

Divider Plate and Tube-to-Tubesheet Weld Cracking Guidance and Proposed Changes to Steam Generators Program

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NRC Meeting with
Industry Steam Generator Task Force
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Purpose

- Provide feedback on initial license renewal (LR) and subsequent license renewal (SLR) guidance for steam generator (SG) divider plate and tube-to-tubesheet weld cracking
- Provide summary of proposed changes to SLR Aging Management Program (AMP) XI.M19, “Steam Generators”

Background - Divider Plate and Tube-to-tubesheet Weld Cracking Guidance

- LR Guidance
 - LR-ISG-2016-01
- SLR Guidance
 - Volumes 1 and 2 of NUREG-2191, Revision 0
 - NUREG-2192, Revision 0, Further Evaluation (FE) 3.1.2.2.11
- Aging management review (AMR) items for managing cracking due to primary water stress corrosion cracking (PWSCC) by both the Water Chemistry and Steam Generators programs
 - Steel (with nickel-alloy cladding); nickel alloy divider plates
 - Nickel alloy tube-to-tubesheet welds
- FE for plant-specific program to evaluate effectiveness of existing programs (Water Chemistry and Steam Generators)
- Plant-specific program beyond (in addition to) existing programs (Water Chemistry and Steam Generators)

Feedback - Divider Plate Cracking Guidance

Material	Weld Material	Industry analysis (EPRI 3002002850) applicable and bounding	Plant-specific program required beyond existing programs ¹
690	690	N/A	No
600	600	Yes	No
600	600	No	Yes

¹ If a plant-specific program is not necessary, then aging is managed by the existing Water Chemistry and Steam Generators programs

Feedback - Tube-to-tubesheet Weld Cracking Guidance

Tube Material	Tubesheet Cladding Material	Alternate Repair Criteria (C*, F*, W*, or H*) approved for both hot- and cold-leg side of SG	Industry analysis (EPRI 3002002850) applicable and bounding	Plant-specific program required beyond existing programs ¹
690	690	N/A	N/A	No
690	600	N/A	Yes	No
690	600	N/A	No	Yes
600	N/A	Yes	N/A	No
600	N/A	No	N/A	Yes

¹ If a plant-specific program is not necessary, then aging is managed by the existing Water Chemistry and Steam Generators programs

Proposed Changes to SLR AMP XI.M19, “Steam Generators”

- Drafts for comment published in *Federal Register* (FR) on July 11, 2023 (88 FR 44160)
 - Revision 1 of NUREG-2191, “Generic Aging Lessons Learned for Subsequent License Renewal” (GALL-SLR)
 - Revision 1 of NUREG-2192, “Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants” (SRP-SLR)
 - Supplement 1 of NUREG-2221, “Technical Bases for Changes in the Subsequent License Renewal Guidance Documents NUREG-2191 and NUREG-2192” (Tech. Basis Doc.)
- Public Comment Period: July 11, 2023 – September 11, 2023
- Comments should be submitted in writing by any of the following methods:
 - Going to <https://www.regulations.gov> and search for Docket ID NRC-2023-0096
 - Mailing comments to Office of Administration, Mail Stop: TWFN-7-A60M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Program Management, Announcements and Editing Staff

Proposed Changes to SLR AMP XI.M19, “Steam Generators” Cont’d

- Clarify type of corrosion that SG tube plugs may experience
- Clarify that extensive deposit buildup on the secondary side of SGs could affect tube integrity
- Update inspection frequency of divider plate assemblies, tube-to-tubesheet welds, heads (channel or lower/upper heads), and tubesheets to be consistent with the maximum inspection interval allowed by the SG tube inspection requirements for the given SG tube material in Revision 5 of the standard technical specifications that were published in September 2021
- Add guidance on providing a comparison of plant-specific parameters and industry analyses (EPRI 3002002850) to determine if a plant is bounded by the industry analyses for SG divider plate assembly and tube-to-tubesheet weld cracking

Proposed Changes to SLR AMP XI.M19, “Steam Generators” Cont’d

- Change from using a plant-specific AMP to the One-Time Inspection program for evaluating the effectiveness of the Water Chemistry and Steam Generators programs at mitigating PWSCC of divider plate assemblies and tube-to-tubesheet welds
- Clarify that the Water Chemistry and Steam Generators programs are used to manage PWSCC of divider plate assemblies and tube-to-tubesheet welds, even if it is determined that use of the One-Time Inspection program is not needed to confirm their effectiveness at mitigating PWSCC
- Update and add references

Summary

- Currently, a plant-specific program to evaluate effectiveness of Water Chemistry and Steam Generators programs at mitigating PWSCC is necessary when:
 - **Divider plate assemblies** are Alloy 600 or contain Alloy 600 type weld materials, and industry analyses (EPRI 3002002850) are not applicable and bounding
 - **Tube-to-tubesheet welds**
 - Alloy 690 SG tubes and Alloy 600 tubesheet cladding, and industry analyses (EPRI 3002002850) are not applicable and bounding
 - Alloy 600 SG tubes, and alternative repair criteria within tubesheet approved for only the hot leg or cold-leg side of SG
- Public comment period for draft GALL-SLR, SLR-SRP, and Tech. Basis Doc. closes on September 11, 2023

References

- LR-ISG-2016-01, “Changes to Aging Management Guidance for Various Steam Generator Components,” dated November 2016 (ML16237A383)
- NUREG-2191, Revision 0, “Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report,” dated July 2017 (ML17187A031 (Volume 1) and ML17187A204 (Volume 2))
- NUREG–2192, Revision 0, “Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants,” dated July 2017 (ML17188A158)
- EPRI PRI Report 3002002850, “Steam Generator Management Program: Investigation of Crack Initiation and Propagation in the Steam Generator Channel Head Assembly”
- NUREG-2191, Revision 1, Draft for Comment, published July 2023, (ML23180A182 (Volume 1), ML23180A188 (Volume 2))

References Cont'd

- NUREG–2192, Revision 1, Draft for Comment, published July 2023 (ML23180A191)
 - Corrected Tables 3.1-1 and Table 3.2-1, published August 2023 (ML23213A036)
- NUREG–2221, Supplement 1, “Technical Bases for Changes in the Subsequent License Renewal Guidance Documents NUREG–2191 and NUREG–2192”, Draft for Comment, published July 2023 (ML23180A208)
- NUREG-1430, Revision 5, “Standard Technical Specifications Babcock and Wilcox Plants,” dated September 2021 (ML21272A363 (Volume 1) and ML21272A370 (Volume 2))
- NUREG-1431, Revision 5, “Standard Technical Specifications Westinghouse Plants,” dated September 2021 (ML21259A155 (Volume 1) and ML21259A159 (Volume 2))
- NUREG-1432, Revision 5, “Standard Technical Specifications Combustion Engineering Plants,” dated September 2021 (ML21258A421 (Volume 1) and ML21258A424 (Volume 2))

Questions

