



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

September 26, 2023

The Honorable Christopher T. Hanson  
Chair  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT:     REPORT ON THE SAFETY ASPECTS OF THE SUBSEQUENT LICENSE  
                  RENEWAL APPLICATION REVIEW OF ST. LUCIE PLANT, UNITS 1 AND 2**

Dear Chair Hanson:

During the 708<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards (ACRS), September 6-8, 2023, we completed our review of the subsequent license renewal (SLR) application for the St. Lucie Plant, Units 1 and 2 (St. Lucie), and the associated safety evaluation report prepared by staff. Our review considered actions by the Florida Power & Light Company (FPL) to extend the license of each unit by 20 years beyond the currently approved 60 years of licensed operation. During this review, we had the benefit of discussions with representatives of the staff and FPL. We also had the benefit of the referenced documents. This report fulfills the requirement of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 54.25 that the ACRS review and report on all license renewal applications.

**CONCLUSION AND RECOMMENDATION**

1. The established programs and the commitments made by FPL to manage age-related degradation provide confidence that St. Lucie can be operated in accordance with its current licensing basis for the subsequent period of extended operation (SPEO) without undue risk to the health and safety of the public.
  
2. The FPL application for the SLR of the operating licenses for St. Lucie should be approved.

**BACKGROUND**

The St. Lucie Plant, which includes two units, is in Jensen Beach, FL. Each unit consists of a pressurized water reactor with licensed output of 3,020 megawatts thermal (MWt). The Nuclear Regulatory Commission (NRC) issued the initial operating licenses on March 1, 1976, for Unit 1, and April 6, 1983, for Unit 2. The NRC issued the first 20 year renewed operating licenses on October 2, 2003.

In this application, FPL requests renewal of the operating licenses for an additional 20 years beyond the expiration of their current renewed licenses. The licenses would be extended to March 1, 2056, for Unit 1, and April 6, 2063, for Unit 2.

## DISCUSSION

Staff reviewed FPL's application for SLR in accordance with the Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) and the Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants (SRP-SLR) guidance documents. Conformance with this guidance provides the bases for a staff conclusion that an applicant for a license renewal of 20 additional years beyond its current approved license for 60 years will assure adequate protection of the public throughout the SPEO.

Significant generic issues challenging the industry for plant operation beyond 60 years include: reactor pressure vessel embrittlement; irradiation-assisted stress corrosion cracking of reactor internals; concrete structures and containment degradation; and electrical cable environmental qualification, condition monitoring, and assessment. Each of these items has been addressed by FPL and evaluated by staff through the review process. We concur with the staff's safety evaluation regarding these issues.

FPL submitted an SLR application for the St. Lucie plant in October 2021. FPL applied SLR lessons learned from previous applications, requests for additional information, and internal aging management program (AMP) experience in preparation of the St. Lucie SLR application. An experienced multidisciplinary team of corporate, site, and consultant personnel was assembled to develop the SLR application. The team interviewed the St. Lucie SLR AMP owners in 2020 using Electric Power Research Institute (EPRI) guidance to gain their site-specific implementation experience. The St. Lucie SLR application was also informed by initial St. Lucie license renewal AMP effectiveness reviews performed using elements of Nuclear Energy Institute (NEI) guidance document NEI 14-12. FPL followed the GALL-SLR, the SRP-SLR, and SLR interim staff guidance, resulting in a thorough SLR application.

FPL has been making improvements in the St. Lucie facility based upon equipment performance monitoring. Significant modifications have been implemented on important plant systems. Primary system modifications included replacement of the reactor vessel heads and steam generators for both units. Key secondary system modifications were also implemented for each unit, including replacement of the high- and low-pressure turbine steam paths and the moisture separator/reheaters. The main steam valves have been upgraded, and the main steam bypass control system capacity has been increased. The main feedwater pumps and heater drain pumps have been replaced, and the steam generator flow control valves were upgraded. Power delivery improvements include replacement of the main generator rotor, rewinding of the stators and replacement of the main transformers. The main generator hydrogen coolers and the turbine plant cooling water heat exchangers have also been replaced. These improvements extend the life of existing structures, systems, and components, provide additional operational margin, and demonstrate a commitment to maintain the St. Lucie units in good material condition in support of safe operation.

The Unit 1 steam generators were replaced prior to initial license renewal using the original equipment manufacturer. The Unit 2 steam generators were replaced just prior to the extended power uprate (EPU) using a different manufacturer. In our letter report on the EPU for Unit 2, we noted unexpected tube wear, primarily at anti-vibration bar (AVB) locations. Post EPU inspections performed by FPL of the Unit 2 steam generators have indicated that wear rates at AVBs are attenuating. Steam generator performance, including the wear rates, will continue to be monitored through the AMP.

During our discussions, we inquired about whether the material condition of structures at St. Lucie were being adversely affected by the saltwater environment surrounding the plant. While there is some evidence of degradation due to this salt environment, the aging is being acceptably managed by FPL.

FPL will implement 47 AMPs for SLR, comprised of 36 existing programs and 11 new programs. Of the new programs, all are consistent with the GALL-SLR report. Of the 36 existing programs, 6 are consistent with the GALL-SLR report, 29 have enhancements and/or allowed exceptions, and one is plant specific. The staff found the programs, including those with enhancements and exceptions, to be acceptable.

FPL has demonstrated the effectiveness of their programs to maintain material condition, sustain system and equipment performance, and identify and implement improvements to ensure facility safety and reliability. Commitments within the SLR application and in FPL responses to the staff audits and inspections provide confidence that these programs will be implemented effectively throughout the SPEO. The detailed elements of the AMPs and related commitments are documented in the proposed Updated Final Safety Analysis Report supplement and will be managed through FPL's commitment tracking program.

In the safety evaluation report, staff documented their review of the SLR application, additional information submitted by FPL, and information obtained through staff audits, inspections, and responses to requests for additional information. The staff conducted a regulatory audit on the technical details of the SLR application from October 4, 2021, through February 25, 2022. This thorough investigation evaluated the completeness of the identified structures, systems, and components within the scope of the St. Lucie SLR program, the suitability and adequacy of the aging management review, and the acceptability of the plant-specific time-limited aging analyses. The staff audit report confirms the St. Lucie AMPs are comprehensive.

Four license renewal inspections for the initial period of extended operation were conducted at St. Lucie between 2015 and 2017. During the Unit 1 phase 2 inspection, an unresolved item (URI) was opened by the inspectors due to questions regarding implementation status of several FPL AMP commitments. FPL had submitted several changes to AMP commitments that the inspectors were not able to completely review at the time of the Unit 1 inspection. The most extensive of these changes involved the reactor vessel internals inspection program. During the Unit 2 phase 2 inspection, inspectors were able to reach satisfactory conclusions on all the elements within the URI except the reactor vessel internals inspection program that was still under review by staff. A separate staff review of St. Lucie's Reactor Vessel Inspections program completed in 2018 concluded that FPL's commitment to use MRP-227-A in place of a previously approved reactor vessel internals inspection plan was acceptable.

The staff audits and inspections were comprehensive and focused on verifying that the current license renewal requirements are being implemented appropriately. There were no safety significant AMP findings identified during the corresponding inspections and audits. Hence, the staff concluded that FPL would continue to adequately manage the effects of aging. The new programs incorporated in this application augment the current facility monitoring and maintenance in the FPL SLR process. It is reasonable to conclude that the intended safety functions will be maintained consistent with the St. Lucie current licensing basis for the SPEO, as required by 10 CFR 54.21(a)(3). The staff's extensive and detailed review of the SLR application, documented in the safety evaluation report, identified no open or confirmatory items.

## SUMMARY

We conclude that the FPL application for the St. Lucie subsequent license renewal meets the requirements described in 10 CFR 54.29(a)(1) and (a)(2). The established programs and the commitments made by FPL to manage age-related degradation provide confidence that St. Lucie can be operated in accordance with its current licensing basis for the SPEO without undue risk to the health and safety of the public. The FPL application for the SLR of the operating licenses for St. Lucie should be approved.

Member Sunseri did not deliberate in portions of the review related to metal and environmental fatigue or irradiation embrittlement of the reactor pressure vessel.

We are not requesting a formal response to this letter report.

Sincerely,



Signed by Rempe, Joy  
on 09/26/23

Joy L. Rempe  
Chairman

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