

# **API RBI TWG Update**

## **January 19-20, 2004**

**The Equity Engineering Group, Inc.**



# Technical Working Group (TWG)

Responsibilities include:

- Review and ballot all damage methods
- Review of technical inquiries (damage modules; both likelihood and consequence)
- Review of technically problematic areas
- Review of technical issues raised by the Software Working Group related to RBI computerization and modeling

# Representation on TWG

- Hearl Mead – Chair (Shell Global Solutions)
- Brian Busch (BP)
- David Bryan (Marathon Ashland)
- Mike Conley (E<sup>2</sup>G)
- Kevin Doggett (ConocoPhillips)
- Mark Geisenhoff (Flint Hills Resources)
- Ken Gottselig (Lyondell)
- Dave Hampton (ConocoPhillips)
- Allison Hardy (Lyondell)
- Lynne Kaley (E<sup>2</sup>G)
- Jim Riley (ChevronTexaco)
- Ryan Sitton (Berwanger)
- Kelley Van Loon (ConocoPhillips)
- Tom Wylie (Shell Global Solutions)

# Damage Module Balloting

## *Soil/Underground Corrosion:*

- Resolved all ballot comments and negative
- Revised document
- Ready to program into software

# Damage Module Balloting

## *Cooling Water Corrosion:*

- Balloted sent out in late 2002
- 10 Affirmative; 2 Negatives
- Resolving negatives
- Revising document to resolve negative
- Will require reballot
- Second review of changes
- Program into software

# Damage Module Balloting

## *Acid Sour Water Corrosion:*

- Balloted sent out in late 2002
- 11 Affirmative; 1 Negative
- Resolving negative
- Revising document to resolve negative
- Will require reballot
- Program into software

# Damage Module Balloting

## *CO<sub>2</sub> Corrosion:*

- Resolving negative ballot
- Will require rebalot
- Program into software

# Damage Module Balloting

## *Thermal Fatigue Cracking:*

- Current document is too broad/generic
- Needs development of decision tree
- Merge Thermal fatigue with Mechanical fatigue and include consideration for coke drums
- Needs to be balloted

# Damage Module Balloting

## *Creep Damage:*

- Needs revision based on October PVRC conference
- To be revised with furnace module rewrite
- Needs to be balloted

# AST Module Balloting

## *Aboveground Storage Tanks:*

- Balloted sent out in late 2002
- 9 Affirmative; 2 Negatives
- Resolving negatives
- Significant document revision with notes of changes
- Reballot
- Program into software

# HE Bundle Module Balloting

## *Heat Exchanger Bundles*

- Balloted sent out in late 2002
- 10 Affirmative; 2 Negatives
- Resolving negatives
- Significant document revision with notes of changes
- Reballot
- Program into software

# Technical Module Balloting

## Boilers

- Needs to be balloted

# Work on Existing Modules

## Fired Heaters

- Needs to be reworked
- No valuable discrimination between furnaces
- Proposed improvements:
  - Merged approach using RP 530 (Larson-Miller parameter; remaining life fraction) and Omega data.
  - Inclusion of probabilistic calculation to determine the probability of failure
  - Screening questions for convection section corrosion
  - Reuse/Modify existing consequence approach

# Work on Existing Modules

## Liners

- Needs to be reworked
- Improvements made in 5.0 to account for cladding/overlay and corrosion prior to base metal corrosion
- Need to review TM based on questions raised
- Need to add Inspection Effectiveness and Planning
- Include review of thermal-spray coatings

# Work on Existing Modules

- **High Temperature Hydrogen Attack:**
  - Will rewrite based on MPC Technical Basis Document for API RP 941 Hydrogen Attack task group
  - Include inspection effectiveness learnings from new table going into API RP 941
  - Proposal for development
- **Corrosion Under Insulation:**
  - TWG currently reviewing and planning recommended changes
    - Modify 5.0 to allow two options for corrosion rates (severe and moderate)
    - Include optional insulation type

# Work on Existing Modules

- *Naphthenic Acid/Sulfidation*

- Recommend splitting Naphthenic Acid from High Temperature Sulfidation
- Inquiry Naphthenic Acid rates for 12% Chrome alloy
- Table going into API RP 941

- *Wet H<sub>2</sub>S Cracking*

- Recommend splitting HIC from SOHIC
- Identify issues with HIC resistant steels in separate modules
- Rewrite individual inspection effectiveness tables and include information from API NDE roundtable Spring 2001

# Work on Existing Modules

- **Sour Water Corrosion**

- Review NACE JIP findings against module

- **Amine Corrosion**

- Consider new amine fluids (include DIPA, DGA, Sulfinol with MEA, MDEA, DEA)
- Review against revision to API RP 945

- **Sulfuric Acid Corrosion**

- Change velocities in TM 1.5 to be consistent with TM 1.9

# **Work on Consequence Modeling**

**Project In Progress – Update presentation**

# Future Development

## Priorities:

- Ongoing Support of SWG in development of Version 5.0
- Development and review of additional damage or equipment modules
- Revision of existing damage modules
- Revision of modules with “Non-inspectable” risk (such as Brittle Fracture)
- Inspection effectiveness development or inquiries
- Considerations related to multiple mechanisms and synergistic effects
- Testing and resolving logic problems found in Version 5.0