Industry Activities to Support a Risk-Informed ASME XI Appendix G

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NRC/EPRI MRP Meeting

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Summary Status of Industry Activities

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Agenda

1. Introductions
2. *Summary Status of Industry Analysis Activities*
   - *Technical Activities*
   - *Industry proposed approach to modify ASME Section XI Appendix G and reference it in 10 CFR 50 Appendix G*
3. NRC/Oak Ridge Project Analysis Status
4. *Detailed Status of Industry Analysis Status Activities (BWR and PWR Analyses)*
   - *Approach that has been taken to perform Risk-Informed Appendix G Analysis*

Agenda - continued

- *Plants Analyzed*
- *Some Preliminary Analysis Results*
- *Some Preliminary Observations/Conclusions obtained from the Analyses*
- *Technical Issues*

5. Discussion of NRC and MRP Implementation and Future Evaluation plans including Schedule
6. Adjourn

Summary Status of Industry Activities – Project Objective and Benefit

- The objective for the MRP industry project is to define a risk-informed ASME Section XI Appendix G (heat up and cool down Pressure-Temperature limits) methodology and develop the technical justification to support a Code change.
  - The conventional ASME Section XI Appendix G methodology will remain in Section XI.
  - A new risk-informed method will be added to ASME Section XI Appendix G as an alternative to the current methodology.

Summary Status of Industry Activities – Project Objective and Benefit

- The benefit to utilities and the NRC include:
  - ASME Section XI Appendix G technical basis will be consistent with the new PTS technical basis
  - Operators will have increased operating flexibility to better enable them to avoid potential issues, e.g., small operating window's adverse affect on RCP seal, increased safety, etc.
  - Fewer reportable events due to exceeding pressure temperature (P/T) limits
  - Increased LTOP pressure set-points with reduced likelihood of inadvertent LTOP events leads to fewer challenges and increased safety.
  - Reduced temperature and reduced time to perform BWR Leak Test.

Summary Status of Industry Activities – Technical Approach

- The high level approach is to maintain the current ASME Section XI Appendix G method, i.e.,

$$\text{Margin} \times K_{Im} + K_{It} < K_{IC}$$

- But modify the “Margin” to be consistent with the technical basis developed using a risk-informed process

Summary Status of Industry Activities Technical Approach - continued

- Perform Probabilistic Fracture Mechanics Analyses using the FAVOR Code
  - Considering PWR and BWR designs
  - Key distributions, e.g., flaw, consistent with PTS technical basis
  - Obtained and used large set of heat up and cool down transients and operational history for PWR's and BWR's
  - Engaged the PWROG Operations and Procedures Subcommittees to gain insight regarding operations and desired benefit for PWR's from this initiative
  - Considered a set of "Constraints" that can affect the analyses

Summary Status of Industry Activities – Examples of Project "Constraints"

- Many issues have been identified relative to the application of ASME Section XI Appendix G for PWR's and BWR's.
  - Compliance issues, e.g., small operating window
  - Benefits that utilities would like to see if additional margin could be provided via the risk-informed approach, e.g., PTS limits in EOP, initial cool down to 350^0F.
  - Operating issues that would not benefit from additional margin becoming available, e.g., pressurizer design constraints may limit use of potential Appendix G margin.
  - Maintaining leak test below 200^0F for BWR's.

Summary Status of Industry Activities – Anticipated Schedule of Activities

- Initial introduction of proposal to change ASME Section XI Appendix G was made to ASME Section XI WG OPC meeting in August 2008.
- More formal presentation and proposal will be provided at the November 2008 ASME Section XI meetings to WG OPC and SG ES.
- Proposed revision and technical basis will be submitted to the WG OPC and SG ES at the February 2009 meeting in Montreal.
- Anticipate ASME Code approval in 2010.
- ASME Code could then be endorsed through the normal regulatory process