

Draft Interim Guidance for PWR Internals:
Draft SLR-ISG-2020-01



Updated Aging Management Criteria for
Reactor Vessel Internal Components for Pressurized
Water Reactors

Objectives, Scope, and Summary of Draft Revisions

For April 7, 2019 Teleconference
On SLR-ISG Topics

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Draft SLR-ISG-2020-01

Outline of Slide Presentation



Objectives of the Draft SLR-ISG

Scope of GALL-SLR and SRP-SLR Sections and Tables Evaluated for Revisions

Format of Draft SLR-ISG-2020-01

Summaries of Changes Proposed to Relevant GALL-SLR or SRP-SLR Sections and Tables

Draft SLR-ISG-2020-01: Objectives of the Draft SLR-ISG



- Update the staff's guidance for PWR RVI components in GALL-SLR and SRP-SLR
- Clarify whether the AMPs may be modified to use MRP-227, Rev. 1-A as a starting basis for the AMP that will be applied during the subsequent period of extended operation
- Provide additional clarifications on AMP programmatic change bases that are considered as being administrative activities (i.e., within the scope of "administrative controls" element)
- Clarify whether responses to action items on MRP-227-A are still needed and options for responding to the action item on MRP-227, Rev. 1-A
- Close RIS-2011-07 (as an administrative formality)
- Address and resolve industry and public comments received on the contents of the ISG

Draft SLR-ISG-2020-01:

Scope of GALL-SLR and SRP-SLR Sections or Tables Evaluated for Revisions



- SRP-SLR AMR FE Sections – SRP-SLR Sections 3.1.2.2.3, Subsection 3; 3.1.3.2.3, Subsection 3; 3.1.2.2.9; and 3.1.3.2.9
- SRP-based AMR items for PWR RVIs in SRP-SLR Table 3.1-1
- GALL-SLR AMR section and line items for Westinghouse RVIs in GALL-SLR Section IV.B2 and Table IV.B2
- GALL-SLR AMR section and line items for CE-design RVIs in GALL-SLR Section IV.B3 and Table IV.B3
- GALL-SLR AMR section and line items for B&W-design RVIs in GALL-SLR Section IV.B4 and Table IV.B4
- AMP in GALL-SLR AMP Section XI.M16A, “PWR Vessel Internals” and the FSAR Supplement Example for the AMP in GALL-SLR Table XI-01
- Definitions for Materials in GALL-SLR Table IX.C
- Examples of Plant-Specific TLAAs in SRP-SLR Table 4.7-1

Draft SLR-ISG-2020-01: Format of the ISG



- Body of ISG: Basis and objectives of the draft SLR-ISG
- Appendix A: Tabular crosswalk for the draft SLR-ISG
- Appendix Section B: Appendices for proposed edits to AMR items in SRP-SLR Table 3.1-1
- Appendix Section C: Appendices for proposed edits to AMR items in GALL-SLR Tables IV.B2, IV.B3, and IV.B4
- Appendix Section D: Appendices for proposed edits to the AMR further evaluation subsections for PWR RVIs in SRP-SLR Section 3.1.2.2 and 3.1.3.2
- Appendix Section E: Appendices for proposed edits of GALL-SLR AMP XI.M16A
- Appendix Section F: Appendices for edits to material definitions in GALL-SLR Table IX.C
- Appendix Section G: Appendices for proposed edits of SRP-SLR Table 4.7-1
- Appendix H: List of acronyms used in the draft SLR-ISG

Draft SLR-ISG-2020-01:

Summary of Draft Changes to AMR Further Evaluation Acceptance Criteria in SRP-SLR Section 3.1.2.2.9



The major changes of note to SRP-SLR Section 3.1.2.2.9 are:

- The staff's update of the section is based on the assumption that the AMPs applied for SLR will use MRP-227, Rev. 1-A at the starting basis for the AMP
- Updated history summary in the AMR FE section to indicate current staff-endorsed basis is MRP-227, Rev. 1-A
- Updated to clarify that the previous applicant/licensee action items (A/LAIs) on MRP-227-A have been closed and that SLRAs do not need responses to them
- Updated to clarify that the sole A/LAI on MRP-227, Rev. 1-A can be addressed in the "operating experience" program element of the SLR AMP for the internals and that a separate SLRA Appendix C response to the A/LAI is unnecessary
- Updated to clarify that a gap analysis will still be necessary if SLR applicant uses MRP-227, Rev. 1-A as the starting basis for the SLR-AMP

Draft SLR-ISG-2020-01: Summary of Draft Changes to AMR Further Evaluation Review Procedures in SRP-SLR Section 3.1.3.2.9



The staff's proposed edits of the review procedures in SRP-SLR Section 3.1.3.2.9 are analogous to those for SRP-SLR Section 3.1.2.2.9, with the following additional clarifications:

- Staff to verify, that if MRP-227, Rev. 1-A is used as the starting point for the AMP that will be applied during the SPEO, the SLRA includes a gap analysis for the components
- Staff to verify that the applicant has addressed the relevancy of the sole applicant/licensee action item (A/LAI) on MRP-227, Rev. 1-A in either the “operating experience” program element for the RVI SLR-AMP or in the applicant’s technical basis document or procedure for the AMP. A separate SLRA Appendix C response to the A/LAI is unnecessary.
- The staff updated the review procedures to permit a broaden scope for potential use of the GALL-SLR “RP-423” and “RP-424” items in GALL-SLR Tables IV.B2, IV.B3 and IV.B4
 - Can use the items if the applicant is using a plant-specific program for the internals
 - Can now the apply the AMR items if the MRP-227, Rev. 1-A basis for a specified component in GALL-SLR based program is being modified on a site-specific or component-specific basis

Draft SLR-ISG-2020-01:

Summary of Changes to SRP-SLR Table 3.1-1, AMR Item 028



AMR Item 028 – Revised to remove reference of CE-design thermal shield repositioning pins and CE-design incore instrumentation (ICI) thimble tubes in the SRP-SLR line item. The line item now only covers cracking and wear in Westinghouse-design control rod guide tube (CRGT) support pins (split pins).

- The AMR criteria for CE thermal shield repositioning pins have been moved from Item 028 to Item 055b (CE No Additional Measures), as the pins have been placed in the “No Additional Measures” [NAM] category in MRP-227, Rev. 1-A. GALL-SLR Item IV.B3.RP-306 for the NAM components now accounts for the repositioning pins; the previous GALL-SLR Item IV.B3.RP-400 for the pins is being deleted from GALL-SLR Table IV.B2 in the SLR-ISG and as a referenced GALL-SLR item in Item 028.
- The AMR criteria for managing wear in CE ICI thimble tubes have been moved from Item 028 to Item 056c (which addresses CE “Existing Program” components with non-cracking effects). GALL-SLR Item IV.B3.RP-357 has been adjusted to reflect the change in the referenced SRP-SLR item that applies to the guide tubes (now Item 056c), with wear remaining as the existing non-cracking mechanism for the tubes. The GALL-SLR “RP-357” Item is being deleted as a referenced GALL-SLR item in Item 028.
- The revisions to the Item 028 include the revised set of referenced GALL-SLR items for the CRGT split pins. GALL-SLR Item IV.B2.RP-356 is being deleted as a referenced GALL-SLR item for the pins in Item 028 because CRGT split pins made from Type 316 or 316L materials are now placed in the No Additional Measures category, and are now covered by SRP-SLR Table 3.1-1 Item 055c and GALL-SLR Item IV.B2.RP-256.

Draft SLR-ISG-2020-01:

Unchanged Generic Items and Deletion of AMR Item 032 in SRP-SLR Table 3.1-1



Unchanged Generic AMR Items: Item 003 (AMR of RVI components with fatigue TLAAAs) and Item 015 (AMR for B&W-designed RVI components subject to reduction of ductile fracture toughness analysis) remain unchanged and are as originally drafted in Table 3.1-1 of the SRP-SLR report. Item 087 on loss of material due to pitting and crevice corrosion also remains unchanged.

Item 032 (and associated GALL-SLR “RP-382” Items). Item 032 in SRP-SLR Table 3.1-1 and GALL SLR Items IV.B2.RP-382, IV.B3.RP-382 and IV.B4.RP-382 are being deleted.

- These items apply to PWR RVI components that are categorized as ASME Section XI Code Class components, where aging management of the components is tied to AMP XI.M1 (ASME Section XI Inservice Inspection Program).
- The existence of Item 032 in SRP-SLR Table 3.1-1 is somewhat redundant with the AMR Item 114 in SRP-SLR Table 3.1-1.
- Similarly, the “RP-382” items in GALL-SLR Tables IV.B2, IV.B3, and IVB.4 were determined to be redundant with Item IV.E.R-444 in Table IV.E of the GALL-SLR report.

Draft SLR-ISG-2020-01:

Summary of Draft Changes to AMR Items for B&W RVI Components in SRP-SLR Table 3.1-1



Item 051a (B&W “Primary” Components – Cracking). Administratively edited for realignment of referenced GALL-SLR items in Item 051a per “Primary” component categorizations made in MRP-227, Rev. 1-A. Added in Item IV.B4.RP-252e as a new referenced GALL-SLR item in item 051a. Deleted GALL-SLR IV.B4.RP-400 as a referenced GALL-SLR item. Otherwise remains as previously issued in the SRP-SLR report.

Item 051b (B&W “Expansion” Components – Cracking). Bases for changes are similar to those for 051a, except looked for realignment in or out of the referenced “Expansion” category. Added in IV.B4.RP-246c, IV.B4.RP-246d, and IV.B4.RP-375 as new referenced GALL-SLR items in Item 051b. Deleted GALL-SLR IV.B4.RP-254 and IV.B4.RP-254a as referenced GALL-SLR items. Otherwise remains as previously issued in the SRP-SLR report.

Item 055a (B&W No Additional Measures Components). No changes.

Item 058a (B&W “Primary” Components – Non-Cracking Effects). Administratively edited for realignment of referenced GALL-SLR items in Item 058a per “Primary” component categorizations made in MRP-227, Rev. 1-A. Added in IV.B4.RP-247c and IV.B4.RP-252d as new referenced GALL-SLR items. Deleted GALL-SLR IV.B4.RP-401 as a referenced GALL-SLR item. Otherwise remains as previously issued in the SRP-SLR report.

Item 058b (B&W “Expansion” Components – Non-Cracking Effects). Bases for changes are similar to those for 058a, except looked for realignment in or out of the referenced “Expansion” category. Added in IV.B4.RP-246e, IV.B4.RP-252c, and IV.B4.RP-375a as new referenced GALL-SLR items. Deleted GALL-SLR IV.B4.RP-254b as a referenced GALL-SLR item. Otherwise remains as previously issued in the SRP-SLR report.

Draft SLR-ISG-2020-01:

Summary of Changes to AMR Items

in SRP-SLR Table 3.1-1 for CE RVI Components



Item 052a (CE “Primary” Components – Cracking). Administratively edited for realignment of referenced GALL-SLR items in Item 052a per “Primary” component categorizations made in MRP-227, Rev. 1-A. Deletes GALL-SLR IV.B.RP-363 as a referenced GALL-SLR item in Item 052a.

Item 052b (CE “Expansion” Components – Cracking). Bases for changes are similar to those for 052a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Expansion” category. Added in IV.B3.RP-363 as a new referenced GALL-SLR item. Otherwise remains as previously issued in the SRP-SLR report.

Item 052c (CE “Existing Program” Components –Cracking). Bases for changes are similar to those for 052a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Existing Program” category. Added in IV.B3.RP-320a as a new referenced GALL-SLR item. Otherwise remains as previously issued in the SRP-SLR report.

Item 055b (CE No Additional Measures Components). No changes.

Draft SLR-ISG-2020-01:

Summary of Changes to SRP-SLR AMR Items for CE RVI Components (Continued)



Item 056a (CE “Primary” Components – Non-Cracking). Administratively edited for realignment of referenced GALL-SLR items in Item 056a per “Primary” component categorizations made in MRP-227, Rev. 1-A. Adds GALL-SLR Item IV.B3.RP-338a as a new referenced GALL-SLR item in Item 056a. Deletes GALL-SLR IV.B.RP-364 as a referenced GALL-SLR item. Otherwise remains as previously issued in the SRP-SLR report.

Item 056b (CE “Expansion” Components – Non-Cracking Effects). Bases for changes are analogous to those for Item 056a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Expansion” category. Added in IV.B3.RP-364 as a new referenced GALL-SLR item in Item 056b. Otherwise remains as previously issued in the SRP-SLR report.

Item 056c (CE “Existing Program” Components – Non-Cracking Effects). Bases for changes are analogous to those for Item 056a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Existing Program” category. Added in IV.B3.RP-357 as a new referenced GALL-SLR item in Item 056c. Deleted GALL-SLR Item IV.B3.RP-334a as a referenced GALL-SLR Item for Item 056c. Otherwise remains as previously issued in the SRP-SLR report.

Draft SLR-ISG-2020-01:

Summary of Changes to AMR Items in SRP-SLR Table 3.1-1 for Westinghouse RVI Components



Item 053a (Westinghouse “Primary” Components – Cracking). Administratively edited for realignment of referenced GALL-SLR items in Item 053a per “Primary” component categorizations made in the MRP-227, Rev. 1-A report. Added in GALL-SLR Item IV.B2.RP-296a as new GALL-SLR item references in Item 053a. Deleted GALL-SLR IV.B2.RP-280 as a referenced GALL-SLR item. Otherwise remains as previously issued in the SRP-SLR report.

Item 053b (Westinghouse “Expansion” Components – Cracking). Bases for changes are similar to those for 052a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Expansion” category. Added in IV.B3.RP-363 as a new referenced GALL-SLR item in Item 053b. Otherwise remains as previously issued in the SRP-SLR report.

Item 053c (Westinghouse “Existing Program” Components –Cracking). Bases for changes are similar to those for 052a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Existing Program” category. Added in IV.B3.RP-320a as a new referenced GALL-SLR item in Item 053c. Otherwise remains as previously issued in the SRP-SLR report.

Item 054 (Westinghouse-design flux thimble tubes). Minor administrative edit of the component description in the line item to explain the line item only applies to Westinghouse-design PWRs. SRP-SLR Table 3.1-1 Item 054 and GALL-SLR Item IV.B2.RP-284 remain as the items for managing wear in the flux thimble tubes.

Draft SLR-ISG-2020-01:
Summary of Changes to AMR Items for
Westinghouse RVI Components (Continued)



Item 055c (Westinghouse No Additional Measures Components). No changes

Item 059a (Westinghouse “Primary” Components – Non-Cracking Effects). Administratively edited for realignment of referenced GALL-SLR items in Item 059a per “Primary” component categorizations made in the MRP-227, Rev. 1-A report. The staff did not need to make any changes to the list of referenced GALL-SLR items in Item 059a. Item 059a remains as previously issued in the SRP-SLR report.

Item 059b (Westinghouse “Expansion” Components – Non-Cracking Effects). Bases for changes are similar to those for 059a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Expansion” category. Added in IV.B2.RP-280a and IV.B2.RP297a as new referenced GALL-SLR items in Item 059b. Deleted Item IV.B2.RP-278a as a referenced GALL-SLR Item for Item 059b. Otherwise remains as previously issued in the SRP-SLR report.

Item 059c (Westinghouse “Existing Program” Components – Non-Cracking Effects). Bases for changes are similar to those for 059a, except the GALL-SLR references were checked for components realigned in or out of the referenced “Existing Program” category. The staff did not need to make any changes to the list of referenced GALL-SLR items in Item 059c. However, the staff amended Item 059c to add stellite as a listed material for the line item (i.e., the material may be used for clevis insert or alignment pin surfaces).

Draft SLR-ISG-2020-01:
Summary of Changes to SRP-SLR Table 3.1-1,
Items 114, 118, and 119



Item 114 (Generic Item for ASME Class 1 Components, Including Class 1 Internals).

The staff amended the component description of the line item to include ASME Code Class 1 reactor vessel interior attachments among the list of ASME Code Class 1 components referenced in the line item (which also include Class 1 core support structure components). The staff also amended the aging effect and mechanism column entry of the line item to list irradiation assisted SCC, PWSCC, and fatigue as additional types of cracking mechanisms.

Items 118 (Cracking) and 119 (non-cracking effects). The staff broadened the scope of the line items to permit an expanded basis for applying the line items in a PWR SLRA. The expanded scope will now allow the line items to be used for specified components, and in particular for cases where the generic GALL-SLR XI.16A based program and MRP-227 I&E protocols for the component are being adjusted on a site-specific or component-specific basis (usually as a result of a gap analysis methodology being applied to the component).

Draft SLR-ISG-2020-01:
Summary of Changes to GALL-SLR AMP XI.M16A and the FSAR
Supplement Example for the AMP in GALL-SLR Table XI-01



GALL-SLR AMP XI.M16A, “PWR Vessel Internals.”

- Updated the program description and program elements to indicate the program is based on the methodology in MRP-227, Rev. 1-A, as supplemented by the results of a gap analysis or supplemental methodologies that may factor into the scope of the AMP
- Corrected previous wording in the program description that otherwise, if left uncorrected, may be misinterpreted to convey the concept that programs for B&W components include “Existing Program” components.
- Added a criterion clarification in the “administrative controls” element that activities used to maintain the program procedures up-to-date with MRP-227, Rev. 1-A or other supplemental methodologies used for the AMP are within the scope of the “administrative controls” and do not need to be within the scope of programmatic enhancements or commitments.

FSAR Supplement Example. Updated for reference of MRP-227, Rev. 1-A

Draft SLR-ISG-2020-01:
Summary of Changes to Materials Definitions in GALL-SLR Table IX.C
and Plant-Specific TLAA Examples in SRP-SLR Table 4.7-1



GALL-SLR Table IX.C, “Use of Terms for Materials.” Added a definition for stellite based on the general definition for the material in www.dictionary.com

SRP-SLR Table 4.7-1, “Examples of Potential Plant-Specific TLAA Topics.” Added a new line item for plant-specific TLAA topics for PWRs to cite “EPRI MRP Cycle-based and Fluence-Based Analyses in Support of MRP-227 Methodologies” as an additional example of a potential, plant-specific TLAA for PWR-design nuclear plants.