

From: Michael Mahoney
Sent: Monday, August 14, 2023 9:27 AM
To: Phillabaum, Jerry
Cc: Mack, Jarrett
Subject: Request for Additional Information - St. Lucie Plant, Units 1 and 2 - Adopt 10 CFR 50.69 (L-2022-LLA-0182)
Attachments: St. Lucie 50.69 RAIs.pdf

Hi Jerry,

By application dated December 2, 2022 (ADAMS Accession No. ML22243A161) as supplemented by letter dated July 27, 2023 (ML22336A071), Florida Power and Light Company (FPL, the licensee) submitted a license amendment request (LAR) for the St. Lucie Plant, Units 1 and 2. The proposed LAR would modify the licensing basis by the addition of a license condition to allow for the implementation of the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors."

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has identified areas where additional information is needed to complete its review.

As discussed, response to the attached RAIs is requested no later than 30 business days from today's date.

The NRC staff considers that timely responses to RAIs help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. If circumstances result in the need to revise the requested response date, please contact me.

Once this email is added to ADAMS, I will provide the accession number.

Thanks

Mike Mahoney

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REQUEST FOR ADDITIONAL INFORMATION (RAI)

LICENSE AMENDMENT REQUEST TO ADOPT 10 CFR 50.69, RISK-INFORMED

CATEGORIZATION AND TREATMENT OF STRUCTURES, SYSTEMS, AND

COMPONENTS

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE, UNITS 1 AND 2

DOCKET NOS. 50-335 AND 389

EPID L-2022-LLA-0182

RAI-01 (APLA) – Credit for FLEX Equipment and Actions

NRC memorandum dated May 6, 2022¹, provides the NRC's staff updated assessment of identified challenges and strategies for incorporating Diverse and Flexible Mitigation Capability (FLEX) equipment into a PRA model in support of risk-informed decisionmaking in accordance with the guidance of RG 1.200². The staff considers the May 6, 2022, memorandum to be applicable to any other portable equipment credited in PRA models.

With regards to equipment failure probability, in the memorandum dated May 6, 2022, the NRC staff states in Conclusion 4:

Licensees that choose not to use the generic failure probabilities in PWROG-10842 to develop plant-specific failure probabilities for portable FLEX equipment modeled in PRA used for risk-informed applications should submit a justification for the methods and probabilities used to the NRC for review and approval.

With regards to the uncertainty related to equipment failure probabilities, in the updated NRC memorandum, the NRC staff states in Conclusion 8:

PWROG-18043, Revision 1, notes that there was insufficient data to quantify the failure to load probabilities for portable diesel generators due to lack of detailed data. To account for the uncertainty in the testing activities...licensees should ensure their preventive maintenance strategies include such testing and that the data reported provides this information. ...licensees should continue to assess the uncertainty in equipment failure rates and address or disposition it.

With regards to HRA, in the memorandum dated May 6, 2022, the NRC staff states, in part, in Conclusion 11:

¹ U.S. NRC memorandum, "Updated Assessment of Industry Guidance for Crediting Mitigating Strategies in Risk Assessments," dated May 6, 2022 (ADAMS Accession No. ML22014A084).

² U.S. Nuclear Regulatory Commission, "Acceptability of Probabilistic Risk Assessment Results for Risk-Informed Activities," RG 1.200, Revision 3, December 2020 (ADAMS Accession No. ML20238B871).

EPRI 3002013018 provides updated detailed industry guidance for estimating the human error probabilities (HEPs) of the actions needed to implement mitigating strategies using portable equipment. EPRI 3002013018 provides guidance that is acceptable to the NRC, with the clarifications below...

With regards to PRA Upgrade, the staff states in the update memorandum in Conclusion 2:

Therefore, Conclusion 2 remains unchanged [that] for any new risk-informed application that has incorporated mitigating strategies...the licensee should either perform a focused-scope peer review of the PRA model or demonstrate [that it does not meet the three criteria of an PRA Upgrade].

The NRC staff understands the St. Lucie, Units 1 and 2 (St Lucie or PSL) PRA models does not incorporate FLEX equipment and mitigation strategies but includes other portable equipment in the PRA models used for this application.

- a) Clarify if the St. Lucie PRA models credit any portable equipment during the categorization process. If portable equipment is credited, then respond to the following parts.
- b) Describe the methodology used to assess the failure probabilities of any modeled portable equipment credited in the licensee's PRA model. The discussion should include a justification of the rationale for parameter values, and how the uncertainties associated with the parameter values are considered in the categorization process in accordance with ASME/ANS RA-Sa-2009³, as endorsed by RG 1.200 (e.g., supporting requirements for HLR-DA-D).
- c) A discussion detailing the methodology used to assess operator actions related to portable equipment and the licensee personnel that perform these actions. The discussion should include:
 - i. A summary of how the licensee evaluated the impact of the NRC clarification with regards in using the EPRI 3002013018 FLEX HRA methodology.
 - ii. Provide updated portable equipment HRA results, if required, to address the NRC clarifications.
 - iii. Provide justification that the use of the EPRI FLEX HRA methodology does not meet the definition of an PRA Upgrade as defined by RG 1.200.

-OR-

Propose a mechanism to conduct a focused-scope peer review (FSPR) regarding incorporation of the EPRI FLEX HRA method for the St. Lucie

³ American Society of Mechanical Engineers (ASME) and American Nuclear Society (ANS) PRA standard ASME/ANS RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications", February 2009, New York, NY (Copyright).

PRA models. Include in the mechanism to close out all F&Os that result from the FSPR prior to implementing the categorization process.

- d) Provide an assessment, such as a sensitivity study, of the impact on risk associated with the uncertainty in portable equipment and operator action failure rates credited in St. Lucie's PRA models. This assessment should include, if required, any modifications to portable equipment modeling based on the issues raised in this question. Include in this discussion the impact of SSC risk importance associated with the uncertainty in portable equipment and operator action failure rates on the categorization process (e.g., an SSC goes from low safety significance in the base case to high safety significance in the sensitivity case).

RAI-02 (APLA) – Determination of Key Sources of Uncertainty for the 10CFR50.69 Categorization Process and Sensitivity Results

Sections 50.69(c)(1)(i) and 50.69(c)(1)(ii) of 10 CFR require that a licensee's PRA be of sufficient quality and level of detail to support the SSC categorization process, and that all aspects of the integrated, systematic process used to characterize SSC importance must reasonably reflect the current plant configuration and operating practices, and applicable plant and industry operational experience. The guidance in NEI 00-04 specifies that sensitivity studies be conducted for each PRA model to address uncertainty. The sensitivity studies are performed to ensure that assumptions and sources of uncertainty (e.g., human error, common cause failure, and maintenance probabilities) do not mask the importance of components. The guidance in NEI 00-04 states that additional "applicable sensitivity studies" from characterization of PRA adequacy should be considered.

Section 3.2.8 of the LAR Enclosure describes the process used for reviewing the PRA assumptions and sources of uncertainty. The NRC staff reviewed the uncertainty documents provided on this audit's electronic portal for the internal events, internal flooding, and fire PRA and found that further clarification is necessary regarding the review of assumptions and sources of uncertainty for this application. It is unclear if additional analysis was performed and documented to determine if any source of uncertainty could adversely impact any SSC categorization. Some portal documents referred to sensitivity studies that are contained in other documents, however these sensitivity results were not provided on the portal. In light of these observations, provide the following information:

- a) Provide details of how the PSL PRA sources of uncertainty were evaluated as a potential key source of uncertainty for this application. Include in this discussion any documentation of this process.
- b) Provide the results of sensitivity studies that determined the impact on risk for each associated source of uncertainty. Include in this discussion justification that the sensitivity results demonstrate that the associated source of uncertainty does not adversely impact any SSC categorization.

RAI-03 (APLA) – Open F&O CS-B1-01 Concerning Circuit Coordination

Regulatory Guide (RG) 1.200, Revision 3 "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-informed Activities," (ADAMS Accession No. ML20238B871), provides guidance for addressing PRA acceptability. RG 1.200

describes a peer review process utilizing the ASME/ANS PRA standard (currently ASME/ANS-RA-Sa-2009) as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established for evaluations that could influence the regulatory decision. The primary results of a peer review are the F&Os recorded by the peer review and the subsequent resolution of these F&Os. A process to close-out Finding-level F&Os is documented in NEI 17-07, Revision 2, "Performance of PRA Peer Reviews Using the ASME/ANS PRA Standard" (ADAMS Accession No. ML19231A182) that is endorsed by RG 1.200, Revision 3.

LAR Attachment 3 "Disposition and Resolution of Open Peer Review Findings and Self-Assessment Open Items" presents a Finding-level F&O (i.e., CS-B1-01) which states:

No evaluation was performed to verify that the new components and cables associated with the Fire PRA is bounded by existing overcurrent coordination analysis.

The St. Lucie disposition for Finding CS-B1-01 states:

This finding has been resolved, but independent review to certify closure has not yet been completed. This has no impact on 10 CFR 50.69 implementation.

LAR Section 3.3 explains that in "April 2019, the Pressurized Water Reactor Owners Group performed an independent assessment and certified that all F&Os generated for PSL were closed except for fire-related items in Attachment 3." Since April 2019, it appears there have been efforts to resolve Finding CS-B1-01.

In the file identified as "AR for None-Safety Related MCC 1A3 & 1B3 Breaker Coordination.pdf," it is stated that during review of coordination calculation, PSL-1FSE-09-001, it was discovered there were feeder breakers for loads downstream of non-safety related motor control center (MCCs) 1A3 and 1B3 modeled in the fire PRA that were not "fully coordinated." In another file identified as "AR 2318093 Enhance Non-Safety MCC BRKS Coord for the Fire PRA Modeling," it is stated for MCC 1A3 and 1B3 that "enough margin exists to shift their current time current characteristics (TCC) to the right without challenging coordination with the upstream load center breakers." This statement appears to indicate that some adjustment is needed to the TCC of these breakers to resolve the coordination issue. It is not completely clear to NRC whether the adjustment has been made to resolve the coordination issue associated with MCC 1A3 and 1B3, which are credited in the PRA, has been resolved.

NRC staff notes that circuit breakers and fuses should be adequately coordinated with the upstream load center breaker over the rated range of the circuit, to prevent the adverse effects of a fault on the rest of the circuits powered from a common source. If circuits modelled in the fire PRA cannot be found to be coordinated, then the coordination issues should be physically resolved, or the negative effects of the coordination issue should be modelled in the fire PRA.

It appears that an evaluation has been performed and was documented in a cited report (i.e., PSL-1FSE-09-001) to evaluate whether new components and cables associated with the Fire PRA are bounded by existing overcurrent coordination analysis as requested in Finding CS-B1-01. In the file identified as "AR 2318092 NRC TFP1 SR MCCS Potential Lack of Coordination.pdf," it is stated that three generic sources of potential weaknesses in circuit coordination on Unit 1 Safety-Related MCCs were identified but were shown not to be a concern to safe shutdown or impact PRA risk. Accordingly, it appears that Safety-Related MCCs are not a concern but certain non-Safety-Related MCCs are a concern. However, the full scope content of PSL-1FSE-09-001 is not known.

Given the observations above, address the following:

- a) Confirm that Finding CS-B1-01 has been closed using an NRC approved F&O closure process,

- OR -

- b) Commit to a licensee condition (e.g., an implementation item) that ensures Finding CS-B1-01 will be closed using an NRC approved F&O closure process prior to implementation of the 10 CFR 50.69 risk categorization program.

- OR -

- c) Describe the evaluation that was performed to verify that the new (non-safe shutdown) components and cables modeled in the fire PRA are bounded by existing overcurrent coordination analysis. Also, describe actions (if any) performed after the evaluation to ensure circuit coordination. Include in this description:
 - i. Discussion of how the evaluation assures that new (non-safe shutdown) components and cables modeled in the Fire PRA are bounded by existing overcurrent coordination analysis.
 - ii. Discussion of the results of the evaluation discussed above.
 - iii. If certain circuits were found to uncoordinated by the evaluation, then describe the efforts undertaken that resolve the coordination issue(s), or demonstrate (e.g., through a sensitivity study) that the impact of the coordination issues do not have a consequential impact on 10 CFR 50.69 risk categorization.

RAI-04 (APLA) – Open F&O CS-A3-01 Concerning MSO of Fire PRA Components

Regulatory Guide (RG) 1.200, Revision 3 “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-informed Activities,” (ADAMS Accession No. ML20238B871), provides guidance for addressing PRA acceptability. RG 1.200 describes a peer review process utilizing the ASME/ANS PRA standard (currently ASME/ANS-RA-Sa-2009) as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established for evaluations that could influence the regulatory decision. The primary results of a peer review are the F&Os recorded by the peer review and the subsequent resolution of these F&Os. A process to close-out Finding-level F&Os is documented in NEI 17-07, Revision 2, “Performance of PRA Peer Reviews Using the ASME/ANS PRA Standard” (ADAMS Accession No. ML19231A182) that is endorsed by RG 1.200, Revision 3.

LAR Attachment 3 “Disposition and Resolution of Open Peer Review Findings and Self-Assessment Open Items” presents a Finding-level F&O (i.e., CS-A3-01) which states:

4kV power and 125VDC control cables required to support the operation of the Containment Spray Pump were not identified. Fire PRA Plant Response model and other Fire PRA support tasks are adversely affected. Perform a comparison of the components identified on the MSO (multiple spurious operation) list against the Fire PRA components for which new cable selection was performed (i.e., components not previously identified on the Appendix R safe shutdown equipment list. Verify that the cable selection for the common components supports all credited operations. Fire PRA Plant Response model and other Fire PRA support tasks are adversely affected.

The St. Lucie disposition for Finding CS-A3-01 states:

This finding has been resolved, but independent review to certify closure has not yet been completed. This has no impact on 10 CFR 50.69 implementation.

Again, LAR Section 3.3 explains that in “April 2019, the Pressurized Water Reactor Owners Group performed an independent assessment and certified that all F&Os generated for PSL were closed except for fire-related items in Attachment 3.” Since April 2019, it appears there have been efforts to resolve the Finding CS-A3-01.

In license report PSL-BFJR-16-039 (non-public) “St Lucie NFPA 805 – Task 2 Component and Cable Selection,” dated August 24, 2020, it is explained that to address Multiple Spurious Operations (MSO) for the fire PRA a review using an expert panel process is performed to identify and characterize potential MSO combinations that lead to new accident sequences. In license report FPL-SL120-PR-001 (non-public), “Update Review for St. Units 1 and 2 Cable-to-Fire-to-Compartment Relationships,” an “MSO” designator is assigned a large fraction of the plant components. However, NRC staff could not conclude after reviewing these two reports that the circuits of concern cited in the Finding had been identified (i.e., 4kV power and 125VDC control cables required to support the operation of the Containment Spray Pump). Moreover, NRC staff could not confirm whether components in the MSO list were compared to the fire PRA component list to identify additional circuits that may need to be selected or ensure that cable selection for common components supports all credited operations. Given the observations above, address the following:

- a) Confirm that Finding CS-A3-01 has been closed using an NRC approved F&O closure process,

-OR -

- b) Commit to a licensee condition (e.g., an implementation item) that ensures Finding CS-A3-01 will be closed using an NRC approved F&O closure process prior to implementation of the 10 CFR 50.69 risk categorization program.

OR

- c) Describe the evaluation that was performed to 1) compare the components identified on the MSO list to the fire PRA component list to identify additional circuits that may need to be selected, 2) ensure that cable selection for common components supports all credited operations, and 3) identify the 4kV power and 125VDC control cables required to the operation of the Containment Spray Pump were identified for the fire PRA.

RAI-05 (APLA) – Status of Fire F&Os

Regulatory Guide (RG) 1.200, Revision 3 “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-informed Activities,” (ADAMS Accession No. ML20238B871), provides guidance for addressing PRA acceptability. RG 1.200 describes a peer review process utilizing the ASME/ANS PRA standard (currently ASME/ANS-RA-Sa-2009) as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established for evaluations that could influence the regulatory decision. The primary results of a peer review are the F&Os recorded by the peer review and the subsequent resolution of these F&Os. A process to close-out Finding-level F&Os is documented in NEI 17-07, Revision 2, “Performance of PRA Peer Reviews Using the ASME/ANS PRA Standard” (ADAMS Accession No. ML19231A182) that is endorsed by RG 1.200, Revision 3.

The NRC staff reviewed the peer review and closure review documents provided on this audit's electronic portal regarding open F&Os and found that further clarification is necessary regarding the status of three fire F&Os. The licensee document PSL-FJR-17025 (non-public) regarding the January 2010 fire PRA peer review states in Section 4 and Table 4-15 that a total of thirty-six findings were determined by the review team. The NRC staff notes that the documents PSL-BFJR-18-020 and PSL-BFJR-19-005 (non-public) state that only thirty-three fire PRA findings were reviewed on both occasions. It is unclear to the staff the correct status of the F&Os closed out after the August 2018 're-review.'

- a) Provide clarification of the F&Os (all models) that were closed out after the August 2018 review.
- b) Identify, if any, F&Os that were not assessed as closed by a closure review team. Include in this discussion the disposition of these F&Os for this application.

RAI-06 (APLA) – Status of PRA Upgrades Associated with F&Os

Regulatory Guide (RG) 1.200, Revision 3 "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-informed Activities," (ADAMS Accession No. ML20238B871), provides guidance for addressing PRA acceptability. RG 1.200 describes a peer review process utilizing the ASME/ANS PRA standard (currently ASME/ANS-RA-Sa-2009) as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established for evaluations that could influence the regulatory decision. The primary results of a peer review are the F&Os recorded by the peer review and the subsequent resolution of these F&Os. A process to close-out Finding-level F&Os is documented in NEI 17-07, Revision 2, "Performance of PRA Peer Reviews Using the ASME/ANS PRA Standard" (ADAMS Accession No. ML19231A182) that is endorsed by RG 1.200, Revision 3.

The NRC staff reviewed the peer review and closure review documents provided on this audit's electronic portal regarding open F&Os and found that further clarification is necessary regarding the disposition of closed F&Os that resulted in PRA Upgrades. The NRC staff notes that the August 2018 closure review (PSL-BFJR-19-005, non-public) states that the independent assessment team (IAT) determined that four fire F&Os (F-5 (ES-C1-01), F-6 (ES-CW-01), F-8 (FQ-C1-01), and F-24 (HRA-C1-01) remained open since the associated changes to the PRA model constituted a PRA Upgrade that required a focused-scope peer review (FSPR). The subsequent IAT report PSL-BFJR-19-024 (non-public) issued in April 2019 identified the F-5, F-6, F-8, and F-24 F&Os as PRA Maintenance. The 2019 IAT appears to have performed an FSPR on three different closed fire F&Os (IGN-A5-01, SF-A1-01, and FSS-H1-01). It is unclear to the NRC staff the inconsistency between the two IATS concerning the F-5, F-6, F-8, and F-24 F&Os.

- a) Provide a description of the F&Os, the associated model changes for addressing the F&Os, a summary of the IAT evaluation of these F&Os from the August 2018 and the April 2019 F&O closures.
- b) Provide clarification of the PRA model changes associated with the closure of the F-5, F-6, F-8, and F-24 F&Os and detailed justification why these changes do not constitute a PRA upgrade. Include in this discussion an explanation on the two different IAT assessments.

- c) Propose a mechanism, if any of the four F&Os were determined to be PRA Upgrades, to perform a FSPR and close any associated F&O prior to implementation of the categorization process.

RAI-07 (APLC) – Seismic Tier 1 GMRS vs SSE Criteria

Paragraph 50.69(b)(2)(ii) of 10 CFR requires that the measures taken to assure that the quality and level of detail of the systematic processes that evaluate the plant for external events during operation are adequate for the categorization of SSCs.

Section 3.2.3 of the LAR Enclosure references the EPRI 3002017583 Tier 1 criteria for the Ground Motion Response Spectrum (GMRS) of below or approximately equal to the Safe Shutdown Earthquake (SSE) between 1.0 and 10.0 Hertz. The LAR continues by stating that the St. Lucie response to the NRC 50.54(f) letter, regarding post-Fukushima recommendations, concluded that the plant SSE exceeded the GMRS in the specified frequency range. However, the staff notes that no curves showing the SSE and GMRS and their comparison are provided in the LAR.

Provide an SSE/GRMS hazard curve comparison demonstrating that the Tier 1 criteria are met for the appropriate frequency band.

RAI-08 (APLC) – External Hazards Screening

Section 2.3.1, Item 7, of NEI 06-09-A, states that the “impact of other external events risk shall be addressed in the RMTS program,” and explains that one method to do this is by documenting prior to the RMTS program that external events that are not modeled in the PRA are not significant contributors to configuration risk. The NRC staffs SE for NEI 06-09 states that “[o]ther external events are also treated quantitatively, unless it is demonstrated that these risk sources are insignificant contributors to configuration-specific risk.”

In Attachment 4 (External Hazards Screening) of the LAR Enclosure, the licensee screens the External Flood hazard as C1, “Event damage is < events for which plant is designed.” Staff notes that a flood hazard reevaluation report (FHRR) was submitted for PSL Units 1 and 2 (ADAMS Accession No. ML15083A306; 2015). However, the application does not appear to include this report in its screening analysis.

With regards to external flooding, according to the FHRR, all flood causing mechanisms, except Local Intense Precipitation (LIP) and Probable Maximum Storm Surge (PMSS) associated with the Probable Maximum Hurricane (PMH), are bounded by the current licensing basis (CLB). The NRC December 15, 2017, staff assessment of the PSL Flood Evaluation (FE) (ADAMS ML17325B630) concluded that effective flood protection, *if appropriately implemented*, exists at PSL. Regarding Unit 2, portable stop logs are used for flood protection when directed by procedure. The NRC staff notes that Criterion C1 is provided within the context of the design basis and notes that the use of temporary barriers contingent on procedural compliance and operator action is usually not considered as part of the design basis. It is unclear to the NRC staff if the use of stop logs (as portable equipment) is allowed to be part of the licensing basis since it requires significant operator action.

- a) Confirm the use of Unit 2 stop logs for flood protection is part of the PSL CLB.

- b) If the Unit 2 stop logs are not part of the PSL CLB, then provide additional justification, such as a second screening criterion, that would allow the screening of external flooding when using procedurally directed installation of the stop logs as temporary barriers.