Duisburg, August 2009

EPRG-PRCI-APIA
17th JOINT TECHNICAL MEETING ON PIPELINE RESEARCH

11 – 15 May 2009

TECHNICAL WORKSHOPS AND THEIR OUTCOMES

PURPOSE

During the 17th Joint Technical Meeting, time was allocated to a series of Technical Workshops. The purpose of the Workshop Sessions was to explore in depth the aims and needs of research on particular topics of interest across our three organisations, looking particularly at how well the planned projects address the issues and identifying ways in which improved collaboration between the three organisations could enhance the delivery of benefits to our members

The Workshop sessions focused on the research priorities, emphasis and project portfolio of the three organisations. This was undertaken in four stages:

- Needs and opportunities – Pipeline operator, pipe manufacturer and standards-oriented viewpoints on needs, issues and opportunities (looking five years ahead). Technical gaps and challenges for future R&D, short and longer-term objectives for gas/liquids pipelines.

- Where are we now? Presentations on the current status of research by PRCI, EPRG, APIA and others, highlighting the extent to which we already address the identified operator needs/gaps.

- How do we go forward from here? Six parallel groups focused on topic areas currently being addressed by all three organisations. The aim was to develop a unified strategic plan (roadmap) for each topic, with key tasks, priorities and timescales, incorporating the contributions of all three organisations and identifying how we can collaborate to achieve the overall objectives

- Review of the six strategic plans developed by the Working Groups, asking:
  Are we addressing the right issues/priorities?
  Are we spending the right amount of money?

Are we making timely progress towards our goals?
What gaps still remain?
How do we build more collaborative momentum?

WORKING GROUPS

The six Working Groups focused on research topics currently being addressed by all three organisations. In total, around 150 participants attended the six Working Groups. The selected topics and indicative scopes were:

Advanced design methods.
Strain-based design for displacement-controlled loading - standardised methods and applications, building up experience, gaining regulatory acceptance. Reliability-based design – standardised methods, broadening the application range, building up experience, gaining regulatory acceptance. Modelling ultimate limit states, dynamic fracture control. Other risk-based design approaches

Pipe materials and properties
Higher strength (>X70) – quantifying the benefits, manufacturing routes. Higher ductility and/or toughness, significance of Y/T ratio. Specifying and measuring properties, comparison of test specimen results with component behaviour. Regulatory acceptance for higher strength grades, broader application of standard grades. Composite systems - understanding behaviour, specifying properties.

Welding and weld inspection
Welding higher strength steels. Higher speed girth welding processes for thin and thick pipe. Weld quality control, weld zone properties, application of strain-based design and constraint-based mechanics. Inspection speed, accuracy and reliability – size, location & orientation, nature (crack or pore?) Standardisation of weld procedure qualification, weldability testing

Corrosion prevention and management.
Prevention by pipe material selection, especially for mildly corrosive (sour) situations. Prevention by coatings and cathodic protection – long term performance and degradation, shielding issues. Assessing the structural significance of corrosion defects - ILI accuracy/reliability, measuring growth rates, setting re-inspection intervals. Application of reliability-based methods

Mechanical damage
Understanding when, where and how damage happens – building a complete picture. Damage prevention by design, by right-of-way monitoring, and by legislation. Damage location and sizing – ILI, above-ground surveys, in-ditch measurements. Structural significance of non-penetrating damage - severity assessment, immediate or time-dependent failure (+environment), leak or rupture. Pressure reduction for safe intervention, frequency of regular re-inspection.

Stress corrosion cracking
Site selectivity – why are some pipelines/segments immune? Coating degradation and SCC incubation periods. Inspection – accuracy and reliability of ILI. Sampling strategies for Direct Assessment Development of shallow cracks, coalescence, crack growth rates in service (from repeated ILI). Setting re-inspection intervals

Brief summaries of ongoing, recently completed and planned projects by PRCI, EPRG and APIA relevant to each Working Group were provided to participants in advance. These are included in Appendix A.

WORKING GROUP OUTCOMES

Each Working Group was asked to provide a report summarising the outcome of the discussions, including

- A 'visual roadmap' identifying and prioritizing the main topics needing to be addressed
- Outline plans and individual tasks for the three or four highest-priority topics
- Identification of topics that would benefit from enhanced collaboration between the three organisations

The highest-priority topics identified by the Working Groups are as follows:

Advanced design methods
–Practical application of Reliability-Based Design and Assessment methodologies
–Characterisation of strain demand
–Compressive strain capacity
–Tensile strain capacity

Pipe materials and properties
–Fracture arrest prediction
–Deep-water pipes
–Strain based design

Welding and construction
–A dedicated auto GMAW and AUT standard.
–Welding contractor and personnel competence
–Welding of X80 pipelines
–Defect acceptance criteria – rationalisation and decreased conservatism

Corrosion Prevention and Management-Standard for unpiggable pipelines
-Standard for integrity management for subsea pipelines
-Corrosion growth rates

Mechanical damage
–Assess and improve the impact of human and organisational factors on damage prevention -ILI, in the ditch, above ground performance, discrimination -Improved Mechanical Damage assessment methods development & validation
-Better data management: access to existing MD data

Stress Corrosion Cracking
–Improvements for crack detection ILI
–Global data mining of SCC experience to feed model development etc
–Consistent assessment method for SCC

The presentations by each Working Group are included in Appendices B-G

THE WAY AHEAD – COLLABORATIVE PROJECTS

The Working Groups identified those projects that could benefit from better collaboration between the three organisations. The identified projects are:

New pipeline construction

- Fracture control – shock tube testing
- Requirements for the application of mechanised GMAW to pipeline girth welds
- Implementation of ISO 3834 in the pipeline industry
- Welding of X80 pipelines
- Defect acceptance criteria

Maintaining pipeline integrity

- Standards for corrosion assessment of unpiggable pipelines
- Integrity management for subsea pipelines
- Corrosion growth rates
- Delayed failure of mechanical damage
- Human factors in mechanical damage prevention
- Damage discrimination – ILI, In-ditch, Above-ground
- Better damage assessment – methods & validation
- Improved field data collection and interpretation for mechanical damGE
- SCC experience database:
    - -Environmental conditions under disbonded coatings
    - -How many digs to achieve satisfactory reliability for SCCDA
    - -Predicting whether shallow SCC cracks propagate
- Improvements for crack detection ILI
- Consistent assessment method for SCC
- Validated models for predicting re-inspection intervals for SCC

Short descriptions of each project, and the nominated Project Champions to develop the collaborative initiatives, are included in Appendix H.

It is intended that the overall outcome from the Technical Workshop will be an aid to the planning and direction of future research programmes being developed by PRCI, EPRG and APIA-RSC. In particular, it is intended that efforts will be made to establish collaborative projects in the areas identified by the Working Groups. The Tripartite Committe will address the requirement to formulate appropriate collaboratinve working arrangements to enable this to happen.

APPENDICES

A – Background material
B – Advanced Design Methods; Working Group Report
C – Pipe Materials and Properties; Working Group Report
D – Welding and Construction; Working Group Report
E – Corrosion Prevention and Management; Working Group Report
F – Mechanical Damage; Working Group Report
G – Stress Corrosion Cracking; Working Group Report
H – Potential Collaborative Projects Identified by the Working Groups