An Operator’s Perspective of Pipeline Repair Methods

Government and Industry Pipeline R&D Forum
Work Group 4 – Pipeline Repair and Remediation

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Spectra Energy System Map – US Operations
Defect Assessment – Establish Pass/Fail Condition

Sources of uncertainty into damage assessment:
- defect size, shape
- material properties
- loading conditions
- prior stress/strain history
- assessment method

Damage Fitness for Service Assessment
Corrosion damage (external, internal)
Mechanical damage
Environment cracking damage
Manufacturing defect damage
Construction defect damage

Pass
- Recoat, backfill, monitor

Fail
- Apply pressure reduction (y/n)
- Select Repair Methods
- Conduct Repair
- Monitor
Defect Repair

Select Repair Method

Conventional
- Pipe Removal
- Mechanical Clamp
- Grind Repair
- Composite Repair
- Hot Tap/Weld Deposition
- Full Encirclement Sleeve

Unconventional
- Epoxy
- Collapsible Sleeve
- Nanotechnology
- Future Technology
- Others??

Schedule/Conduct Re-Assessment

Additional Remediation? Y/N
Some thoughts on D & D Gaps

• Key capability for a pipeline operator is to make consistent methodical excavation decisions
  – Using ILI data
  – Non-piggable pipelines

• In-the-ditch assessment becomes somewhat routine as a suite of technologies exist to make repairs...however:
  – Is consistent guidance available with respect to the following?:
    • Understanding loading conditions on in-service pipelines
    • Scheduling excavations
    • Applying appropriate pressure reductions
    • Defect assessment for complex situations
      – environmental cracks, seam weld defects, interacting defects,
    • Further pipeline remediation measures
Pipeline Repair vs Pipeline Remediation

• Pipeline Repair
  Pig and Dig (repair)
  Direct assessment and repair
  Hydrotest and repair

• Pipeline Remediation – somewhat more subjective
  1. restore CP (anode, rectifier installation)
  2. restore coating (recoat)
  3. restore fitness integrity
     - hoop strength (hydrotest, external or internal reinforcement)
     - establish integrity “equivalence” for a vintage pipeline to current expectations

Are existing provisions adequate to allow operators to introduce and apply new technologies?
Conclusions

• A suite of repair alternatives exist for most pipeline applications....probably not a huge R&D gap

• Key assessment gaps include the following
  – Assessment of seam weld defects, environmental crack colonies
  – Assessment of vintage girth welds, buckles and wrinkles
    • Uncertainty in existing and future stress and strain condition of the pipeline
    • Uncertainly in strain capacity of the pipeline
  – Management and remediation activities for vintage pipelines to meet the expectations of current integrity expectations

Uncertainty and reluctance to introduce/apply new technology for repair and remediation of pipelines restricts advancement of alternatives to address vintage pipeline issues
...thanks for your time

Questions???