St. Lucie SLRA: Breakout Questions

SLRA Section 3.5.2.2, “Further Evaluation of Aging Management as Recommended by NUREG-2192”
TRP: 074, Concrete

Note: Breakout Questions are provided to the applicant and will be incorporated into the publicly-available audit report.

Technical Reviewer	George Wang	12/07/2021
Technical Branch Chief	Joseph Colaccino	12/20/2021
Breakout Session	*Date/Time*	*To be filled in by PM*

Applicant Staff	NRC staff
To be filled out by PM during breakout	

Question Number	SLRA Section	SLRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request	Outcome of Discussion
1	3.5.2.2.1.2 Table 3.5.2-1	3.5-21 2.5-80	SRP-SLR Section states that Subsection CC-3440 of ASME code, Section III, Division 2, specifies the concrete temperature limits for normal operation or any other long-term period. (i.e., general area temperature 150 °F and local area temperature 200 °F) SLRA Section 3.5.2.2.1.2 states localized hotspots are limited in area and are designed to be maintained below the degradation threshold temperature limits of the ACI standards. However, it is unclear what's the degradation threshold	1. Clarify the degradation threshold temperature limits of the ACI standards. 2. Clarify the actual general area temperature and local area temperature. 3. Explain how the elevated temperature (264 °F) in containment vessel is adequately managed. 4. Explain why aging effect for Table 2 line items (Note I cited): penetrations	

			temperature limits of the ACI standards used. SLRA AMR item 3.5.1-003 in Table 3.5-1 states that as described in the UFSAR and consistent with the current renewed licenses, temperatures of containment penetrations are below the allowable general and local temperature thresholds for reduction of strength and modulus by design. Hot (Type I) penetration assemblies include insulation. This insulation has an ‘insulate (thermal)’ function for SLR and is addressed in Table 3.5.2-1. However, SLRA AMR item 3.5.1-048 in Table 3.5-1 states that there have been no instances of elevated temperatures for PSL plant structures other than containment, and PSL Unit 1 UFSAR Section 3.8.2.1.2 states that temperature coincident with design and maximum pressure design pressure is 264 ^{o}F, and design pressure and temperature as included in the purchase specification maximum calculated LOCA pressure and temperature are 38.4 psig and 259°F, respectively. PSL Unit 2 UFSAR Section 3.8.2.3.1 also listed temperatures for the design of the containment vessel and penetrations, in which some of them are 264 ^{o}F. It appears that there is elevated	(mechanical), thermal insulation (type I hot penetrations) is not applicable in SLRA Table 3.5.2-1. 5. Clarify whether thermal insulation for Type III (semi-hot) penetrations is subject to aging management review. 6. Discuss the plan to update the SLRA as necessary.	

			temperature in the containment vessel. SLRA Table 3.5.2-1 cites note I for penetrations (mechanical), thermal insulation (type I hot penetrations), which aging effect for these components is not applicable. However, SLRA Section 3.5.2.2.1.2 states that Type I (hot) penetration assemblies are insulated to limit Containment Vessel nozzle thermal stresses that also serve to limit Shield Building concrete temperatures. It appears that thermal insulation (type I hot penetrations) is subject to AMR. SLRA Type III (semi-hot) penetrations are designed to accommodate moderate thermal movements. Type III penetrations include blowdown, letdown, charging, safety injection, shutdown cooling, RCP bleed-off, and integrated leak rate test (ILRT) lines. However, the staff could not locate Table 2 AMR line item for thermal insulation (type III semi-hot penetrations).		
2	3.5.2.2.2.1.2 3.5.2.2.2.3.2	3.5-28 3.5-31	SLRA Sections 3.5.2.2.2.1.2 and 3.5.2.2.2.3.2 state that the Structures Monitoring AMP has been refined, based on industry/fleet information, to include visual examination for patterned cracking, darkened crack edges, water ingress and misalignment that would be indicative	1. Clarify whether enhancement to the Structures Monitoring program shall be provided on the visual examination for patterned cracking, darkened crack edges, water ingress and misalignment that would	

			of reaction with aggregates, such as alkali silica reaction (ASR) and alkali carbonate reaction (ACR), and includes opportunistic inspection of inaccessible concrete locations. However, the staff could not locate the information of ASR inspection in the procedure ADM-17.32. During our on-site audit, the staff identified pattern cracking or crazed concrete cracking on roof slabs of Turbine Building and Reactor Auxiliary Building. The staff also reviewed AR 01693560 and AR 01725652, but these OEs have not been discussed in SLRA. SRP-SLR Section 3.5.3.2.2.1.2 and 3.5.3.2.2.3.2 states that a plant-specific evaluation or program is required if (1) reactivity tests or petrographic examinations of concrete samples identify reaction with aggregates, or (2) accessible concrete exhibits visual indications of aggregate reactions, such as “map” or “patterned” cracking, alkali-silica gel exudations, surface staining, expansion causing structural deformation, relative movement or displacement, or misalignment/distortion of attached components. However, SLRA sections 3.5.2.2.2.1.2 and 3.5.2.2.2.3.2 did not state if	be indicative of reaction with aggregates. 2. Clarify whether pattern cracking or crazed concrete cracking were identified on other buildings besides Turbine Building and Reactor Auxiliary Building that we observed during the on-site audit. 3. Clarify if accessible concrete areas had exhibited visual indications of aggregate reactions, as described in the SRP-SLR sections 3.5.3.2.2.1.2 and 3.5.2.2.2.3.2, and state if ASR is an applicable aging effect at the site.	

			accessible concrete had exhibited visual indications of aggregate reactions, as described in the SRPSLR, and/or stated if ASR is an applicable aging effect at the site.		
3	3.5.2.2.2.1.4 3.5.2.2.2.3.3	3.5-29 3.5-31	SLRA Section 3.5.2.2.2.1.4 states that leaching has been observed several times in the Unit 1 RAB ECCS Room. SLRA Section 3.5.2.2.2.3.3 also states leaching OE for concrete components at the intake structure, UHS dam and the concrete covered dike walls at the intake structure. SRP-SLR Section 3.5.3.2.2.1.4 guidance states that a plant-specific AMP is not required for the reinforced concrete exposed to flowing water if evaluation determined that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure. However, the staff could not locate the evaluation for accessing observed leaching of calcium hydroxide and carbonation in accessible areas	Clarify whether evaluation on all observed leaching is conducted to conclude that the observed leaching of calcium hydroxide and carbonation in accessible areas has no impact on the intended function of the concrete structure.	
4	3.5.2.2.2.2	3.5-29	SLRA Section 3.5.2.2.2.2 states that local hot spots for concrete penetrations outside containment were not evaluated, and insulation on	1. Clarify general concrete temperatures and local area concrete temperatures in any	

			process piping with temperatures above 200 °F is included in the scope of SLR to assist in maintaining local concrete temperatures. The aging management of this insulation is provided by the PSL External Surfaces Monitoring of Mechanical Components AMP. It is unclear what's the elevated temperature and how aging effect for insulation on process piping with temperatures above 200 °F is managed. SPR-SLR Section 3.5.3.2.2.2 guidance states a plant-specific evaluation should be performed if any portion of the concrete Groups 1–5 structures exceeds specified temperature limits (i.e., general temperature greater than 150 °F and local area temperature greater than 200 °F). Higher temperatures may be allowed if tests and/or calculations are provided to evaluate the reduction in strength and modulus of elasticity and these reductions are applied to the design calculations. It appears that SLRA lacks details of OE regarding concrete temperatures and their aging management.	portion of the concrete Groups 1-5 structures. 2. Clarify whether tests and/or calculations are available to evaluate the reduction in strength and modulus of elasticity and these reductions are applied to the design calculations when concrete temperatures exceed the specified temperature limits. 3. Clarify Table 2 item for the insulation for high-temperature piping (greater than 200 °F) managed by the External Surfaces Monitoring of Mechanical Components AMP. Explain how this elevated temperature is adequately managed. 4. Discuss the plan to update SLRA as necessary.	