

Materials Information Exchange Meeting

Rockville, MD

May 24, 2017

Update on Resolution of MRP-227-A Applicant/Licensee Action Items



Jeff Poehler

Senior Materials Engineer

NRR/DE/EVIB

U.S. Nuclear Regulatory Commission

11555 Rockville Pike, Rockville, MD 20852

+1-301-415-8353

Jeffrey.Poehler@nrc.gov

Background

- The final SE of MRP-227-A contains eight applicant/licensee action items (A/LAI) that must be addressed by applicants or licensees implementing the topical report.
- Initially, lack of guidance on how to respond to some A/LAI's.
- A/LAI's 1,2,6, and 7 required significant effort by applicants or licensees.
- Both NRC and industry have a desire to minimize A/LAIs in topical report SE's.

Background

- NRC and EPRI/PWROG/Westinghouse held several meetings to discuss expectations and generic path for resolution of A/LAI's.
- Industry did significant generic work to resolve A/LAI's.
- NRC has reviewed and documented its assessment of several generic technical reports.
- These reports provide a basis for resolution for several of the action items.

A/LAI 1 – Plant-Specific Applicability Background

- Requires an applicants/licensee to demonstrate that MRP-227-A is applicable to its plant.
- After a series of interactions with industry, the NRC determined applicants/licensees could resolve A/LAI 1 by answering the following:
 1. Does the plant have non-weld or bolting austenitic stainless steel (SS) components with 20 percent cold work or greater, and if so, do the affected components have operating stresses greater than 30 ksi? (If both conditions are true, additional components may need to be screened in for stress corrosion cracking, SCC.)”
 2. Does the plant have atypical fuel design or fuel management that could render the assumptions of MRP-227-A, regarding core loading/core design, non-representative for that plant?”

A/LAI 1 – Resolution

- PWROG-15105-NP addresses cold work levels in RVI components – provides basis to conclude no components with cold work >30%. Staff assessment (ML17081A010) complete.
- MRP issued guidance for addressing core design parameters (MRP Letter 2013-025) – now Appendix B to MRP-227, Rev. 1. Staff assessment complete.
- Based on generic guidance reviewed by staff, A/LAI 1 can be closed for applicants/licensees referencing MRP-227-A by meeting the criteria above.
- In MRP-227, Rev. 1 review, staff is considering recommending that applicants/licensees document compliance with the above criteria in their plant-specific RVI Inspection Plans.

A/LAI 2 – Identification of Plant-Specific Components

- Requires applicants and licensees to identify any plant-specific RVI components that were not addressed by the generic screening, FMECA, functionality, and aging management recommendations of MRP-227-A.
- Also extends to components with same configuration, but different materials than the generic component in MRP-227-A.
- Plant-specific RVI Inspection Plans following MRP-227-A have found few if any plant-specific components that required changes to the aging management activities.
- EPRI added additional wording to MRP-227, Rev. 1 Section 2.4 to address the need to identify plant-specific differences.
- Conclusion – May be able to eliminate based on additional guidance in MRP-227, Rev. 1.

A/LAI 7 – Plant-Specific Evaluation of CASS RVI Components - Background

- Requires plant-specific evaluation of cast austenitic stainless steel (CASS) components to demonstrate these components will remain functional through the PEO considering the effects of both thermal aging embrittlement (TE) and irradiation embrittlement (IE).
- To screen for TE, licensees need chemical compositions of CASS components. Searches for CMTR's were expensive and time consuming.
- Therefore, industry developed PWROG-15032-NP – "Statistical Assessment of PWR RV Internals CASS Materials"
 - Used available data to determine a statistical upper bound on ferrite content.
 - Additional plant-specific record searches unnecessary.

A/LAI 7 - Resolution

- Only CASS components in scope of A/LAI 7 for Westinghouse and CE plants are the lower support columns (W) and core support columns (CE).
 - Expansion component, difficult to examine.
 - Subject to high neutron fluence.
 - Industry developed a generic functionality evaluation for CSC and LSC
 - PWROG-14048-P, Rev. 0
- Staff assessment of PWROG-14048, Rev. 0 found it may be used for guidance in the evaluation methodology. However, plant-specific parameters and conditions need to be used as input into the analytical evaluations.
- PWROG-14048, Rev. 1 is intended to demonstrate generic applicability of the methodology of PWROG-14048, Rev. 0 to the W and CE fleet. Under review by NRC staff.

A/LAI 7 Resolution (2)

- NRC developed revised screening criteria for irradiated CASS
 - supports screening out IE for low-molybdenum CASS components with $\leq 20\%$ ferrite (static cast) or $\leq 25\%$ ferrite (centrifugally cast) that receive < 1 dpa.
 - Documented in Appendix to BWRVIP-234 Final SE (ML16096A002)
 - Consistent with MRP-175 screening criteria for IE of CASS, different technical basis
 - ISG not initiated
- B&W CASS Components Subject to A/LAI 7 – NRC staff approved functionality evaluations for four units, two other licensees have LR commitments to submit.

A/LAI 7 Resolution (3)

- Staff expects that A/LAI 7 can be resolved by licensees referencing MRP-227-A based on the generic reports.
 - PWROG-15032-NP allows TE to be screened out for most RVI CASS components
 - Revised screening criteria for irradiated CASS allow screening out IE for low-moly CASS < 1 dpa.
 - For lower support columns, pending completion of staff review of PWROG-14048, Rev. 1, functionality will be demonstrated for PEO.
 - B&W functionality evaluations expected to be reviewed and approved for all units.
- May be possible to eliminate A/LAI 7 for MRP-227, Rev. 1.

A/LAI 3 – Adequacy of plant-specific programs

- Applicable to some CE components plus Westinghouse split pins
- Responses for most CE plants already reviewed
- MRP-227, Rev. 1 adds additional guidance in section 4.4 for split pins (RAI 14)
- May be able to eliminate for MRP-227, Rev. 1 if split pin guidance is made a requirement

A/LAI 5 – Physical Measurements

- Requires a description and justification of physical measurement acceptance criteria for two components:
 - Hold-down spring (Westinghouse)
 - Responses to date described a consistent method
 - Criteria for allowable spring height vary with fuel design, so licensees would prefer to finalize closer to outage in which measurement will be done
 - Low safety significance – HDR is FMECA group 1 (low consequence)
 - Core shroud gap (CE)
 - Examined by VT-1 – high resolution (0.044 in)
 - Detection of any gap would trigger engineering evaluation under WCAP-17096-NP-A, Rev. 2
 - A condition of WCAP-17096-NP-A requires submittal of this evaluation to NRC
- Based on above, staff considering elimination of A/LAI 5 in MRP-227, Rev. 1

A/LAIs Applicable to B&W-Design RVI

- A/LAI 4 – Core support Structure Upper Flange Stress Relief
 - Requires confirmation that the core support structure upper flange weld was stress relieved during the original fabrication.
 - All B&W applicants/licensees have responded to A/LAI 4 that flange was stress relieved
 - Therefore, A/LAI 4 not needed in MRP-227, Rev. 1.
- A/LAI 6 – Inaccessible Components
 - Requires submittal of engineering evaluations performed in lieu of examinations for certain inaccessible B&W RVI components.
 - In-scope components are all Expansion.
 - Condition in SE of WCAP-17096-NP-A, Rev. 2 requires submittal of these evaluations if linked Primary component results trigger the Expansion inspection.
 - Therefore, this A/LAI is adequately addressed by guidance in WCAP-17096-NP-A, Rev. 2. Staff considering eliminating in MRP-227, Rev. 1 SE.

A/LAI 8 – Submittal of Information for Staff Review and Approval

- Requires submittal of an RVI AMP and inspection plan by applicants/licensees to credit implementation of MRP-227-A. Additional information also required for applicants that submitted an LRA after MRP-227 final SE (FSAR supplement, TS changes related to RVI aging management, and TLAAs applicable to RVI.
- Licensee commitments generally address submittal of RVI AMP Inspection plan, so A/LAI not needed to ensure this.
- Need to submit FSAR supplement, TS changes, and TLAA's is addressed by 10 CFR 54, therefore is redundant.
- A/LAI 8 also asked for consideration of effects of environment for RVI TLAAs. This is contrary to other LR guidance in the SRP-LR, and outside CLB for most plants.
- Based on the above, staff is considering eliminating A/LAI 8 in its SE of MRP-227, Rev. 1.