

**St. Lucie Nuclear Plant, Units 1 and 2, Subsequent License Renewal Application (SLRA)**

Breakout Audit Questions

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**TRP 019: Steam Generators**

| # | SLRA Section | SLRA Page             | Question / Issue  | Why are we asking?   | Outcome of Discussion |
|---|--------------|-----------------------|---|--|-----------------------|
| 1 | 2.3.1.5, 3.1 | 2.3-13, 3.1-98        | <p>SLRA Table 2.3.1-5 states that the intended functions for the tube bundle wrapper and wrapper supports are structural support and direct flow. However, SLRA Table 3.1.2-5 only includes a structural support intended function for the carbon steel tube bundle wrapper and wrapper supports.</p> <p>Please clarify the intended function(s) for the carbon steel tube bundle wrapper and wrapper supports.</p> | The NRC staff is seeking clarification on the intended function(s) of the carbon steel tube bundle wrapper and wrapper supports.   |                       |
| 2 | 3.1          | 3.1-5, 3.1-93, 3.1-96 | <p>SLRA Table 3.1.2-5 includes carbon steel with nickel alloy diaphragm primary manway covers (Unit 1), carbon steel with stainless steel diaphragm primary manway covers (Unit 2), and carbon steel with stainless steel diaphragm secondary manway and handhole closure covers (Unit 2). However, SLRA Section 3.1.2.1.5 does not refer to nickel alloy or stainless steel diaphragms.</p>                        | The NRC staff is seeking clarification on whether carbon steel with nickel alloy and stainless steel diaphragm should be added as a material to SLRA Section 3.1.2.1.5. In addition, the staff is seeking clarification on which Unit(s) are managed for loss of material of the secondary manway and handhole |                       |

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|   |   |                           | <p>Please discuss whether carbon steel with nickel alloy and stainless steel diaphragm should be added as a material to SLRA Section 3.1.2.1.5.</p> <p>The NRC staff notes AMR item 3.1-1, 124 is cited for managing loss of material of the carbon steel secondary manway and handhole closure covers exposed externally to uncontrolled indoor air by the External Surfaces Monitoring of Mechanical Components program. This Component Type does not have a unit associated with it. Please clarify which Unit(s) this Component Type applies to.</p>  | <p>closure covers exposed externally to uncontrolled indoor air.</p>   |  |
| 3 | <p>Sections 19.2.2.10 in SLRA Appendices A1 and A2, Section B.2.3.10 in SLRA Appendix B</p> | <p>A1-18, A2-18, B-88</p> | <p>The Description of Program for the Steam Generators program in Table XI-01 of the GALL-SLR cites Revision 3 of NEI 97-06. However, Sections 19.2.2.10 in SLRA Appendices A1 and A2 do not cite Revision 3 of NEI 97-06. In addition, the NRC staff was unable to determine whether the references associated with Sections 19.2.2.10 in SLRA Appendices A1 and A2 cite Revision 3 of NEI 97-06.</p> <p>The NRC staff notes that Section B.2.3.10 in SLRA Appendix B states that the St. Lucie Steam Generators program is based on Revision 3 of NEI 97-06.</p> <p>Please discuss whether the Updated Final Safety Analysis Report will cite</p> | <p>The NRC staff is seeking clarification on whether the Updated Final Safety Analysis Report will cite Revision 3 of NEI 97-06 consistent with Table XI-01 of the GALL-SLR.</p> |  |

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|   |     |               | Revision 3 of NEI 97-06 consistent with Table XI-01 of the GALL-SLR.   |  |  |
| 4 | 3.1 | 3.1-5, 3.1-89 | <p>SLRA Section 3.1.2.15 does not identify wall thinning due to erosion as an applicable aging effect associated with the steam generators. In addition, SLRA Table 3.1.2-5 does not identify wall thinning due to erosion for any steam generator components.</p> <p>The NRC staff notes that GALL-SLR AMP Report XI.M17, "Flow Accelerated Corrosion," states, in part, "...there are no materials that are known to be totally resistant to wall thinning due to erosion...."</p> <p>Please discuss whether wall thinning due to erosion is an applicable aging effect for steam generator components (e.g., carbon steel blowdown nozzles, carbon steel and stainless steel feedwater feedrings, nickel alloy and stainless steel feedwater j-nozzles, carbon steel feedwater nozzle, carbon steel and stainless steel moisture separator components, carbon steel secondary instrument nozzles (Unit 2), carbon steel steam outlet nozzle (Unit 2), carbon steel steam outlet nozzle with integral flow orifices (Unit 1)).</p> <p>The NRC staff notes that CSI-NDE-00-07 states that the j-tubes/feedring, j-tube bore holes, feedring distribution box,</p> | The NRC staff is seeking clarification on whether wall thinning due to erosion is an applicable aging effect for steam generator components. |  |

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|   |                                     |       | and feeding are not susceptible to erosion/corrosion.   |  |  |
| 5 | N/A                                 | N/A   | <p>The NRC staff noted that Section 4.4 of Revision 0 of NEESL00008-REPT-048 states visual inspections of the stub runner are performed. However, it appears that the St. Lucie replacement steam generators do not have a stub runner.</p> <p>Please discuss whether the statement regarding visually inspecting the stub runner should be removed from Revision 0 of NEESL00008-REPT-048.</p>   | The NRC staff is seeking clarification on the statement regarding visually inspecting the stub runner being removed from Revision 0 of NEESL00008-REPT-048.  |  |
| 6 | Section B.2.3.20 of SLRA Appendix B | B-174 | <p>Section B.2.3.20 of SLRA Appendix B states, "The PSL steam generator divider plates are constructed of materials not susceptible to primary water stress corrosion cracking. Therefore, the PSL Unit 1 and Unit 2 steam generator divider plates do not require inspection per the PSL One-Time Inspection AMP." However, SLRA Section 3.1.2.2.11 states, "The PSL Unit 1 divider plate assemblies use a floating divider plate and as such there is no crack initiation point. A plant-specific AMP is not necessary-"</p> <p>Please discuss the apparent difference in how the SLRA describes why a plant-specific AMP is not necessary for the Unit 1 divider plate assemblies.</p> <p>The NRC staff notes that Plant-Specific Note 1 to SLRA Table 3.1.2-5 states,</p> | The NRC staff is seeking clarification on the difference between how Section B.2.3.20 of SLRA Appendix B and SLRA Section 3.1.2.2.11 describe why a plant-specific AMP is not necessary for the Unit 1 divider plate assemblies. |  |

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|   |  |                                   | <p>“Per further evaluation 3.1.2.2.11.1 the Unit 2 divider plates are fabricated from <u>non-susceptible</u> [emphasis added] materials and do not require further aging management.” The staff thinks the use of “highly resistant” is a better term to use in Plant-Specific Note 1 because certain contaminants (e.g., lead) could result in cracking of Alloy 690 even though it is highly resistant to primary water stress corrosion cracking.</p>  |  |  |
| 7 | <p>3.1, Section 19.2.2.10 of Appendices A1 and A2, Section B.2.3.10 of SLRA Appendix B</p> | <p>3.1-89, A1-18, A2-18, B-88</p> | <p>GALL-SLR item 3.1-1, 025 (IV.D1.RP-385) manages cracking due to primary water stress corrosion cracking of nickel alloy tube-to-tubesheet welds exposed to reactor coolant by the Steam Generators and Water Chemistry programs. However, SLRA Table 3.1.2-5 does not cite any AMR items for managing aging effects of the Unit 1 or Unit 2 tube-to-tubesheet welds.</p> <p>Section 3.1.3.2.11 of NUREG-2192 states, “A plant-specific AMP should be evaluated, <u>along with the primary water chemistry and steam generator programs</u>, to manage cracking due to PWSCC in nickel alloy steam generator tube-to-tubesheet welds exposed to reactor coolant.”</p> <p>While SLRA Section 3.1.2.2.11 concluded that a plant-specific AMP is not necessary for both the Unit 1 and Unit 2 tube-to-tubesheet welds, reactor</p> | <p>The NRC staff is seeking clarification on managing applicable aging effects for the Unit 1 and Unit 2 tube-to-tubesheet welds. In addition, the staff is seeking clarification on updating Section 19.2.2.10 of Appendices A1 and A2 and Section B.2.3.10 of SLRA Appendix B to state the Steam Generators program manages the tube-to-tubesheet welds.</p> |  |

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|   |  |              | <p>water chemistry control and visual inspections will still be relied upon to mitigate cracking due to PWSCC.</p> <p>Please discuss not including AMR items to manage applicable aging effects for the Unit 1 and Unit 2 tube-to-tubesheet welds.</p> <p>Table XI-01 of the GALL-SLR and GALL-SLR AMP XI.M19 state that the Steam Generators program manages the tube-to-tubesheet welds. Section 19.2.2.10 of Appendices A1 and A2 and Section B.2.3.10 of SLRA Appendix B do not state that the Steam Generators program manages the tube-to-tubesheet welds, however, Section 4.3 of Revision 0 of NEESL00008-REPT-048 states, in part, "Inspections are also performed on internal SG channel head components including...the tube-to-tubesheet welds."</p> <p>Therefore, please discuss updating Section 19.2.2.10 of Appendices A1 and A2 and Section B.2.3.10 of SLRA Appendix B to state the Steam Generators program manages the tube-to-tubesheet welds.</p> |   |  |
| 8 | 3.1, Section B.2.3.10 of SLRA Appendix B | 3.1-89, B-92 | <p>Section B.2.3.10 of SLRA Appendix B states that a visual inspection of the Unit 2 feedwater and its supports is performed every outage due to history of water hammer events. The NRC staff did not find information related to visual inspection of the Unit 1 feedwater</p>  | <p>The NRC staff is seeking clarification on managing applicable aging effects of the feedwater feeding supports, and the frequency of the inspections.</p> |  |

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|   |  |                    | <p>feeding supports. SLRA Table 3.1.2-5 does not specifically state whether the cited items for managing applicable aging effects of the feedwater feeding for both Units 1 and 2 include the supports.</p> <p>Please discuss whether the AMR items cited in SLRA Table 3.1.2-5 for managing applicable aging effects for the feedwater feeding for both Units 1 and 2 include the supports. Given that the Unit 1 SGs are a different design than Unit 2, how often are the Unit 1 feedwater feeding supports visually inspected?</p>  |   |  |
| 9 | Section 19.2.2.10 of Appendices A1 and A2, Section B.2.3.10 of SLRA Appendix B | A1-18, A2-18, B-88 | <p>Section 19.2.2.10 of Appendices A1 and A2, Section B.2.3.10 of SLRA Appendix B include “repair of flawed tubes,” “acceptable tube repair methods,” and “repaired.” Section B.2.3.10 of SLRA Appendix B also includes “repair,” “repairs,” and “repair criteria of flawed tubes.” Revision 0 of NEESL00008-REPT-048 makes the following statements:</p> <ul style="list-style-type: none"> <li>• “The PSL Steam Generators AMP performs tube plugging and tube repair/maintenance...”</li> <li>• “When SG tubes do not meet these performance criteria, they are repaired or removed from service by plugging.”</li> </ul> <p>The NRC staff notes that Revision 0 of NEESL00008-REPT-048 states, “PSL</p> | The NRC staff is seeking clarification on why the SLRA and Revision 0 of NEESL00008-REPT-048 includes repair. |  |

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|    |   |              | <p>Technical Specifications [Ref. 9.4 and Ref 9.5] do not allow alternate repair criteria, or alternate repair methods such as sleeving.”</p> <p>Given that St. Lucie is not approved for alternate repair criteria or alternate repair methods, please discuss why the SLRA and Revision 0 of NEESL00008-REPT-048 includes repair.</p>   |  |  |
| 10 | Section B.2.3.10 of SLRA Appendix B       | B-90         | <p>Section B.2.3.10 of SLRA Appendix B states, “Visual inspections are performed on other primary-side and secondary-side components. The visual inspections of the primary-side components listed above are performed in accordance with the Degradation Assessment (DA) that is prepared as each steam generator is scheduled for examination.”</p> <p>It appears that secondary-side visual inspections are addressed in the degradation assessments prepared for St. Lucie based on those available on the portal. Therefore, discuss why the second sentence above only notes the visual inspections of primary side components are performed in accordance with the degradation assessment.</p> | The NRC staff is seeking clarification on whether visual inspection of secondary-side components is also being performed in accordance with the SG degradation assessment. |  |
| 11 | Section 19.4 of SLRA Appendices A1 and A2 | A1-71, A2-72 | Table 19-3 in Section 19.4 of SLRA Appendices A1 and A2 states that the implementation schedule for the Steam Generators Program is “No later than 6 months prior to the SPEO, or no later  | The NRC staff is seeking clarification on the implementation schedule for the Steam Generators program.  |  |



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|    |              |                | <p>than the last refueling outage prior to the SPEO...”</p> <p>The NRC staff notes that the Implementation Schedule for the Steam Generators program in Table XI-01 in the GALL-SLR states, “Program and SLR enhancements, when applicable, are implemented 6 months prior to the subsequent period of extended operation.”</p> <p>The statement in the SLRA, “or no later than the last refueling outage prior to the SPEO” is not consistent with the GALL-SLR. However, given that the Commitment is to continue the existing Steam Generators program, meaning the program is already implemented, the Implementation Schedule could be “ongoing.” The NRC staff notes that “ongoing” is used in Table 19-3 for the Quality Assurance and Operating Experience programs.</p> |  |  |
| 12 | 2.3.1.5, 3.1 | 2.3-13, 3.1-98 | <p>For Unit 1, the straight lengths of the tubes are supported by lattice grid tube supports and the u-bend region of the tubes is supported by <u>flat fan bars</u>. For Unit 2, the straight lengths of the tubes are supported by broached support plates, and the U-bend region of the tubes are supported by anti-vibration bars. Unit 2 also has v-shaped support pads and v-shaped support bars.</p>  | <p>The NRC staff is seeking clarification on whether the Unit 1 flat fan bars and/or the Unit 2 v-shaped support pads and bars should be added to SLRA Table 2.3.1-5 and SLRA Table 3.1.2-5.</p> |  |

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|    |     |                | <p>SLRA Table 2.3.1-5 and SLRA Table 3.1.2-5 do not appear to include AMR items for the Unit 1 flat fan bars and/or the Unit 2 v-shaped support pads and bars.</p> <p>Please discuss whether these components should be added to SLRA Table 2.3.1-5 and SLRA Table 3.1.2-5.</p>  |  |  |
| 13 | 3.1 | 3.1-23, 3.1-97 | <p>SLRA Table 3.1.2-5 cites GALL-SLR item 3.1-1, 008 to manage cumulative fatigue damage of carbon steel with stainless steel cladding, carbon steel with nickel alloy cladding, nickel alloy, and stainless steel steam generator components with fatigue analysis exposed internally to reactor coolant. The NRC staff notes that the Discussion for GALL-SLR item 3.1-1, 008 in SLRA Table 3.1-1 states, “Cumulative fatigue damage of stainless steel, steel (<u>with or without</u> stainless steel or nickel alloy cladding) and nickel alloy steam generator components exposed to reactor coolant...” The item in SLRA Table 3.1.2-5 does not include steel without cladding.</p> <p>GALL-SLR includes item 3.1-1, 005 to manage cumulative fatigue damage of steel steam generator components (top head, steam nozzle and safe end, upper and lower shell, feedwater and auxiliary feedwater nozzle and safe end, feedwater impingement plate and</p> | <p>The NRC staff is seeking clarification on why GALL-SLR item 3.1-1, 005 was not cited for any steel steam generator components. In addition, the staff is seeking clarification on whether the steam generator bolting is subject to a fatigue analysis.</p> |  |

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|    |                                     |      | <p>support) exposed to secondary feedwater or steam.</p> <p>SLRA Table 3.1.2-5 does not cite GALL-SLR item 3.1-1, 005 for any steel steam generator components. Therefore, please discuss why this item was not cited for any steel steam generator components.</p> <p>The NRC staff notes that the Discussion for GALL-SLR item 3.1-1, 005 in SLRA Table 3.1-1 states, "Cumulative fatigue damage of stainless steel and steel (with stainless steel cladding), piping components and <u>bolting</u> is addressed as a TLAA in Section 4.3.1." While the steam generator bolting appears to be carbon steel, please discuss whether the steam generator bolting is subject to a fatigue analysis.</p> |  |  |
| 14 | Section B.2.3.10 of SLRA Appendix B | B-89 | <p>Section B.2.3.10 of SLRA Appendix B states, "The procedures associated with this AMP provide parameters to be monitored or inspected except for steam generator divider plates, channel heads, and tubesheets. For these latter components, visual inspections are performed at least every 72 effective full power months or every third refueling outage (RFO), whichever results in more frequent inspections." This is consistent with the "Parameters Monitored or Inspected" program element in GALL-SLR AMP XI.M19. The NRC staff notes that, like Table XI-</p>   | <p>The NRC staff is seeking clarification on whether there are any plans to take an exception to the Steam Generators program related to the frequency of the visual inspections of the steam generator divider plates, channel heads, and tubesheets.</p> |  |

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|  |  | <p>01 in the GALL-SLR, this statement does not appear in Section 19.2.2.10 in Appendices A1 and A2.</p> <p>The NRC staff is aware that on September 15, 2021 (ADAMS Accession No. ML21265A285), that Florida Power &amp; Light Company submitted a license amendment request for technical specifications conversion to Revision 5 of NUREG-1432. Given that both the St. Lucie Units 1 and 2 steam generator tubing is Alloy 690TT, the inspection period is proposed to change from 72 to 96 EFPM, which would conflict with the 72 EFPM or every third refueling outage for the visual inspections of the steam generator divider plates, channel heads, and tubesheets in the SLRA and GALL-SLR.</p> <p>During the October 7, 2021 (ADAMS Package Accession No. ML21293A117), NRC meeting with the Steam Generator Task Force, the NRC staff noted that prior to issuance of interim staff guidance that license renewal applicants may take an exception to the requirement.</p> <p>Please discuss whether there are any plans to take an exception to the Steam Generators program related to the frequency of the visual inspections of the steam generator divider plates, channel heads, and tubesheets.</p> |  |  |
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| 15 | Section 19.2.2.10 of Appendices A1 and A2 | A1-71, A2-72 | <p>Table XI-01 of the GALL-SLR states, “The technical specifications require condition monitoring (explicitly) and operational assessments (implicitly) to be performed to ensure that the tube integrity will be maintained until the next inspection.”</p> <p>Section 19.2.2.10 of Appendices A1 and A2 do not include discussion of operational assessments. Therefore, please discuss adding discussion of operational assessments to be consistent with the GALL-SLR.</p>  | The NRC staff is seeking clarification on adding discussion of operational assessments to Section 19.2.2.10 of Appendices A1 and A2 to be consistent with the GALL-SLR. |  |
| 16 | N/A                                       | N/A          | During the inservice inspection breakout session, it was noted that there is a procedure for periodically replacing the studs on the pressurizer manway covers. Is there a similar procedure for replacing the studs for the steam generator manway covers?   | The NRC staff is seeking clarification on whether there is a procedure for periodically replacing the studs for the steam generator manway covers.                      |  |
| 17 | SLRA Section B.2.3.10                     | B-88 to B-95 | As stated in SLRA Section B.2.3.10, aging of the steam generators is managed, in part, through plugging and repairs. The Operating Experience description for the Unit 1 SGs in SLRA Section B.2.3.10 states that all tube plugging (except for one tube) during the fall 2016 inspection was a result of tube wear at fan bars. The NRC staff noted that all tube plugging during the spring 2021 was also a result of wear at fan bars (Unit 1 SG Tube Inspection Report, 11/1/2021, ML21305A868). The staff also notes the tubes were plugged proactively to | Please describe how multiple fan bar wear indications in one tube are evaluated for plugging relative to single wear indications.                                       |  |

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|  |  |  | <p>ensure tube integrity is maintained until the next inspection, not because the wear reached a depth that required plugging.</p> <p>Based on the fan bar wear and tube plugging details provided in the Unit 1 spring 2021 inspection report, it appears that having multiple fan-bar wear indications on one tube influences tube integrity projections more than a single, deeper fan-bar wear indication.</p> |  |  |
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