

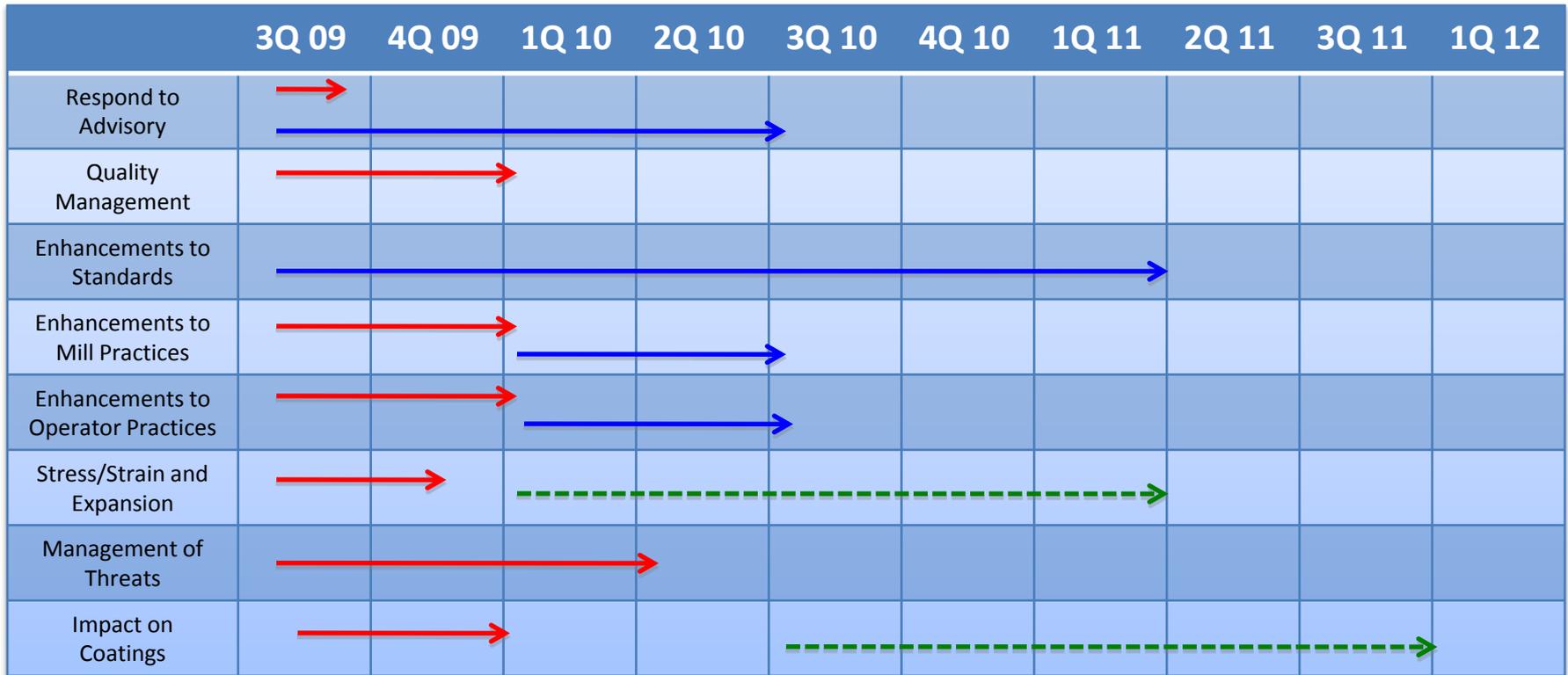
# **Energy Pipeline Industry Pipe Quality Action Plan**

**July 15, 2009**

# Energy Pipeline Industry Pipe Quality Action Plan

1. Implementation of Advisory Bulletin
2. Line Pipe Quality Management
3. Evaluation of Enhancements to API 5L
4. Evaluation of Enhancements to Operator Specifications and Practices
5. Evaluation of Enhancements to Pipe Manufacturer Specifications and Practices
6. Understanding Steel Stress Strain Behavior and Pipe Expansion
7. Development of Methods to Understand Implications of Expansions on Stress and Strain and Implications to Each Threat in ASME B31.8S
8. Evaluate Implications of Expansions On Coatings

# Timeline for Action Plans



Quick-Hit White Papers →

Longer-Term Work Efforts Culminating in White Papers →

Research - - - - - →

# Work Group 1 - Implementation of Advisory Bulletin

**Scope:** Develop a uniform process for responding to the PHMSA Advisory Bulletin, PHMSA-2009-0148.

## **Action Plan:**

1. Industry representatives will meet to develop uniform approach(es) to responding to advisory
  - Tailor approach to design factor
  - Other factors such as history with source materials
2. Will share and adjust approaches developed through interaction with PHMSA
3. Recommend considering “expected variability” in lieu of “no variability in pipe properties” in applying advisory with operators

# Work Group 2 - Line Pipe Quality Management

**Scope:** Develop a comprehensive quality management system for line pipe building upon API 5L, Annex B

## **Action Plan:**

1. Bring issues to API Subcommittee 20 on Supply Chain Management
2. Approach SC 20 to further develop Annex B of API 5L, 44<sup>th</sup> Edition
3. Life Cycle JIP to develop white paper providing critical technical elements and background
4. INGAA and API Issue Policy Statement that encourages use of Annex B on projects to be operated under 0.8 design factor
5. Encourage API Monogram Program to consider audits of steel suppliers.

# Work Group 3 - Evaluation of Enhancements to API 5L

**Scope:** Evaluate enhancements to API 5L reflecting on changes in new edition, 44<sup>th</sup> edition, with emphasis on traceability, testing and retest provisions.

## **Action Plan:**

1. Bring issues to API Line Pipe Committee
  - Initial discussion in June 09 meeting
2. Review traceability, testing and retest provisions and verification of non-conformance practices
3. Encourage involvement of PHMSA personnel in Line Pipe Committee
4. Propose that tensile test results should approximate a predicted elastic modulus; atypical values should require retest.

# Work Group 4 - Evaluation of Enhancements to Operator Specifications and Practices

**Scope:** Review processes for incorporating pipe spec provisions into pipe manufacturing processes and recommend leading practices and enhancements that operators can incorporate.

## **Action Plan:**

1. Strengthen API 5L, Annex B to incorporate process for integrating operator pipe spec provisions into MPSs and ITPs, for steel producers, steel suppliers and pipe manufacturers.
2. Conduct Workshop on Best Practices for Operator QMS, including essential pre-production activities
3. Life Cycle JIP White Paper to propose process for API Line Pipe Committee to consider.
4. Evaluate enhancements to traceability, testing, retesting and verification of non-conformance practices in operator specs

# Work Group 5 - Evaluation of Enhancements to Pipe Manufacturer Specifications and Practices

**Scope:** Review processes for incorporating pipe spec provisions into pipe manufacturing processes and recommend leading practices and enhancements that manufacturers can incorporate.

## **Action Plan:**

1. Strengthen API 5L, Annex B to incorporate process for integrating operator pipe spec provisions into MPSs and ITPs, for steel producers, steel suppliers and pipe manufacturers.
2. Develop capability to provide real-time information, histograms, etc.
3. Define key process check points that do not compromise proprietary aspects of production.
4. Conduct Workshop on Best Practices for Pipe Manufacturer QMS.
5. Evaluate enhancements to traceability, testing, retesting and verification of non-conformance practices

# Work Group 6 - Understanding Steel Stress Strain Behavior and Pipe Expansion

**Scope:** Develop methods to understand stress strain behavior in high strength, low alloy steels and the expansion of pipe in mill and field hydrostatic tests.

## **Action Plan:**

1. Document applicability of finite element analyses to model formation of localized expansions.
2. Define modeling basis and validate with base case of non-expanded pipe as well as known expanded pipes and burst tests to correlate pipe mechanical properties, test pressure and percent expansion.
3. Approach ASTM to develop standardized method for flattened strap specimens.
4. Provide reference information about magnitude of uncertainty in MTR data.
5. Evaluate enhancements to PV plot to recognize significant yielding (ASME B31.8, Appendix N, consider German Standard).
6. Develop common basis for calculating expansion and incorporate into API 1163 (Overarching ILI RP)
7. Apply variability in MTR values into model to project onset of pipe yielding. Develop basis for differentiating low yield pipe.
8. Evaluate value of additional R&D to develop parametric study to validate modeling.

# Work Group 7 - Development of Methods to Understand Implications of Stress and Strain on Expansions and Implications to Each Threat in ASME B31.8S

**Scope:** Develop a basis for managing pipe with reduced strain capacity, especially for 0.8 design factor systems and evaluate each threat and impact of expansions on integrity. Defects that are a result of strain are of concern; mechanical damage, as well as weather and outside force. Address by grade as margin between Y and T decreases.

## **Action Plan:**

1. Define how much reduction in yield to tensile is allowable and how the Y/T relates to total strain.
2. Evaluate current strain limits in B31.8, i.e.- 2% total strain and suitability as a threshold.
3. Evaluate suitability of higher levels of strain with additional O&M provisions.
4. Evaluate each threat and define impact.
5. Demonstrate that each threat was evaluated below a threshold level.
6. Above threshold, develop more conservative O&M practices.
7. Consider interactive threats; especially those resulting from strain.

# Work Group 8 - Evaluate Implications of Expansions On Coatings

**Scope:** Evaluate the degree to which expansions compromise coating and ultimately lead to cracking and disbonding. Consider coating type (non-shielding vs. shielding, ARO), nature of expansion (localized or extended), among others.

## **Action Plan:**

1. Evaluate work conducted by PRCI and historical experience with bending tests.
2. Evaluate data from expanded pipes.
3. Develop test protocol and conduct tests. Initial work by manufacturers and coating applicators. May require PRCI/PHMSA research.
4. Establish guidance thresholds by coating type, and other factors to be determined.