



June 26, 2020

L-2020-094
10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington D C 20555-0001

RE: St. Lucie Unit 2
Docket No. 50-389
Renewed Facility Operating Licenses NPF-16

Supplemental Response to Request for Additional Information Regarding License Amendment Request to Modify the Reactor Coolant Pump (RCP) Flywheel Inspection Program Requirements

References:

1. Florida Power & Light Company letter, L-2019-091, License Amendment Request to Modify the Reactor Coolant Pump (RCP) Flywheel Inspection Program Requirements, October 9, 2019 (ADAMS Accession No. ML19282D338)
2. NRC electronic memorandum, RAIs for LAR to Revise Technical Specifications 6.8.4.o, "Reactor Coolant Pump Flywheel Inspection Program" March 31, 2020 (ADAMS Accession No. ML20092G344)
3. Florida Power & Light Company letter, L-2020-061, Response to Request for Additional Information Regarding License Amendment Request to Modify the Reactor Coolant Pump (RCP) Flywheel Inspection Program Requirements, April 30, 2020 (ADAMS Accession No. ML20121A170)
4. NRC electronic memorandum, Request for Supplemental Information for the First Round RAI Responses Regarding the License Amendment Request to Revise Technical Specifications 6.8.4.o, "Reactor Coolant Pump Flywheel Inspection Program", May 25, 2020

In Reference 1, Florida Power & Light Company (FPL) requested an amendment to Renewed Facility Operating License NPF-16 for St. Lucie Nuclear Plant Unit 2. The proposed license amendment modifies the St. Lucie Unit 2 Technical Specifications (TS) by revising the Reactor Coolant Pump Flywheel Inspection Program requirements consistent with the conclusions and limitations specified in NRC safety evaluation (SE), Acceptance for Referencing of Topical Report SIR-94-080, "Relaxation of Reactor Coolant Pump Flywheel Inspection Requirements", dated May 21, 1997.

In Reference 2, the NRC requested additional information necessary to complete its review. In Reference 3, FPL provided its response to the request for additional information (RAI). In Reference 4, the NRC requested information clarifying the response to RAI #2 provided in Reference 3.

The enclosure to this letter provides supplemental information supporting FPL's response to RAI #2. The supplemental information clarifies the application, does not expand the scope of the application as originally noticed, and does not alter the conclusion in Reference 1 that the changes do not involve a significant hazards consideration pursuant to 10 CFR 50.92 and there are no significant environmental impacts associated with the changes.

This letter contains no new or revised regulatory commitments.

Should you have any questions regarding this submittal, please contact Mr. Wyatt Godes, St. Lucie Licensing Manager, at (772) 467-7435.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 26, 2020.

Sincerely,



Daniel DeBoer
Site Director - St. Lucie Nuclear Plant
Florida Power & Light Company

Enclosure: FPL Supplemental Response to RAI #2

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, St. Lucie Nuclear Plant, Units 1 and 2
USNRC Senior Resident Inspector, St. Lucie Nuclear Plant, Units 1 and 2

ENCLOSURE

St. Lucie Unit 2

Supplemental Response to Request for Additional Information Regarding License Amendment
Request to Modify the Reactor Coolant Pump (RCP) Flywheel Inspection Program Requirements

In Reference 1, Florida Power & Light Company (FPL) requested an amendment to modify the St. Lucie Unit 2 Technical Specifications (TS) by revising the Reactor Coolant Pump (RCP) Flywheel Inspection Program requirements consistent with the conclusions and limitations specified in NRC safety evaluation (SE), Acceptance for Referencing of Topical Report SIR-94-080, "Relaxation of Reactor Coolant Pump Flywheel Inspection Requirements" (Reference 2). In Reference 3, the NRC requested supplemental information clarifying FPL's response to request for additional information (RAI) #2 provided in Reference 5. Specifically, the NRC requests detail clarifying how the fracture toughness values of 69.5 ksi√in and 50 ksi√in were calculated using the ASME Section XI, Appendix A equations. FPL's response follows.

RAI-2

In Section 3.5 of the enclosure to the submittal, the licensee calculated fracture toughness (K_{IC}) using empirical formulas and stated that the resulting K_{IC} values "are of greater toughness than the lower bound ASME K_{IC} vs. $T-RT_{NDT}$ curve." The staff noted that this conclusion is inconsistent with the licensee's calculation of K_{IC} in Section 3.4 of the enclosure to the submittal using equation A-4000 of ASME Code, Section XI. This is based on the fact that all the K_{IC} values using the empirical formulas were less than the ASME Code K_{IC} value.

Request: Explain the inconsistency between the statement in Section 3.5 of the enclosure to the submittal that the K_{IC} using the empirical formulas "are of greater toughness than the lower bound ASME K_{IC} vs. $T-RT_{NDT}$ curve" and the ASME Code K_{IC} calculation in Section 3.4 of the enclosure to the submittal.

FPL Response (Reference 5):

The statement in question is technically accurate but requires clarification. The values obtained by the empirical correlations exceed the ASME XI Appendix A curve at the temperatures used for the correlations (room temperature and 110°F.) It would be inappropriate to compare these values to those from section 3.4, which calculates K_{IC} using the derived RT_{NDT} of -50°F. The result of applying the correlation temperatures to the ASME Curve is summarized by the table below.

Correlation Name	Equation	Result for PSL Unit 2 (ksi√in)	
		CVN at Room Temp. (~72°F)	CVN at +110°F
Corten and Sailors	$15.5 (CVN)^{0.5}$	139.5	147.0
Roberts and Newton	$9.35(CVN)^{0.63}$	149.0	159.2
ASME XI, Appendix A	$33.2 + 20.734 \exp[0.02(T - RT_{NDT})]$	69.5	50

While not a direct comparison to the K_{IC} calculated in 3.4, the correlations do result in values that exceed both the 90 ksi√in at +100°F required by the SIA topical report (Reference 2), and ASME XI Appendix A values for similar temperatures.

Note 1 - Section 3.4 of the LAR reported a K_{IC} of 449 ksi√in. However, the ASME K_{IC} vs. $T-RT_{NDT}$ curve is truncated above 200 ksi√in, and 200 ksi√in is considered the maximum attainable K_{IC} using the ASME XI, Appendix A, curve.

Note 2 - A similar justification was accepted by the NRC for Millstone Nuclear Power Station, Unit 2 (Reference 4), albeit with a higher RT_{NDT} (+40°F versus -50°F for St. Lucie Unit 2), which correlates to lower toughness.

FPL Supplemental Response:

The reviewer is using the temperature at which corollary Charpy V Notch (CVN) test values are obtained as the operating temperature "T" in the $(T - RT_{NDT})$ portion of the K_{IC} equation, and the resulting values do not align with the response statement that they exceed the ASME K_{IC} curve. Please note that the values in the response reflect the result when these temperatures are used for RT_{NDT} and not the operating temperature. See below:

$$K_{IC} = 33.2 + 20.734\exp[0.02(T - RT_{NDT})] = 33.2 + 20.734\exp[0.02(100 - 72)] = 69.5\text{ksi}\sqrt{\text{in}}$$

AND

$$K_{IC} = 33.2 + 20.734\exp[0.02(T - RT_{NDT})] = 33.2 + 20.734\exp[0.02(100 - 110)] = 50\text{ksi}\sqrt{\text{in}}$$

This makes a very conservative assumption that RT_{NDT} is the temperature at which CVN values were obtained (72°F and 110°F), and shows that the correlation derived K_{IC} values exceed the corresponding ASME K_{IC} curve values for that value of RT_{NDT} and an operating temperature of 100°F.

References:

1. Florida Power & Light Company letter, L-2019-091, License Amendment Request to Modify the Reactor Coolant Pump (RCP) Flywheel Inspection Program Requirements, October 9, 2019 (ADAMS Accession No. ML19282D338)
2. NRC letter to Director, Nuclear Safety Division, Entergy Operations, Inc., Acceptance for Referencing of Topical Report SIR-94-080, Relaxation of Reactor Coolant Pump Flywheel Inspection Requirements, May 21, 1997 (ADAMS Legacy Accession Nos. 9706230099 and 9706240192).
3. NRC electronic memorandum, Request for Supplemental Information for the First Round RAI Responses Regarding the License Amendment Request to Revise Technical Specifications 6.8.4.o, "Reactor Coolant Pump Flywheel Inspection Program", May 25, 2020
4. NRC letter to Dominion Nuclear Connecticut, Inc. Millstone Nuclear Power Station, Unit No. 2 - Issuance of Amendment RE: Reactor Coolant Pump Flywheel Inspection; February 1, 2002 (ADAMS Accession No. ML013370406)
5. Florida Power & Light Company letter, L-2020-061, Response to Request for Additional Information Regarding License Amendment Request to Modify the Reactor Coolant Pump (RCP) Flywheel Inspection Program Requirements, April 30, 2020 (ADAMS Accession No. ML20121A170)