<u>Oconee SLRA: Breakout Questions</u>

SLRA Section 4.3.3, "Environmentally-Assisted Fatigue"

TRP: 143.3

Question Number	SLRA Section	SLRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.4 SLR-ONS-TLAA-0306NP	4-71 2	SLRA Section 4.3.4 (SLR-ONS-TLAA-0306NP) addresses the environmentally-assisted fatigue (EAF) for the reactor coolant system (except the reactor vessel). The report indicates that the applicant performed EAF screening to determine the leading locations for the ASME Code, Section III components and piping and ANSI B31.7 piping. However, the staff notes that ANSI B31.7, Class II and III piping correspond to the non-Class 1 piping of ASME Code Section III. The fatigue analysis for the non-Class I piping is separately addressed in SLRA Section 4.3.3. Therefore, the staff needs to clarify whether the ANSI B31.7 Class I piping is the specific piping evaluated in the EAF analysis.	1. Clarify whether the ANSI B31.7 Class I piping is the B31.7 piping that is evaluated in the EAF analysis.
2	4.3.4 SLR-ONS-TLAA-0306NP	4-71 4	SLRA Section 4.3.4 discusses the EAF screening process to determine the leading EAF locations. The section indicates that, to reduce excess conservatism for stainless steel location due to the very large maximum F_{en}, an estimated F_{en} (F_{en}*) is calculated as the average of the value based on a	1. Clarify the meanings of (1) the qualitative estimate of strain rate and (2) the worst possible strain rate in the discussion on the reduction of the excessive conservatism.

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			qualitative estimate of strain rate and the value based on the worst possible strain rate. The staff needs clarification regarding the meanings of (1) the qualitative estimate of strain rate and (2) the worst possible strain rate.	2. For the other materials, discuss how the strain rate is determined in the F_{en} calculations. 3. In addition, clarify whether the EAF screening process is generally consistent with the guidance in EPRI 1024995.
3	4.3.4 SLR-ONS-TLAA-0306NP	4-71 4	SLRA Section 4.3.4 (SLR-ONS-TLAA-306NP) indicates, for locations where the conservatively determined screening CUF_{en} exceeded 1.0, further evaluations were performed in accordance with NUREG/CR-6909, Revision 1. The report does not clearly discuss how the conservatism associated with the screening CUF_{en} calculation has been removed in the further evaluations.	1. Discuss how the conservatism associated with the screening CUF_{en} calculation has been removed in the further evaluations.
4	4.3.4 SLR-ONS-TLAA-0306NP	4-71 5	SLRA Section 4.3.4 indicates that the high pressure injection (HPI) piping stop-valve-to-check-valve location is bounding for the HPI nozzle that is identified in NUREG/CR-6260 as one of the leading locations for EAF in Babcock and Wilcox designed plants. The staff needs the projected CUF_{en} values of these piping locations to confirm the adequacy of the applicant's evaluation.	1. Provide the projected CUF_{en} values of the HPI stop-valve-to-check-valve weld and HPI nozzle to confirm that the HPI stop-valve-to-check-valve weld is bounding for the HPI nozzle in the EAF analysis.

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5	4.3.4 SLR-ONS-TLAA-0306NP	4-71 Table 4.3.4-1	Table 4.3.4-1 of SLRA Section 4.3.4 addresses the leading EAF locations. The table indicates that the control rod drive mechanism (CRDM) weld is part of the reactor vessel head closure (RVCH) replacement. The table also states that the SLR CUF of the CRDM weld is based on reduced “power loading/unloading” cycles. The table further states that the “power loading/unloading” transients are excluded from the Fatigue Monitoring program, which will require reconsideration if the applicant implements flexible power operation. Given that the reduced “power loading/unloading” cycles used in the CUF_{en} calculation, the transients may need to be monitored by the Fatigue Monitoring program to ensure that the projection basis with the reduced cycles remains valid.	1. Describe which weld of the CRDM is specifically referenced in Table 4.3.4-1 of SLRA Section 4.3.4 (e.g., reactor vessel head penetration nozzle weld or CRDM housing weld). 2. Describe the reduced cycles in comparison with the design cycles in UFSAR Table 5-2. 3. Provide justification for why the “power loading/unloading” transients are excluded from the fatigue monitoring even though the reduced cycles are used in the CUF_{en} calculation for the CRDM weld. If it cannot be justified, include the power loading/unloading transients in the scope of the Fatigue Monitoring program to ensure the cycle projection basis remains valid.

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6	4.3.4 SLR-ONS-TLAA-0306NP	4-71 Table 4.3.4-1	SLRA Table 4.1.4-1 provides the EAF analysis results for the pressurizer surge nozzle weld overlay (path 3). The results address both the environmental fatigue correction factor (F_{en}) and the maximum F_{en}. The table does not clearly describe (1) the difference between these two parameters and (2) why the F_{en} value is used instead of the maximum F_{en} value in the EAF analysis.	1. Describe (1) the difference between F_{en} and maximum F_{en} and (2) why the F_{en} value is used instead of the maximum F_{en} value in the EAF analysis.
7	4.3.4 SLR-ONS-TLAA-0306NP	4-71 Table 4.3.4-2	SLRA Section 4.3.4, Table 4.3.4-2 provides the results of the flaw tolerance evaluation for the pressurizer surge line piping and high pressure injection (HPI) piping in accordance with ASME Code Section XI, Appendix L. The table does not clearly address the time period for the flaw growth to the final flaw size listed in the table.	1. Describe the time period for the flaw growth to the final flaw size. As part of the discussion, clarify whether the time period for the final flaw size is the same as the allowable operating period in the table.

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8	4.3.4 SLR-ONS-TLAA-0306NP	4-71 Table 4.3.4-2	As previously discussed, SLRA Section 4.3.4, Table 4.3.4-2 provides the results of the flaw tolerance evaluation for the pressurizer surge line piping and high pressure injection (HPI) piping in accordance with ASME Code Section XI, Appendix L. The SLRA section does not clearly address whether the transient cycles used in the flaw tolerance evaluation are equivalent to or bounding for the CLB design cycles in UFSAR Tables 5-2 and 5-23. In addition, the following reference indicates that Transients 3 and 4 (power loading/unloading transients) in UFSAR Table 5-2 are used in the flaw tolerance evaluation for the pressurizer surge line piping (Reference: SIA Calculation Package 1301379.305, Revision 0, Crack Growth Calculation for Surge Piping Appendix L Evaluation, 8/27/2020, Section 3.2). However, Transients 3 and 4 are not listed in SLRA Table 4.3.1-1 as monitored transients.	1. Clarify whether the transients cycles used in the flaw tolerance evaluations are equivalent to or bounding for the design transient cycles. If not, provide justification for why a reduced set of transient cycles is acceptable for the flaw tolerance evaluations. 2. Given that Transients 3 and 4 in UFSAR Table 5-2 are used in the flaw tolerance evaluations, explain why SLRA Table 4.3.1-1 does not include these transients as monitored transients. If it cannot be justified, revise SLRA Table 4.3.1-1 to include these transients in the table.

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9	4.3.4	4-71	The following reference provides the fatigue analysis and cumulative usage for the steam generator tube-to-tubesheet welds (Reference: Calculation Number OSC 11520, Revision 0, Replacement Once through Steam Generators Tube-to-Tubesheet Weld Stress analysis). Table 1.1 of the reference indicates that the projected cumulative usage factor of the welds is slightly less than the design limit (1.0). However, this reference and SLRA Section 4.3.4 (SLR-ONS-TLAA-0306NP), which provide the applicant's EAF analysis, do not clearly address the EAF analysis for the steam generator tube-to-tubesheet welds. Therefore, the staff needs additional information regarding the EAF analysis for these welds.	1. Describe the evaluation period of the fatigue analysis for the steam generator tube-to-tubesheet welds. 2. Clarify whether the EAF analysis for the steam generator tube-to-tubesheet welds is a TLAA. If so, provide the projected CUF_{en} value of the welds and discuss why SLRA Section 4.3.4 (SLR-ONS-TLAA-0306NP) does not address the EAF analysis for the welds. 3. Discuss how the applicant will manage the aging effect of fatigue for the tube-to-tubesheet welds.

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10	4.3.4 ANP-3898NP	4-71 8-4	The following reference indicates that the 80-year CUF_{en} for the venturi exceeds the fatigue design limit (1.0) but the CUF_{en} is acceptable because it is not a reactor coolant pressure boundary component that requires an EAF analysis (Reference: Section 8.5 of ANP-3898NP, Revision 0, Framatome Reactor Vessel and RCP TLAA and Aging Management Review Input to the ONS SLRA"). However, the related discussion in the reference does not clearly discuss how the applicant will manage the aging effect of fatigue for the venturi.	1. Describe the intended function of the venturi and how the applicant will manage the aging effect of fatigue for the venturi. In addition, clarify whether the applicant's aging management review (AMR) results identify the aging management for the venturi.