UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 26, 2024

Bob Coffey
Executive Vice President, Nuclear
and Chief Nuclear Officer
Florida Power & Light Company
700 Universe Blvd.
Mail Stop: EX/JB
Juno Beach, FL 33408

SUBJECT: ST. LUCIE PLANT, UNIT NO. 1 – REVISION TO THE REACTOR VESSEL MATERIAL SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE (EPID L-2024-LLL-0002)

Dear Bob Coffey:

By letter dated February 27, 2024, the Florida Power and Light (FPL) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for staff review and approval for a revision to the reactor vessel material surveillance capsule withdrawal schedule for the St. Lucie Plant, Unit No. 1 facility. The revised schedule was submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," III.B.3.

The NRC staff has reviewed FPL's withdrawal schedule revision request and concludes, as set forth in the enclosed safety evaluation, that the revised surveillance capsule withdrawal schedule for St. Lucie, Unit No. 1, is acceptable because (1) it addresses applicable aspects of Appendix H to 10 CFR Part 50 (i.e., monitor changes in the fracture toughness properties of the reactor pressure vessel) and (2) it aligns with the recommendations in NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," for the subsequent period of extended operation (i.e., 80-years).

Sincerely,

DAVID WRONA

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David J. Wrona, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure:
Safety Evaluation

cc: Listserv

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR REVISION TO

REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM

WITHDRAWAL SCHEDULE

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT, UNIT NO. 1

DOCKET NO. 50-335

1.0 INTRODUCTION

By letter dated February 27, 2024 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML24058A115), Florida Power & Light Company (FPL, the licensee) requested revision of the reactor vessel material surveillance capsule withdrawal schedule for the St. Lucie Plant (PSL), Unit No. 1.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," Section III.B.3, a proposed withdrawal schedule must be submitted with a technical justification as specified in § 50.4 and must be approved prior to implementation. Specifically, the licensee proposed to revise the reactor vessel material surveillance capsule withdrawal schedule so that (1) the 263-degree capsule is removed from the reactor vessel after 46 effective full-power year (EFPY) of operation such that it is exposed to a neutron fluence of 4.6×10^{19} neutron per square centimeter (n/cm^2) and (2) the 83-degree capsule is removed from the reactor vessel after 62 EFPY of operation such that it is exposed to a neutron fluence of 6.38×10^{19} n/cm^2.

2.0 REGULATORY EVALUATION

The regulations and guidance pertinent to this request include:

Section I of Appendix H to 10 CFR Part 50 states, in part:

> The purpose of the [reactor vessel] material surveillance program required by this appendix is to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light water nuclear power reactors which result from exposure of these materials to neutron irradiation and

> the thermal environment. Under the program, fracture toughness test data are obtained from material specimens exposed in surveillance capsules, which are withdrawn periodically from the reactor vessel.

Section III(B)(3) of Appendix H to 10 CFR Part 50 states:

> A proposed withdrawal schedule must be submitted with a technical justification as specified in [10 CFR 50.4]. The proposed schedule must be approved prior to implementation.

Administrative Letter 97-04, "NRC [U.S. Nuclear Regulatory Commission] Staff Approval for Changes to 10 CFR Part 50, Appendix H, Reactor Vessel Surveillance Specimen Withdrawal Schedules," dated September 30, 1997, states, in part:

> The Commission found that while 10 CFR Part 50, Appendix H, II.B.3 requires prior NRC approval for all withdrawal schedule changes, only certain changes require license amendments as the process to be followed for such approval. Specifically, those changes that do not conform to the ASTM standard referenced in Appendix H (ASTM E-185, Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels) will require approval by the license amendment process, whereas changes that conform to the ASTM standard require only staff verification of such conformance.

3.0 NRC STAFF EVALUATION

By letter dated August 3, 2021 (ML21215A314), the licensee submitted an application for the subsequent license renewal for the St. Lucie Plant, Unit Nos. 1 and 2, pursuant to 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." NRC Memorandum and Order CLI-22-03, as issued on February 24, 2022 (ML22055A521), stated, in part, that in recognition of the need to correct a deficiency in the National Environmental Policy Act (NEPA), the NRC will not issue any further licenses for subsequent renewal terms for nuclear plants until the NRC staff has completed an adequate NEPA review for each license renewal application. The NRC staff issued the Safety Evaluation Related to the Subsequent License Renewal of St. Lucie Plant, Unit Nos. 1 and 2, on September 1, 2023 (ML23219A003).

Given the NRC policy described in CLI-22-03 and its impacts to the review of the PSL, Unit Nos. 1 and 2, subsequent license renewal application, the staff noted that the rationale for the subject request is to revise the surveillance capsule withdrawal schedule in the Current Licensing Basis (CLB) for the PSL, Unit No. 1 to be consistent with the one that was reviewed and found acceptable to the NRC in its safety evaluation dated September 1, 2023.

Table 4.3-18 of the PSL Unit No. 1 Final Safety Analysis Report (FSAR) indicates that the peak neutron fluence at clad-base metal interface of the reactor vessel at 54 EFPY is 4.21×10^{19} n/cm^2. The staff noted that consistent with the licensee's CLB, as approved by the NRC staff during the review of its initial license renewal application, the withdrawal and testing of the 263-degree capsule is to coincide with the time when the accumulated neutron fluence of the capsule corresponds to the approximate end of life (EOL) fluence at the reactor vessel inner wall location. The staff finds that the licensee's proposal to withdraw the 263-degree capsule after 46 EFPY of operation in order for the capsule to be exposed to a neutron fluence of 4.6 x

10^{19} n/cm^2 achieves the same objective for this capsule as contained in the licensee's CLB, which is explained in NUREG-1779, "Safety Evaluation Report Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2" (ML032940205). Additionally, the staff noted that the proposed schedule for the 263-degree capsule is also consistent with the guidelines in ASTM E185-82 for the EOL capsule, which is to be withdrawn at not less than once or greater than twice the peak EOL (i.e., 60-years of operation for PSL, Unit No. 1) vessel fluence.

The staff noted that NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," provides the staff's recommendation of aging management programs that the staff determined are adequate for the subsequent period of extended operation. Specifically, NUREG-2191, Section XI.M31, "Reactor Vessel Material Surveillance," recommends that this program "includes withdrawal and testing of at least one capsule addressing the subsequent period of extended operation with a neutron fluence of the capsule between one and two times the peak neutron fluence of interest at the end of the subsequent period of extended operation." PSL, Unit Nos. 1 and 2, Subsequent License Renewal Application Section 4.2.1 indicates that the 72 EFPY bounding peak neutron fluence at clad-base metal interface of the reactor vessel is 6.38 x 10^{19} n/cm^2. The staff noted that the proposed withdrawal of the 83-degree capsule after 62 EFPY of operation in order for the capsule to be exposed to a neutron fluence of 6.38 x 10^{19} n/cm^2 achieves at least one time, but not exceeding two times, the maximum neutron fluence expectations for 80 years of operation.

The staff determined that the proposed withdrawal schedule for the 83-degree capsule will accomplish addressing (1) the underlying purpose for Appendix H to 10 CFR Part 50 (i.e., monitor changes in the fracture toughness properties of the reactor pressure vessel) and (2) recommendations in NUREG-2191 for the subsequent period of extended operation (i.e., 80-years). Therefore, the staff finds that the licensee's proposed withdrawal schedule for the 83-degree capsule to be tested following its withdrawal, is acceptable. The staff concludes that the withdrawal and testing of 83-degree capsule supplements the requirements of the reactor vessel material surveillance program for the current license period (i.e., 60 years of operation) at PSL, Unit No. 1.

4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the revised surveillance capsule withdrawal schedule for the 263-degree and 83-degree capsules for PSL, Unit No. 1, to be withdrawn after 46 EFPY and 62 EFPY, respectively, is acceptable and approves this revised surveillance capsule withdrawal schedule. The NRC staff does not make any conclusions in this staff assessment regarding the use of the 83-degree capsule in potential future licensing applications.

Principal Contributors: O. Yee, NRR
J. Tsao, NRR

Date: March 26, 2024

SUBJECT: ST. LUCIE PLANT, UNIT NO. 1 – REVISION TO THE REACTOR VESSEL MATERIAL SURVEILLANCE CAPSULE WITHDRAWAL SCHEDULE (EPID L-2024-LLL-0002) DATED MARCH 26, 2024

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ADAMS Accession No.: ML24078A262 ***by email** **NRR-106**

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