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# 2018 Materials Programs Technical Information Exchange Meeting WCAP-17096-NP-A Interim Guidance

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P R E S S U R I Z E D   W A T E R   R E A C T O R   O W N E R S   G R O U P

# Background / History

- WCAP-17096-NP-A provides the methodology and data requirements for development of acceptance criteria supporting MRP-227 inspections of reactor pressure vessel internals components
- Reviewed and approved by the NRC for industry use via safety evaluation
  - Final SE issued by the NRC in May 2016
  - Approved version of the WCAP submitted on the docket in September 2016
- Since the approved version of the WCAP has been issued, other generic industry guidance documents have been issued
  - e.g. MRP-227, Rev. 1, MRP 2017-009 (baffle former bolt interim guidance), etc.

# WCAP-17096-NP-A Update

- PWROG work is in progress to update WCAP-17096-NP-A to incorporate other industry guidance documents that have been issued since NRC approval of the topical report
- NEI 03-08, Rev. 3 Appendix C screening process is being applied to support decision for submittal of updated WCAP to NRC for review / approval
- WCAP-17096-NP, Rev. 3 expected to be issued in 3<sup>rd</sup> quarter 2018
- Interim Guidance issued in March 2018 on WCAP-17096-NP-A, via PWROG-17071, for technical changes that should be implemented prior to complete revision of topical report
  - IG items will be incorporated into WCAP-17096-NP, Rev. 3

# WCAP-17096-NP-A Interim Guidance Summary

- Interim Guidance includes:
  - Cross-reference matrix from MRP-227-A to MRP-227, Rev. 1
  - Acceptance criteria (AC) methods for new B&W-design MRP-227 components
  - Incorporation of baffle-former bolt (WEC-design) interim guidance for developing margin criteria
  - Incorporation of guide card wear (WEC-design) interim guidance
  - Fatigue assessment in lieu of usage factor calculation for thermal shield flexure AC (WEC-design)
  - Add specific crack growth rate model reference for high fluence weld locations (WEC and CE design)

# IG: Cross-Reference Matrix

- Cross-reference chart comparing details of MRP-227-A and MRP-227, Rev. 1 component lists
  - Numbering / nomenclature
  - Applicable AC methodology
  - Relevant NRC RAIs (issued on MRP-227, Rev. 1)
- Developed to help plants performing inspections prior to issuance of the updated version of the topical report
- Charts for CE and WEC designs (minimal changes to B&W-design)
- This matrix does not represent a technical change in AC methods from approved version of WCAP

# IG: New B&W-Design MRP-227 Components

- New Primary and Expansion components in MRP-227, Rev. 1 do not have AC methods and data requirements in approved version of WCAP-17096-NP-A
- New components include:
  - Original and modified vent valve locking devices
  - Vent valve bodies
  - Lower grid rib section
- Methodology added is procedural (e.g., determine if component can be left as-is or if further action is needed for component to perform intended function)
- These new component details are not a technical change to AC methods in approved version of WCAP

# IG: Baffle-Former Bolt Interim Guidance

- NEI 03-08 “Needed” Interim Guidance issued on BFB in March 2017 (MRP 2017-009)
  - Inspection requirements based on plant tiers from NSAL-16-1
  - Defined typical vs. accelerated BFB degradation as percent of indications and presence or absence of clustering (dependent on plant configuration)
  - Specified re-exam periods for each category of plant

# IG: Baffle-Former Bolt Interim Guidance

- Current Acceptance Criteria:
  - Pattern of un-failed bolts meets ABPA criteria or is analyzed in real-time
- Modified Acceptance Criteria:
  - Demonstrate structural integrity of bolting pattern (e.g., ABPA)
  - Establish degradation category
  - Margin assessment
    - Probabilistic Model (Accelerated or Typical Degradation)
    - Margin Ratio (Typical Degradation)



# IG: Baffle-Former Bolt Interim Guidance

- Probabilistic Model
  - Applied when accelerated degradation is observed in order to demonstrate margin
  - Plant-specific analysis (or otherwise account for plant differences if other plant inspection results are used)
  - Patterns of un-failed bolts determined for end of re-inspection period based on likelihood of failure
  - Bolt replacements and plant improvements (e.g., upflow conversion) can be credited
  - 95% confidence used for pattern results at end of re-inspection interval
  - Used to demonstrate a 10-year re-inspection interval (longer intervals can be justified in certain circumstances)

# IG: Thermal Shield Fatigue Assessment

- Relax requirement to calculate a cumulative usage factor (CUF) to perform fatigue assessment (can be qualitative)
- Current requirement:
  - “Demonstrate the usage factor for low cycle fatigue...”
- Modified requirement:
  - “Assess low cycle fatigue...”
- Loads cases that must be considered are not changed
- Change is considered technically acceptable since a limited quantity of transient cycles are likely to occur over the next operating cycle

# IG: Crack Growth Rate Model for High Fluence Welds

- Several high fluence welds in the CE and WEC-designed reactor internals include a current requirement to use a crack growth rate model appropriate for the fluence level and material
- An EPRI report issued since WCAP-17096-NP was approved includes appropriate models for use
  - This report is referenced for each of the relevant high fluence welds as one appropriate model for use
- No technical change in AC methods from approved version of WCAP, but points utilities to a specific reference to meet the current requirement

# Questions?

*The Materials Committee is established to provide a forum for the identification and resolution of materials issues including their development, modification and implementation to enhance the safe, efficient operation of PWR plants.*



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