POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 (PBN) SUBSEQUENT LICENSE RENEWAL APPLICATION (SLRA) DRAFT REQUEST FOR ADDITIONAL INFORMATION (RAI) SAFETY - SET 7

SLRA Section 4.7.2, "Leak-Before-Break of Reactor Coolant System Auxiliary Piping"

DRAI 4.7.2-1

Regulatory Basis:

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 54.21(c), the SLRA shall include an evaluation of time-limited aging analyses (TLAAs). The applicant shall demonstrate that (i) the analyses remain valid for the subsequent period of extended operation; (ii) the analyses have been projected to the end of the subsequent period of extended operation; or (iii) the effects of aging on the intended function(s) will be adequately managed for the subsequent period of extended operation.

Background:

SLRA Section 4.7.2, "Leak-Before-Break [LBB] of Reactor Coolant System Auxiliary Piping," identifies the potential for thermal aging of the auxiliary line piping components and fatigue crack growth as the aging effects that must be addressed for subsequent license renewal (SLR). SLRA Section 4.7.2 states that thermal aging of the stainless steel weld material was considered in the evaluations of the pressurizer surge line, the residual heat removal (RHR) system, and the accumulator line (see WCAP-15065-P-A, Revision 1, "Technical Justification for Eliminating Pressurizer Surge Line Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear Plants," June 2001; WCAP-15105-P-A, Revision 1, "Technical Justification for Eliminating Residual Heat Removal (RHR) Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear Plants," June 2001; and WCAP-15107-P-A, Revision 1, "Technical Justification for Eliminating Accumulator Rupture as the Structural Design Basis for Point Beach Units 1 and 2 Nuclear Plants," June 2001) by assuming saturated conditions (fully aged).

In addition, SLRA Section 4.7.1, "Leak-Before-Break of Reactor Coolant System Loop Piping," and WCAP-14439-P, Revision 4, "Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for the Point Beach Nuclear Plant Units 1 and 2 for the Subsequent License Renewal Program (80 Years)," June 2020, address thermal aging effects on the cast austenitic stainless steel components for the LBB analyses of the Point Beach reactor coolant loop piping.

Issue:

SLRA Enclosure 4, Attachment 17, Westinghouse LTR-SDA-II-20-06, Revision 1, "Leak-Before-Break Reconciliation of the Point Beach Units 1 and 2 Pressurizer Surge Line, Residual Heat Removal Line, and Accumulator Line Piping Systems for the Subsequent License Renewal Program," May 4, 2020, does not discuss the disposition of thermal aging of the stainless steel welds as described in SLRA Section 4.7.2 and does not provide a basis for that disposition in the SLRA.

In addition, the equation used to implement the assumption of "saturated conditions (fully aged)" in the calculations is Eq. 3

$$J\left(\frac{kJ}{m^2}\right) = 73.4 + 83.5\ \Delta a(mm)^{0.643}$$

in NUREG/CR-6428, "Effects of Thermal Aging on Fracture Toughness and Charpy-Impact Strength of Stainless Steel Pipe Welds," May 1996 ("Revision 0"), which is described as "the lower–bound J–R curve for both SAWs [submerged arc welds] and SMAWs [shielded metal arc welds]." A more recent report, NUREG/CR-6428, Revision 1, "Effects of Thermal Aging on Fracture Toughness and Charpy-Impact Strength of Stainless Steel Pipe Welds," August 2018 ("Revision 1"), identifies Eq. 22

$$J\left(\frac{kJ}{m^2}\right) = 117\ \Delta a(mm)^{0.45}$$

as the recommended lower bound J-R curve for thermally aged SAWs and SMAWs.
Eq. 22 of Revision 1 is approximately 25% lower than Eq. 3 of Revision 0 at a crack growth (Δa) value of 1 mm.

Request:

1. What is the basis for the disposition of 10 CFR 54.21(c)(1)(i) in SLRA Section 4.7.2 as it pertains to thermal aging of stainless steel welds?
2. In its consideration of the TLAA related to LBB analyses for the reactor coolant system auxiliary piping, did the applicant consider the updated analysis on lower bound thermal aging of stainless steel welds from NUREG/CR-6428, Revision 1, relative to the assumptions made in WCAP-15065-P-A, Revision 1, WCAP-15105-P-A, Revision 1, and WCAP-15107-P-A, Revision 1?
3. Would the use of the updated lower bound thermal aging curves for stainless steel welds from NUREG/CR-6428, Revision 1 affect the conclusions in SLRA Section 4.7.2?
4. As cited in SLRA Section 4.7.1, WCAP-14439-P, Revision 4 addresses thermal aging effects on the cast austenitic stainless steel components for the LBB analyses of the Point Beach reactor coolant loop piping. Was thermal aging of the stainless steel welds considered in this report, and would use of the updated lower bound thermal aging curves for stainless steel welds from NUREG/CR-6428, Revision 1 affect the conclusions in SLRA Section 4.7.1?