



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

July 5, 2018

Mr. Mano Nazar
President, Nuclear Division
and Chief Nuclear Officer
Nuclear Division
Florida Power & Light Company
Mail Stop EX/JB
700 Universe Blvd
Juno Beach, FL 33408

SUBJECT: TURKEY POINT NUCLEAR GENERATING UNITS 3 AND 4 - PLAN FOR THE
IRRADIATED CONCRETE TECHNICAL ISSUE REGULATORY AUDIT
REGARDING THE SUBSEQUENT LICENSE RENEWAL APPLICATION
REVIEW (EPID NO. L-2018-RNW-0002)

Dear Mr. Nazar:

By letter dated January 30, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18037A812), and supplemented through Revision 1 dated April 10, 2018 (ADAMS Accession No. ML18113A132), Florida Power & Light Company (FPL, the applicant) submitted an application for subsequent renewal of Renewed Facility Operating License Nos. DPR-31 and DPR-41 for the Turkey Point Nuclear Generating Units 3 and 4 (Turkey Point), respectively. The applicant requested renewal of the Turkey Point operating licenses for an additional 20 years beyond the current renewed 60-year current license terms, which expire on July 19, 2032, for Unit 3 and April 10, 2033, for Unit 4. The staff of the U.S. Nuclear Regulatory Commission (NRC) is reviewing this application in accordance with the guidance in NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants."

The NRC staff plans to conduct an irradiated concrete technical issue regulatory audit at Turkey Point in Homestead, FL, from July 17-20, 2018, in accordance with the enclosed regulatory audit plan. If you have any questions, please contact me by e-mail at Lois.James@nrc.gov.

Sincerely,

/RA/

Lois M. James, Senior Project Manager
License Renewal Project Branch
Division of Materials and License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosure:
Regulatory Audit Plan

cc w/encl: Distribution via Listserv

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***Concurrence via email**

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Audit Plan

Irradiated Concrete Technical Issue Regulatory Audit Turkey Point Nuclear Generating Units 3 and 4 Subsequent License Renewal Application

July 17-20, 2018

**Division of Materials and License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission**

Enclosure

Audit Plan
Irradiated Concrete Technical Issue Regulatory Audit
Turkey Point Nuclear Generating Units 3 and 4
Subsequent License Renewal Application

1. Background

By letters dated January 30, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18037A812), February 9, 2018 (ADAMS Accession No. ML18044A653), February 16, 2018 (ADAMS Accession No. ML18053A123), March 1, 2018 (ADAMS Accession No. ML18072A224), and April 10, 2018 (ADAMS Accession Nos. ML18102A521 and ML18113A132), Florida Power & Light Company (FPL, the applicant) submitted an application for subsequent license renewal of Renewed Facility Operating License Nos. DPR-31 and DPR-41 for the Turkey Point Nuclear Generating Units 3 and 4 (Turkey Point). Turkey Point requested renewal of the operating license for an additional 20 years beyond the current renewed 60-year current license term, which expires on July 19, 2032, for Unit 3 and April 10, 2033, for Unit 4.

In accordance with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, the staff of the U.S. Nuclear Regulatory Commission (NRC) will perform an irradiated concrete technical issue regulatory audit. The review of Subsequent License Renewal applications follows the recommendations of NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants," (SRP-LR), for the review of the adequacy of irradiated concrete structures and their ability to perform their intended functions through the subsequent period of extended operation. The applicant's Subsequent License Renewal Application (SLRA) Section 3.5.2.2.2.6, consistent with the SRP-LR guidance, discusses the applicant's "Further Evaluation" of the aging effect of reduction in strength and mechanical properties of concrete due to irradiation. The SLRA states that "a plant-specific program to manage the effects of concrete irradiation is not expected to be necessary to ensure the [concrete containment internal structures and] components [will be able to] perform their intended functions consistent with the current licensing basis (CLB) through the subsequent period of extended operation." To verify this claim, staff from the Office of Nuclear Reactor Regulation will conduct a regulatory audit to: (1) gain a better understanding of the applicant's technical evaluation and disposition of adequacy; and (2) review documentation of technical bases supporting the conclusion that a plant-specific program is not necessary to manage this aging effect.

2. Regulatory Audit Bases

License renewal requirements are specified in 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." Section 10 CFR 54.17, "Filing of Application," requires applicants for renewed licenses to send written correspondence to the NRC. Section 10 CFR 54.37, "Additional Records and Record Keeping Requirements," requires that license renewal applicants maintain documents demonstrating compliance with the requirements of 10 CFR Part 54 in auditable and retrievable form. During review of a license renewal application, there may be supporting information retained as records under Section 10 CFR 54.37 that, although may not necessarily be required to be submitted as part of the SLRA, provide additional information and technical bases for the submitted information that would facilitate staff's review, and therefore the staff may determine an audit is necessary. Staff guidance is provided in NUREG-2192, SRP-LR, dated July 2017, and in NUREG-2191,

“Generic Aging Lessons Learned (GALL) Report for Subsequent License Renewal,” dated July 2017.

3. Regulatory Audit Scope

The purpose of the audit is for the staff to verify that in accordance with 10 CFR 54.21, that the applicant has demonstrated the effects of concrete irradiation for containment internal structures will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation. The scope of this audit is to examine the applicant’s supporting documentation for its disposition of the “Further Evaluation” provided in SLRA Section 3.5.2.2.2.6. Staff guidance in SRP-SLR Section 3.5.2.2.2.6 states:

Further evaluation is recommended of a plant-specific program to manage aging effects of irradiation if the estimated (calculated) fluence levels or irradiation dose received by any portion of the concrete from neutron (fluence cutoff energy $E > 0.1$ MeV) or gamma radiation exceeds the respective threshold level during the subsequent period of extended operation or if plant-specific OE of concrete irradiation degradation exists that may impact intended functions. Higher fluence or dose levels may be allowed in the concrete if tests and/or calculations are provided to evaluate the reduction in strength and/or loss of mechanical properties of concrete from those fluence levels, at or above the operating temperature experienced by the concrete, and the effects are applied to the design calculations

In the SLRA, Section 3.5.2.2.2.6 discusses evaluations and references published papers in support of: (1) its determination of projected fluence to 80 years of operation, and (2) its conclusion that a plant-specific program is unnecessary to manage reduction in strength and mechanical properties due to irradiation of concrete. The applicant determined that containment internal concrete structures at Turkey Point would be capable of performing their intended functions through the period of extended operation without being managed for this aging effect.

During this audit, the staff will use the following scope as a guide:

- Examine the applicant’s program basis documents and related references for the aging management program.
- Review supporting calculations and evaluations.
- Interview applicant representatives to obtain additional clarification related to the disposition of the irradiation effects on containment internal concrete structures.
- Assess whether it needs additional information to be submitted to the NRC (docketed) in support of this review.
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Agenda:

- Entrance meeting, introduction of personnel, review overall purpose of meeting.
- Applicant demonstration (presentation) of methodology and process, including justification of the use of referenced publications applied to the evaluation and how the specifics of the references are used in calculations/analyses.

- Review of plant-specific calculations/analyses for irradiation aging effects, specifically.
- Determination of neutron fluence and gamma radiation, thermal heating and their combined effects at the face of concrete structures and their attenuation within the RPV supporting concrete:
 - How the CLB design loading combinations and acceptance criteria are considered (design codes used), including design basis events such as LOCA and SSE
 - Consideration or disposition of any potential effects of changes in loading scenarios associated with refueling outages when water and fuel loads may change
 - Consideration or disposition of serviceability conditions such as deformations or deflections and the potential effect of resulting irradiation and thermal heat effects on containment building structures (CBS)/structural support functions
 - Rationale for assumptions related to the effects of neutron and gamma radiation, and thermal effects on concrete strength and modulus of elasticity (including concrete damage and depth of damage, exposed and embedded steel damage and capacity to carry load, steel anchor bolt capacity, reduction in bond strength; or bounding case if applicable), considering plant-specific fluence, gamma, and thermal loading estimates
 - How the structural configuration and detailing (dimensions, distances, anchorage of reactor pressure vessel and nozzles to supports, materials used, placement of reinforcement and embedments) of Turkey Point Units 3 and 4 internal concrete structures is considered for both fluence assessments and structural capacity (also local design and section checks where necessary).
- Determine information that will need to be submitted on the docket subsequent to the audit for continued review of the SLRA.
- Exit briefing.

Risk Insight:

The NRC staff will use risk insights to focus the breadth and depth of its review of plant specific operating procedures and operating experience. However, the NRC staff's review is not limited to risk significant systems and components because 10 CFR Part 54 is a deterministic rule and the NRC staff must conclude that there is reasonable assurance that activities will continue to be conducted in accordance with the CLB and the effects of aging will be managed during the period of extended operation for all structures and components within the scope of Part 54.

The NRC staff has reviewed the list of risk significant systems and components provided as part of the pre-application meeting for scoping and screening methodology and documented in the meeting summary (ADAMS Accession No. [ML18081A293](#)).

4. Information and Other Material Necessary for the Regulatory Audit

For the irradiated concrete technical issue regulatory audit July 17–20, 2018, the audit team will review the license renewal application, as supplemented and revised, the bases documents and other FPL supporting documents as appropriate and requests the following:

- (1) A presentation to the staff that systematically explains the methodology used and points to references as applicable.
- (2) One hard copy of: (i) relevant materials (including original design calculations and subsequent modifications, including those applicable to SLRA) be available to the staff in addition to electronic files; (ii) all associated drawings and details (design and as-built) for applicable structures, including drawings identifying: dimensions, distances, anchorage of reactor pressure vessel and nozzles to supports, materials used, placement of reinforcement and embedments; and (iii) steel reinforcement grades used and concrete compressive test results and types of cement and aggregates used
- (3) availability of a projector to facilitate information exchange to the entire group (when such exchange is necessary)
- (4) availability of cognizant technical staff (including contractors as necessary) for interview
- (5) internet access (not necessary to allow access to FPL internal sites)
- (6) unescorted access to NRC staff for feasibility and efficiency of access to working area, if working location is inside of the protected area

5. Team Assignments

The NRC Staff participation is projected as follows (some deletions, additions, or substitutions may occur on an as-needed basis):

Area of Review	Assigned Auditor
Team Lead	Angela Buford, Structural Engineer
Technical Reviewer	Andrew Prinari, Structural Engineer
Technical Reviewer	Samuel Cuadrado de Jesus, Structural Engineer
Management	Brian Wittick, Branch Chief
Project Manager	Bill Rogers

6. Logistics

The audit will be conducted July 17-20, 2018, on location at the Turkey Point site, with space to be provided by FPL. Working hours are from 8 a.m. to 4:30 p.m. Entrance and exit briefings will be held at the beginning and end of the audit. Status briefs will occur as deemed necessary during the audit.

7. Deliverables

An audit report should be issued to FPL within 90 days from the end of the audit.