

ACRS Briefing on the Staff's Review of
EPRI MRP Technical Report No. 3002020105,
“Materials Reliability Program: Pressurized Water
Reactor Internals Inspection and Evaluation Guidelines
(MRP-227, Revision 2)”

NRR Lead Project Manager: Ms. Lois James

NRR Technical Review Leads: James Medoff and John Tsao

November 21, 2024

Briefing Agenda

- Summary of the regulatory process for performing the review:
 - Regulatory framework, including requirements and guidelines
- Summary of the staff's review:
 - Review of generic criteria in the TR – examples of complexity
 - Review of component-specific aging strategies – examples of complexity
- Staff Conclusion

Regulatory process for Reviewing the TR– Applicable Requirements, Guidelines, and Framework

- Applicable Requirements: 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants”
 - Includes component-specific “scoping” requirements of 10 CFR 54.4(a)
 - Includes component-specific aging management review screening requirements of 10 CFR 54.21(a)(1)
 - For structures or components with applicable aging effects requiring management, includes the aging the Commission’s aging management requirements specified in 10 CFR 54.21(a)(3)
- Applicable Plant Aging Guidelines: NUREG-2191 & NUREG-2192 (GALL-SLR and SRP-SLR reports)
 - Includes GALL-SLR AMP XI.M16A, “PWR Vessel Internals” and linked AMR items for PWR RVI components
 - Includes Aging Management Review Further Evaluation criteria in SRP-SLR Sections 3.1.2.2.9 and 3.1.3.2.9
- For PWR RVIs, Applicable ISG: SLR-ISG-2021-01-PWRVI (January 2021, updated criteria for PWR RVI components)
 - Updated AMR items, AMR further evaluation criteria, and AMP XI.M16A criteria relative to EPRI MRP’s past issuance of the MRP-227, Rev. 1-A report
 - Need for an 80-year impact gap analysis if MRP-227, Rev. 1-A is used as the reference basis

Examples of Generic TR Content Areas Requiring Significant Staff Review

- TR Appendix C, Options for Alternate Aging Management Approaches for Westinghouse and CE Designs:
 - RAI questions on the basis for including Appendix C in the TR and on the scope and details of the appendix.
 - Addressed whether a licensee could use TR Appendix C to claim staff acceptance of a proposed alternate aging management strategy without staff review and approval.
 - EPRI MRP resolved the staff's issues by deleting TR Appendix C in the RAI response letter of April 2024
- TR Appendix D, Guidance for Flexible Power Operations (FlexOps) of Westinghouse and CE Designs:
 - The staff had RAI questions related the scope and details of TR Appendix D.
 - Includes a staff inquiry on whether application of TR Appendix D would need to be submitted for approval.
 - Staff emphasizes implementation of flexible power operations of PWR units normally requires a 10 CFR 50.90 license amendment request submittal and a staff review of the under the 10 CFR 50.92 provisions.
 - EPRI MRP resolved the staff's issues through specific explanations on the TR's Appendix D bases in the RAI response of April of 2024.
 - Staff found TR Appendix D acceptable for implementation based on the EPRI MRP responses to RAI inquiries on TR Appendix D made in the April 2024 RAI response letter.
 - Any potential impact of flexible operations on the TR's inspection and evaluation criteria for a specified Primary or Expansion category component would be reviewed as part of a 10 CFR 50.90 license amendment or 10 CFR Part 54 LRA/SLRA review.

Component-Specific Example 1 – TR Aging Strategies Requiring Significant Staff Review – Changes to Aging Strategies for B&W Design Core Barrel (CB) Welds

- TR includes major changes to the accessibility assumptions for the various welds in the CB assemblies in B&W PWRs:
 - In previous MRP-227 submittals, all B&W CB assembly welds had been designated as inaccessible, Expansion category welds. In the TR, some of the welds are now identified as being accessible to inspection.
 - Change in the accessibility basis resulted in a new cascading set of unit-to-unit, Primary-to-Expansion category aging management strategies for the various structural welds in the B&W CB assembly designs:
 - A specified B&W CB weld type may be a Primary weld one unit and an Expansion category weld in another unit.
 - The new Primary-to-Expansion sample expansion relationships are precedent setting and leave one B&W unit without any Primary category CB weld inspections.
- The staff issued RAIs on the TR's aging management strategies for B&W CB welds.
- The TR did not define how inspection result information would be disseminated between units (including those owned by different licenses); resolved by TR amendments made in the May 2024 RAI response.
- The staff accepted EPRI MRP's revised aging strategies for B&W-design CB welds based on the following:
 - The new Primary-to-Expansion category sample-expansion strategies does not relieve the licensee of performing the required ASME Section XI VT-3 inspections of the CB assembly welds in its B&W-design unit or units.
 - At least some inspections of the CB assembly welds will be performed in accordance with ASME Section XI.
 - Staff performed a risk-informed crack-frequency estimate to verify CB weld cracking is a low probability event.

Component-Specific Example 2 – Occurrence of an Operating Experience Event that Impacts the TR’s Aging Management Strategy Bases for Specified Components

- In the TR, the core barrel (CB) upper girth weld (UGW) was originally identified as an Expansion category weld for the Primary category CB upper flange weld (UFW) in Westinghouse and CE design PWRs.
- In 2022, the CB UGW in a domestic WEC-designed PWR was determined to be cracked based on ASME Section XI Examination Category B-N-3 visual inspections that were performed on the removable CB assembly structure of the unit:
 - The evidence of cracking in the CB UGW was detected prior to any evidence of cracking that might have been detected in the unit’s the Primary UFW location.
 - This represents a case where degradation in a designated Expansion component is determined to occur prior to any degradation that might be presumed to occur or is detected in the linked Primary component.
 - Again, one of the main assumptions in the MRP-227 screening bases is that the Primary components will be the leading components for exhibiting evidence of aging.
- The staff issued two RAIs to address the impacts of this OE event on the aging management strategies for Westinghouse and CE CB assembly welds and linked Expansion components in the lower internals assembly.
- Staff found that EPRI MRP took the appropriate conservative action to elevate Westinghouse and CE design CB UGWs as Primary category welds (and to make the applicable Expansion category adjustments) in response to this OE event.

Staff Determination and Conclusion on the Contents of MRP-227, Rev. 2

- The staff determined that EPRI MRP has resolved all staff inquiries issued in the RAIs for TR.
- The staff has determined that any amendments made to TR in either the April 2023, April 2024, or May 2024 RAI response letters are acceptable for implementation.
- Based on these verifications, the staff concludes that the aging management guidelines for PWR RVI components in the TR (as amended in the reference RAI response letters) are acceptable for implementation.
 - Includes the 40 – 60 Year ILR and 60 – 80 Year SLR periods that are within the scope of the 80-year period.
 - The staff's acceptance is granted without any limitations, conditions, or action items on the contents of the TR.
 - There are no Open Items regarding the staff's review of the contents or guidelines in the TR.
 - Given that the TR limits the reinspection interval for WEC-design BFBs to a maximum interval of 10 years, the staff's previous A/LAI No. 1 on the contents of the prior MRP-227, Rev. 1-A report is closed as part of the staff's TR review.
- Based on the staff's review, the staff finds that MRP-227, Rev. 2 may be applied for general implementation, as accepted in the staff's final SE for the TR.