

# **Pipeline R&D Challenges**

## **Track 4**

### **Mitigation and Repair**

#### General Themes of Challenges (\* activity listed twice)

- Cost Efficiency (1, 3, 4, 11\*, 15, 16\*, 28, 29\*)
- Decision Basis/Acceptance Criteria (9, 10, 18, 21, 29\*)
- Mitigation or Repair Concerns Requiring Innovative Technology Solutions (6, 16\*, 22, 25, 27, 30)
- Improved Practices (14, 17, 19, 20, 24)
- Regulatory Acceptance of Existing Techniques (5, 11\*)
- Techniques to Facilitate Permitting (7, 13)
  
- Treated in Other Tracks (2→Tr 3; 8→Tr 2; 23→Tr 3; 26→Tr 3)
- No General Theme (12)

#### Characterization

- Not relevant to R&D (A)
- Work in progress, expect resolution (B)
- Work in progress, more work needed (C)
- Little or no work ongoing (D)
- Not worth pursuing or redundant (E)

## Challenges/Activity Areas

1. Developing acceptable (to the regulator) and enhanced on-line repair techniques to avoid line shutdown (e.g., in-service welding, coating replacement, sleeves) (C)
2. Improving small leak detection capability
  - Liquid transmission (D)
  - Gas distribution (D)
3. Mechanisms for internal pipeline repair (e.g., various polymeric liners); consider leak prevention vs. reinforcement vs. isolation (D)
4. Cheap, efficient, safe and quick techniques to dig bell holes (C)
5. Acceptance and application of repair methods for acetylene girth welds (D)
6. Improved methods of repair/remediation of cased crossings (C)
7. Accelerated means for obtaining the permits - especially T&E and cultural issues (A)
8. Better mitigation of contaminants affecting pipeline operations and product quality (C)
9. Criteria (e.g., risk acceptance) for managing pipelines found to contain large numbers of defects (A) – possible project related to acceptability of lining pipe
10. Risk-based repair criteria that acknowledge pipe characteristics (B)
11. Economic and technically valid repair practices for pipelines operating at less than 30% SMYS (current practices and requirements targeted for higher stress lines are overly conservative) (D) for distribution

12. Evaluate the benefits and barriers to establishing go-team repair crews that specialize in mitigation and repair (A)
13. Develop rapidly implementable, small foot print repair site access and repair techniques that can be approved in advance by permitting agencies (C)
14. Improved techniques for operations & maintenance management (e.g., noteworthy practices for managing SCC) (A)
15. Extend the range of economically attractive in-service repair solutions for pipelines (B or C)
16. Internal repair robots (C)
17. Repair asphalt not to disrupt the infrastructure (C)
18. Establish stronger engineering basis for reassessment interval (C)
19. Approach to measuring the effectiveness of CP system (external MIC, disbanded coating) (C)
20. Compile practices that have been successfully applied to mitigate SCC (C or D)
21. Techniques for life prediction given the presence of SCC (crack depth difficult to characterize) (C)
22. Development of techniques for recoating (surface preparation, application) (C)
23. Characterization of coating deterioration with presence of shielding, disbanded coating (SCC, EC) (C or D)
24. Characterization of “appurtenances” (e.g., sleeves, weld-on stopple, drips): When is removal

needed (decision basis)? What information is needed to make decision? Strengthening inspection techniques? (D)

25. Alternative solutions to disbonded coating (D)
26. Above ground method for detecting disbonded coating (C or D)
27. Develop standardized methods for identifying/locating repairs (e.g., clock spring, other repairs); possible use of “smart chips”, gopher vision (see Terry Boss) (C)
28. Improved recoating techniques (C)
29. Economic and acceptable (to the regulator) techniques for repair of small leaks (D)
30. Evaluation of above-ground storage tank bottom design effectiveness (C)
31. User friendly tool for degaussing (D)

# Pipeline R&D Forum

## Summary from Mitigation & Repair Track Session

### December 12, 2003

Mitigation: Prevent further degradation of the pipeline

Red color indicates either not relevant to R&D or resolution expected based on current R&D

<b>Challenges</b>	<b>R&amp;D Opportunities</b>	<b>Reason(s) to Pursue</b>
<b>1. Cost Efficiency of Mitigation &amp; Repair</b>	1. On-Line Repair Techniques	Potential to expedite permitting Avoid supply disruption
	3. Internal Pipeline Repair	Eliminate above-ground disruption
	4. CESQ Bell Hole Techniques	Potential to expedite permitting
	11. Repair Practices for Low Stress Pipe	
	15. In-Service Repair Techniques (see 1 above)	Avoid supply disruption
	16. Internal Repair Robots	Avoid supply disruption
	28. Improved Recoating Techniques	Extend service life

	29. Repair of Small Leak	Mitigate environmental damage
<b>2. Decision Basis, Acceptance Criteria</b>	9. Repair of Pipeline with numerous defects (A)	
	10. Repair Criteria for pipes of small diameter or unusual materials (B)	
	18. Engineering Basis for Reassessment Interval	Optimize integrity expenditures Minimize integrity threats
	21. Life Prediction with SCC	
	29. Repair of Small Leak	Mitigate environmental damage
<b>3. Mitigation or Repair Concerns Requiring Innovative Technology Solutions</b>	6. Repair/Remediation of Cased Crossings	Demonstration of integrity for non-piggable pipe
	16. Internal Repair Robots	
	22. Recoating Techniques	
	25. Solutions to Disbonded Coating	
	27. Identification/Location of Repairs	
	30. Effectiveness of Storage Tank Bottom	

	31. Degaussing Tool	Shorten time to repair
<b>4. Improved Mitigation &amp; Repair Practices</b>	14. Improved O&M (Noteworthy Practices) (A)	
	19. Measuring CP Effectiveness	Answer why continuing EC failures with CP
	17. Non-Disruptive Asphalt Repair	Eliminate above-ground disruption
	20. SCC Mitigation	
	24. Characterization of “appurtenances”	Effective risk modeling techniques needed
<b>5. Regulatory Acceptance of Existing Techniques</b>	5. Repair of Acetylene Girth Welds	
	11. Repair Practices for Low Stress Pipe	
<b>6. Techniques to Facilitate Permitting</b>	7. Accelerated Permitting Techniques (see 13 below)	Supports cost efficient mitigation and repair
	13. Low-Disruption Repair for Advanced Permitting (related to 1 & 4 above)	Supports cost efficient mitigation and repair