing new technologies for leak detection and</li> <li>damage prevention</li> <li>Improving technologies for pipeline operation, monitoring, and control</li> <li>Improving pipeline materials.</li> </ol>	<ol style="list-style-type: none"> <li>Yes</li> <li>Yes</li> <li>Yes</li> <li>M</li> </ol>	<ol style="list-style-type: none"> <li>Previous</li> <li>Safer, Better</li> <li>Safer, Better</li> <li>Move</li> </ol>

# Pipeline Research & Development Forum (Detection & Assessment) Track Summary

Identified Challenges	R&D Opportunities	Consensus	Why Worth Pursuing
<ol style="list-style-type: none"> <li>1. Programs to maintain Integrity</li> <li>2. Programs to influence regulatory requirements associated with safety &amp; integrity</li> <li>3. Programs to reduce capital costs of new pipelines.</li> </ol>	<ol style="list-style-type: none"> <li>1. Mechanical Damage               <ol style="list-style-type: none"> <li>1. Locate/Detect</li> <li>2. Assessment</li> <li>3. Characterization from MFL Signals</li> </ol> </li> <li>2. Non Piggable Pipelines</li> <li>3. Shielded Pipe</li> <li>4. Internal corrosion               <ol style="list-style-type: none"> <li>1. Prioritize Locations</li> <li>2. Inspection</li> <li>3. Monitoring</li> <li>4. Mitigation</li> </ol> </li> <li>5. Assessment Intervals</li> <li>6. Managing SCC               <ol style="list-style-type: none"> <li>1. Sizing</li> <li>2. Characterization</li> </ol> </li> <li>7. Electrical Survey</li> <li>8. Above Ground Detection Methods. (wall loss)</li> <li>9. Increase Bore Passing/ Inspection (capability-MultiD)</li> </ol>	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. Yes</li> <li>3. Yes!!</li> <li>4. Yes</li> <li>5. Yes</li> <li>6. Yes</li> <li>7. Yes</li> <li>8. Yes</li> <li>9. Yes!!</li> </ol>	<ol style="list-style-type: none"> <li>1. Safer, Better, Cheaper</li> <li>2. Prev.</li> <li>3. Safer, Better</li> <li>4. Safer, Better</li> <li>5. Safer, Better, Cheaper</li> <li>6. Safer, Better</li> <li>7. Better</li> <li>8. Better, cheaper, Faster</li> <li>9. Better, Cheaper, Faster</li> </ol>

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Identified Challenges	R&D Opportunities	Consensus	Why Worth Pursuing
<ol style="list-style-type: none"> <li>1. <b>Static Threats</b> <ol style="list-style-type: none"> <li>1. Manufacturing</li> <li>2. Welding/Fabrication</li> </ol> </li> <li>2. <b>Time Dependent Threats</b> <ol style="list-style-type: none"> <li>1. Corrosion</li> <li>2. Environmental Cracking</li> </ol> </li> <li>3. <b>Random Threats</b> <ol style="list-style-type: none"> <li>1. Third Party Damage</li> <li>2. Incorrect operation</li> <li>3. Outside Force</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. <b>Non Piggable Pipelines</b> <ol style="list-style-type: none"> <li>1. Sensor Development</li> </ol> </li> <li>2. <b>Assessment of Third Party Damage</b></li> <li>3. <b>Smart Pipe</b> <ol style="list-style-type: none"> <li>1. Detect and measure stress.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. Yes</li> <li>3. Yes</li> </ol>	<ol style="list-style-type: none"> <li>1. Covered</li> <li>2. Covered</li> <li>3. Better</li> </ol>

# Back Up

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