



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

June 20, 2016

Mr. Mano Nazar
President and Chief Nuclear Officer
Nuclear Division
NextEra Energy
P.O. Box 14000
Juno Beach, FL 33408-0420

**SUBJECT: TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4 - ISSUANCE
OF AMENDMENTS REGARDING TECHNICAL SPECIFICATIONS FOR
MODERATOR TEMPERATURE COEFFICIENT MEASUREMENTS
(CAC NOS. MF6783 AND MF6784)**

Dear Mr. Nazar:

The U.S. Nuclear Regulatory Commission (NRC or the Commission) has issued the enclosed Amendment No. 271 to Renewed Facility Operating License (RFOL) No. DPR-31 and Amendment No. 266 to RFOL No. DPR-41 for the Turkey Point Nuclear Generating Unit Nos. 3 and 4, respectively. The amendments change the Technical Specifications (TSs) in response to License Amendment Request No. 240 from Florida Power & Light Company dated October 6, 2015 (L-2015-189), as supplemented by letter dated March 25, 2016 (L-2016-056).

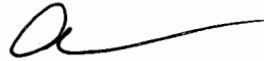
The amendments revise TS 3/4.1, "Reactivity Control Systems, Moderator Temperature Coefficient," Surveillance Requirement 4.1.1.3.b to allow the near end-of-life moderator temperature coefficient measurement requirement to not be performed by placing a set of conditions on reactor core operation. The amendments also revise TS 6.9.1.7, "Core Operating Limits Report," to include the analytical methods used to support the suspension of this measurement requirement.

M. Nazar

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The NRC staff's safety evaluation of the amendments is enclosed. A Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,



Audrey L. Klett, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosures:

1. Amendment No. 271 to DPR-31
2. Amendment No. 266 to DPR-41
3. Safety Evaluation

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

FLORIDA POWER & LIGHT COMPANY

DOCKET NO. 50-250

TURKEY POINT NUCLEAR GENERATING UNIT NO. 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 271
Renewed License No. DPR-31

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Florida Power & Light Company (the licensee) dated October 6, 2015, as supplemented by letter dated March 25, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Operating License and Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Renewed Facility Operating License No. DPR-31 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 271 are hereby incorporated into this renewed license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Tracy J. Orf, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Operating License and
Technical Specifications

Date of Issuance: June 20, 2016



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

FLORIDA POWER & LIGHT COMPANY

DOCKET NO. 50-251

TURKEY POINT NUCLEAR GENERATING UNIT NO. 4

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 266
Renewed License No. DPR-41

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Florida Power & Light Company (the licensee) dated October 6, 2015, as supplemented by letter dated March 25, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Operating License and Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Renewed Facility Operating License No. DPR-41 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 266 are hereby incorporated into this renewed license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'Tracy J. Orf', is written over a horizontal line.

Tracy J. Orf, Acting Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Operating License and
Technical Specifications

Date of Issuance: June 20, 2016

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 271 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-31

AMENDMENT NO. 266 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-41

DOCKET NOS. 50-250 AND 50-251

Replace page 3 of Renewed Facility Operating License No. DPR-31 with the attached page 3. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Replace page 3 of Renewed Facility Operating License No. DPR-41 with the attached page 3. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Replace the following page of the Appendix A Technical Specifications with the attached page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove

3/4 1-5

6-19

Insert

3/4 1-5

6-19

6-19A

- E. Pursuant to the Act and 10 CFR Parts 40 and 70 to receive, possess, and use at any time 100 milligrams each of any source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactively contaminated apparatus;
 - F. Pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of Turkey Point Units Nos. 3 and 4.
3. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations: 10 CFR Part 20, Section 30.34 of 10 CFR Part 30, Section 40.41 of 10 CFR Part 40, Sections 50.54 and 50.59 of 10 CFR Part 50, and Section 70.32 of 10 CFR Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect, and is subject to the additional conditions specified below:
- A. Maximum Power Level

The applicant is authorized to operate the facility at reactor core power levels not in excess of 2644 megawatts (thermal).
 - B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 271 are hereby incorporated into this renewed license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.
 - C. Final Safety Analysis Report

The licensee's Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on November 1, 2001, describes certain future inspection activities to be completed before the period of extended operation. The licensee shall complete these activities no later than July 19, 2012.

The Final Safety Analysis Report supplement as revised on November 1, 2001, described above, shall be included in the next scheduled update to the Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following the issuance of this renewed license. Until that update is complete, the licensee may make changes to the programs described in such supplement without prior Commission approval, provided that the licensee evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

- E. Pursuant to the Act and 10 CFR Parts 40 and 70 to receive, possess, and use at any time 100 milligrams each of any source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactively contaminated apparatus;
 - F. Pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of Turkey Point Units Nos. 3 and 4.
3. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations: 10 CFR Part 20, Section 30.34 of 10 CFR Part 30, Section 40.41 of 10 CFR Part 40, Sections 50.54 and 50.59 of 10 CFR Part 50, and Section 70.32 of 10 CFR Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect, and is subject to the additional conditions specified below:
- A. Maximum Power Level

The applicant is authorized to operate the facility at reactor core power levels not in excess of 2644 megawatts (thermal).
 - B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 266 are hereby incorporated into this renewed license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.
 - C. Final Safety Analysis Report

The licensee's Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on November 1, 2001, describes certain future inspection activities to be completed before the period of extended operation. The licensee shall complete these activities no later than April 10, 2013.

The Final Safety Analysis Report supplement as revised on November 1, 2001, described above, shall be included in the next scheduled update to the Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following the issuance of this renewed license. Until that update is complete, the licensee may make changes to the programs described in such supplement without prior Commission approval, provided that the licensee evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

REACTIVITY CONTROL SYSTEMS

LIMITING CONDITION FOR OPERATION

ACTION: (Continued)

- b. With the MTC more negative than the EOL limit specified in the COLR, be in HOT SHUTDOWN within 12 hours.

SURVEILLANCE REQUIREMENTS

4.1.1.3 The MTC shall be determined to be within its limits during each fuel cycle as follows:

- a. The MTC shall be measured and compared to the BOL limit specified in the COLR, prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading; and
- b. The MTC shall be measured at any THERMAL POWER and compared to the 300 ppm surveillance limit specified in the COLR (all rods withdrawn, RATED THERMAL POWER condition) within 7 EFPD after reaching an equilibrium boron concentration of 300 ppm*. In the event this comparison indicates the MTC is more negative than the 300 ppm surveillance limit specified in the COLR, the MTC shall be remeasured, and compared to the EOL MTC limit specified in the COLR, at least once per 14 EFPD during the remainder of the fuel cycle.

* Measurement of the MTC in accordance with Surveillance Requirement 4.1.1.3.b may be suspended provided that the benchmark criteria in WCAP-13749-P-A and the Revised Prediction specified in the COLR are satisfied.

ADMINISTRATIVE CONTROLS

3. WCAP-10054-P-A, Addendum 2, Revision 1 (proprietary), "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code: Safety Injection into the Broken Loop and COSI Condensation Model," July 1997.
4. WCAP-16009-P-A, "Realistic Large-break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)", January 2005.
5. USNRC Safety Evaluation Report, Letter from R. C. Jones (USNRC) to N. J. Liparulo (W), "Acceptance for Referencing of the Topical Report WCAP-12945(P) 'Westinghouse Code Qualification Document for Best Estimate Loss of Coolant Analysis,' " June 28, 1996. **
6. Letter dated June 13, 1996, from N. J. Liparulo (W) to Frank R. Orr (USNRC), "Re-Analysis Work Plans Using Final Best Estimate Methodology. ***
7. WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," S. L. Davidson and T. L. Ryan, April 1995.
8. WCAP-12610-P-A & CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," July 2006.

The analytical methods used to determine Overtemperature ΔT and Overpower ΔT shall be those previously reviewed and approved by the NRC in:

1. WCAP-8745-P-A, "Design Basis for the Thermal Overtemperature ΔT and Overpower ΔT Trip Functions," September 1986
2. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985

The analytical methods used to determine Safety Limits, Shutdown Margin - $T_{avg} > 200^{\circ}\text{F}$, Shutdown Margin - $T_{avg} \leq 200^{\circ}\text{F}$, Moderator Temperature Coefficient, DNB Parameters, Rod Bank Insertion Limits and the All Rods Out position shall be those previously reviewed and approved by the NRC in:

1. WCAP-9272-P-A, "Westinghouse Reload Safety Evaluation Methodology," July 1985.

The analytical methods used to support the suspension of the measurement of the Moderator Temperature Coefficient in accordance with Surveillance Requirement 4.1.1.3.b shall be those previously reviewed and approved by the NRC in:

1. WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997.
2. WCAP-11596-P-A, "Qualification of the Phoenix-P/ANC Nuclear Design System for Pressurized Water Reactor Cores," June 1988.
3. WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON," August 2004.
4. WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," August 2007.

**As evaluated in NRC Safety Evaluation dated December 20, 1997.

ADMINISTRATIVE CONTROLS

The ability to calculate the COLR nuclear design parameters are demonstrated in:

1. Florida Power & Light Company Topical Report NF-TR-95-01, "Nuclear Physics Methodology for Reload Design of Turkey Point & St. Lucie Nuclear Plants."

Topical Report NF-TR-95-01 was approved by the NRC for use by Florida Power & Light Company in:

1. Safety Evaluation by the Office of Nuclear Reactor Regulations Related to Amendment No. 174 to Facility Operating License DPR-31 and Amendment No. 168 to Facility Operating License DPR-41, Florida Power & Light Company Turkey Point Units 3 and 4, Docket Nos. 50-250 and 50-251.

The AFD, $F_Q(Z)$, $F_{\Delta H}$, $K(Z)$, Safety Limits, Overtemperature ΔT , Overpower ΔT , Shutdown Margin - $T_{avg} > 200^\circ\text{F}$, Shutdown Margin - $T_{avg} \leq 200^\circ\text{F}$, Moderator Temperature Coefficient, DNB Parameters, and Rod Bank Insertion Limits shall be determined such that all applicable limits of the safety analyses are met. The CORE OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector, unless otherwise approved by the Commission.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION FOR
AMENDMENT NO. 271 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-31 AND
AMENDMENT NO. 266 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-41
FLORIDA POWER & LIGHT COMPANY
TURKEY POINT NUCLEAR GENERATING UNIT NOS. 3 AND 4
DOCKET NOS. 50-250 AND 50-251

1.0 INTRODUCTION

By application dated October 6, 2015 (L-2015-189), as supplemented by letter dated March 25, 2016 (L-2016-056),¹ Florida Power & Light Company (the licensee) submitted License Amendment Request No. 240 for changes to the Technical Specifications (TSs) for Turkey Point Nuclear Generating Unit Nos. 3 and 4 (Turkey Point), which are contained in Appendix A of Renewed Facility Operating Licenses DPR-31 and DPR-41. The licensee proposed to revise TS 3/4.1, "Reactivity Control Systems, Moderator Temperature Coefficient [MTC]," Surveillance Requirement (SR) 4.1.1.3.b to allow a near end-of-life (EOL) moderator temperature coefficient measurement requirement to not be performed by placing a set of conditions on reactor core operation. The licensee also proposed to revise TS 6.9.1.7, "Core Operating Limits Report [COLR]," to include the analytical methods used to support the suspension of this measurement requirement.

By electronic mail (email) dated February 11, 2016,² the U.S. Nuclear Regulatory Commission (NRC) staff sent the licensee a request for additional information (RAI). By supplement dated March 25, 2016, the licensee responded to the RAI. This supplement provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration (NSHC) determination as published in the *Federal Register* (FR) on March 8, 2016 (81 FR 12141).

¹ Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML15301A261 and ML16109A117, respectively.

² ADAMS Accession No. ML16064A210.

2.0 REGULATORY EVALUATION

2.1. Description of Moderator Temperature Coefficient Requirements

Reactivity is a function of the fission neutron population and describes the state of the reactor core. A reactor is critical (i.e., no change in neutron population from one generation to the next) when reactivity of the core is zero, subcritical when reactivity is negative, and supercritical when reactivity is positive. As any operating condition of the moderator (i.e., the water flowing through the core) or fuel changes, the reactivity of the core changes accordingly. Changing a reactor core operating parameter affects other properties of the core. Once a change has been made to the core, it is necessary to make some compensating change to maintain criticality at the same power.

The properties of a reactor system that result in positive or negative reactivity additions with changes in certain parameters are generally described by reactivity coefficients. A reactivity coefficient is defined as the change of reactivity per unit change in some operating parameter of the reactor. The response of the reactor core to plant conditions or operator adjustments during normal operation, as well as the response to abnormal or accidental transients, is evaluated by means of detailed plant calculations. In these calculations, reactivity coefficients are required to couple the response of the core neutron multiplication to the variables that are set by conditions external to the core. Because reactivity coefficients change during the life of the reactor core, a range of coefficient values are established to ensure the correct response of the plant throughout its life. The MTC is one of these reactivity coefficients and is one of the controlling parameters for power and reactivity changes. MTC is defined as the change in reactivity in percent millirho (pcm) per degree Fahrenheit (°F) change in moderator temperature (pcm/°F).

TS 3/4.1 has Limiting Condition for Operation (LCO) 3.1.1.3 that states that the MTC shall be within the limits specified in the COLR. The LCO establishes an upper limit for the MTC for the beginning of fuel cycle life (BOC or BOL) during operating modes 1 and 2 and for end of fuel cycle life (EOC or EOL) during modes 1, 2, and 3. The licensee's letter dated April 22, 2015 (L-2015-137),³ contains the TS Bases, which state that LCO 3.1.1.3 ensures that the MTC remains within the limiting condition assumed in the Updated Final Safety Analysis Report (UFSAR) accident and transient analyses.

TS 3/4.1 has SR 4.1.1.3.b that requires the licensee to determine whether the MTC is within its limits during each fuel cycle by comparing the MTC measured at any thermal power to the 300 parts per million (ppm) surveillance limit specified in the COLR (all rods withdrawn, rated thermal power condition) within 7 effective full-power days (EFPD) after reaching an equilibrium boron concentration of 300 ppm. If this comparison indicates the MTC is more negative than the 300 ppm surveillance limit in the COLR, then the MTC is measured again and compared to the EOL MTC limit in the COLR at least once per 14 EFPD during the remainder of the fuel cycle. The TS Bases state that the SRs for measurement of the MTC at the BOL and near-EOL are adequate to confirm that the MTC remains within its limits because this coefficient changes slowly, primarily from the reduction in reactor coolant system boron concentration associated with fuel burnup. The MTC surveillance limit in SR 4.1.1.3.b represents a conservative value at Hot Full Power (HFP, or rated thermal power) core conditions with 300 ppm equilibrium boron

³ ADAMS Accession No. ML15139A080.

concentration. The SR for the MTC measurement at near-EOL (300 ppm) is performed to confirm that the MTC remains within its most negative LCO requirements for the entire cycle.

2.2 Licensee's Proposed Changes

The licensee proposed to modify SR 4.1.1.3.b by placing a set of conditions on core operations – the specified revised prediction of the MTC and several core parameters measured during the cycle are within specified bounds. If these conditions are met, then the surveillance measurement would not be performed, and the MTC measurement would instead be replaced by a design calculation of the core MTC. In its application, the licensee stated that the MTC measurement typically includes time at reduced power, introduces a perturbation to normal reactor operation, and increases the potential for a human performance error involving a reactivity manipulation. The licensee proposed the alternate method, in part, to minimize perturbations on normal reactor operation. The licensee stated that the proposed method for calculating the revised prediction is consistent with the approved algorithm in the Westinghouse topical report WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," dated March 1997.⁴

The proposed changes would revise SR 4.1.1.3.b and TS 6.9.1.7 to allow the near-EOL MTC measurement to not be performed if conditions in WCAP-13749-P-A are met. If these conditions are met, then the MTC measurement would be replaced by a calculated value, which would be compared to the near-EOL MTC limit specified in each unit's COLR. The licensee proposed the following note be added to SR 4.1.1.3.b:

Measurement of the MTC in accordance with Surveillance Requirement 4.1.1.3.b may be suspended provided that the benchmark criteria in WCAP-13749-P-A and the Revised Prediction specified in the COLR are satisfied.

In its letter dated March 25, 2016, the licensee responded to the NRC's RAI and requested to add WCAP-13749-P-A and associated Westinghouse neutronics methodology topical reports to TS 6.9.1.7. The licensee proposed to revise TS 6.9.1.7 by adding the topical reports to the COLR list of references that support the suspension of the measurement of the MTC as follows:

The analytical methods used to support the suspension of the measurement of the Moderator Temperature Coefficient in accordance with Surveillance Requirement 4.1.1.3.b shall be those previously and approved by the NRC in:

1. WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient Measurement," March 1997.
2. WCAP-11596-P-A "Qualification of the PHOENIX-P/ANC [Advanced Nodal Code] Nuclear Design System for Pressurized Water Reactor Cores," June 1988.

⁴ A non-proprietary version of WCAP-13749-P-A (i.e., WCAP-14851-A), which has the same title as WCAP-13749-P-A, is available at ADAMS Legacy Library Accession No. 9704230055. ADAMS Legacy Library documents are available through the NRC's Public Document Room.

3. WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON," August 2004.
4. WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," August 2007.

2.3 Regulatory Review

The NRC staff reviewed the licensee's application to verify that (1) there is reasonable assurance that the activities authorized by the operating license can be conducted without endangering the health and safety of the public, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public. The NRC staff considered the following regulatory requirements, guidance, and licensing and design-basis information during its review of the proposed changes.

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities," provide the regulatory requirements for the licensing of production and utilization facilities. Paragraph 50.92(a) of 10 CFR states that in determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations that govern the issuance of initial licenses to the extent applicable and appropriate. The regulatory requirements related to the content of the TSs are contained in 10 CFR 50.36, "Technical specifications." Paragraph 50.36(a)(1) of 10 CFR states that each applicant for a license authorizing operation of a utilization facility shall include proposed TSs in the application in accordance with the requirements of 10 CFR 50.36.

Paragraph 50.36(c) of 10 CFR requires TSs to include the following categories related to station operation: safety limits, limiting safety systems settings, and control settings; LCOs; SRs; design features; administrative controls; decommissioning; initial notification; and written reports.

Paragraph 50.36(c)(2) of 10 CFR states that LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility, and when LCOs are not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the LCO can be met. LCOs must be established, among other items, for a process variable, design feature, or operating restriction that is an initial condition of a design-basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Paragraph 50.36(c)(3) of 10 CFR states that SRs are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

Paragraph 50.36(c)(5) of 10 CFR states that administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner. Each licensee shall submit any reports to the Commission pursuant to approved TSs as specified in 10 CFR 50.4.

NRC Generic Letter (GL) 83-11, Supplement 1, "Licensee Qualification for Performing Safety Analyses in Support of Licensing Actions" dated June 24, 1999,⁵ provides guidance on licensee qualification for using safety analysis codes (e.g., PARAGON or NEXUS) for licensees who wish to perform their own analyses using methods that have been reviewed and approved by the NRC.

NRC GL 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," dated October 4, 1988,⁶ provides guidance on relocating cycle-specific parameter limits from the TSs to the COLR. The alternative contained in this guidance controls the values of cycle-specific parameters and assures conformance to 10 CFR 50.36, which calls for specifying the lowest functional performance levels acceptable for continued safe operation, by specifying the methodology and acceptance criteria. This permits operation at any specific value determined by the licensee, using the specified methodology, to be within the acceptance criteria. The COLR will document the specific values of parameter limits resulting from licensee's calculations including any mid-cycle revisions to such parameter values.

The methodology associated with the licensee's proposed change was submitted to the NRC for review and approval via the Westinghouse topical report WCAP-13749-P on June 1, 1993.⁷ In its safety evaluation dated October 9, 1996,⁸ the NRC staff approved the report for reference in licensing applications. WCAP-13749-P-A was issued in March 1997. WCAP-13749-P-A provides a methodology for allowing licensees to not perform the near-EOC MTC measurement if core operating characteristics meet certain conditions. If these conditions are met, the TS SR may be satisfied by comparing a corrected predicted value of the MTC to the surveillance limit listed in the COLR.

In its letter dated May 17, 1988,⁹ the NRC staff found the Westinghouse topical report WCAP-11596-P, "Qualification of the PHOENIX-P/ANC Nuclear Design System for Pressurized Water Reactor Cores," acceptable for referencing in license applications to the extent specified and under the limitations delineated in the report and the associated NRC technical evaluation. On June 30, 1988, Westinghouse issued WCAP-11596-P-A.¹⁰ PHOENIX-P is a two-dimensional multigroup transport theory code used to calculate lattice physics parameters and provide cross-sections as input to the ANC code.

In its letter dated March 18, 2004,¹¹ the NRC staff found Revision 0 of the Westinghouse topical report WCAP-16045-P, "Qualification of the Two-Dimensional Transport Code PARAGON," acceptable for referencing as an approved methodology in plant licensing applications. In August 2004, Westinghouse issued Revision 0 of WCAP-16045-NP-A, "Qualification of the Two-Dimensional Transport Code PARAGON."¹² PARAGON is a lattice physics code and is a

⁵ ADAMS Accession No. ML031080345.

⁶ ADAMS Accession No. ML031130447.

⁷ ADAMS Legacy Library Accession No. 9306080365.

⁸ This document contains proprietary information and is not publicly available.

⁹ This document contains proprietary information and is not publicly available.

¹⁰ This document contains proprietary information and is not publicly available.

¹¹ ADAMS Accession No. ML040780402.

¹² ADAMS Accession No. ML042250322. The proprietary version is not publicly available.

replacement for PHOENIX-P. The conclusion in the NRC staff's SE dated March 18, 2004 for the topical report approved this replacement and stated that the staff considers the new PARAGON code to be well qualified as a stand-alone code replacement for the PHOENIX-P lattice code, wherever the PHOENIX-P code is used in NRC-approved methodologies. The staff concluded that it is acceptable for licensing applications.

By letter dated November 29, 2005,¹³ Westinghouse submitted Addendum 1, "Qualification of the NEXUS Nuclear Data Methodology," to WCAP-16045-P-A, which was approved for licensing applications by the NRC staff in its letter dated February 23, 2007, subject to the limitations of the staff's safety evaluation for the topical report.¹⁴ Westinghouse subsequently issued Addendum 1-A to WCAP-16045-P-A on September 7, 2007.¹⁵ NEXUS includes both a re-parameterization of the PARAGON output and a new power reconstruction approach in ANC and, therefore, serves to link the two codes. The staff's safety evaluation for NEXUS states that the NEXUS/ANC code system is adequate to replace the PARAGON/ANC code system wherever the latter is used in NRC-approved methodologies. The NRC staff determined that NEXUS/ANC is qualified as a stand-alone code system so long as its use is limited by the provisions listed in Section 4.0 of the staff's safety evaluation for the topical report.

3.0 TECHNICAL EVALUATION

The staff evaluated the licensee's proposed changes to SR 4.1.1.3.b and TS 6.9.1.7 for compliance with 10 CFR 50.36. The NRC staff previously reviewed and approved topical reports WCAP-13749-P-A, WCAP-11596-P-A, WCAP-16045-P-A, and Addendum 1-A to WCAP-16045-P-A. Therefore, the staff's review focused on verifying that the licensee satisfied the methodologies, conditions, and limitations of the generic approvals for application at Turkey Point.

3.1 Application of WCAP-13749-P-A

The licensee proposed implementation of the methodology described in WCAP-13749-P-A, which was approved by the NRC with the following conditions.

1. Only PHOENIX/ANC calculation methods are used for the individual plant analyses relevant to determinations for the EOL MTC plant methodology.
2. The predictive correction is reexamined if changes in core fuel designs or continued MTC calculation measurement data show significant effect on the predictive correction.

In its application, the licensee explained how it meets these conditions. The staff's evaluation of the licensee's conformance with each of these conditions is discussed as follows.

¹³ ADAMS Accession No. ML053460157. The proprietary version is not publicly available.

¹⁴ ADAMS Accession No. ML070320398.

¹⁵ ADAMS Accession No. ML072570329. The proprietary version is not publicly available.

WCAP-13749-P-A, Condition 1

In its application, the licensee stated that it currently performs Turkey Point's core design calculations with the PHOENIX-P lattice physics code to generate cross-section data and ANC as the core simulator code. The NRC staff finds that Condition 1 is satisfied by the licensee using PHOENIX-P/ANC.

In its application, the licensee stated that it might eventually transition the cross section generation to the PARAGON lattice code and NEXUS methodology and, therefore, requested that the NRC staff review its use of these codes at Turkey Point against WCAP-13749-P-A. In order to support the future use of PARAGON/ANC and NEXUS/ANC, the licensee stated that both code systems are qualified as direct substitutes for the PHOENIX-P/ANC code system and cited the NRC staff's safety evaluations for WCAP-16045-P-A and Addendum 1-A.

In Attachments 4 (proprietary) and 5 (non-proprietary) of its application, the licensee provided additional quantitative data to answer RAIs that the NRC sent to other licensees with similar applications.¹⁶ The data included benchmarks comparing PHOENIX-P/ANC and NEXUS/ANC computations of critical boron concentration, BOC hot zero power (HZP) Isothermal Temperature Coefficient (ITC), EOC HFP MTC, and BOC HZP control rod worth based on calculations and measurements from recent cores throughout the Westinghouse pressurized-water reactor (PWR) fleet. Because the same Westinghouse database of benchmarked plants is used to answer these questions, much of the information that the licensee provided was identical to that already reviewed and approved by the NRC staff for licensees with similar applications.

The licensee also provided measured-minus-predicted data specific to Turkey Point for BOC HZP ITC, and EOC HFP MTC for a few cycles based on PHOENIX-P/ANC. The NRC staff reviewed the Turkey Point specific data and determined that the measured-minus-predicted differences are bounded by the data used in WCAP-13749-P-A.

The staff reviewed the provided benchmarking data for the Westinghouse PWR fleet and specific to Turkey Point and determined that the variance in measured-minus-predicted BOC HZP ITC using NEXUS/ANC will be bounded by the PHOENIX-P/ANC values presented in WCAP-13749-P-A. Therefore, the NRC staff concluded that the predictive correction approved by the NRC for WCAP-13749-P-A is also appropriate for the use of PARAGON/ANC and NEXUS/ANC code systems for Turkey Point.

Therefore, Condition 1 is also satisfied by the licensee using PARAGON/ANC and NEXUS/ANC. The licensee can transition to PARAGON/ANC and NEXUS/ANC for use with WCAP-13749-P-A. The licensee did not specify a defined date or cycle that it would transition to the PARAGON and NEXUS methods; however, all three Westinghouse physics codes are NRC-approved, and PARAGON/ANC and NEXUS/ANC can be used with WCAP-13749-P-A in place of PHOENIX-P.

In its letter dated March 25, 2016, the licensee stated that the COLR provided to the NRC in accordance with TS 6.9.1.7 will identify the neutronics methods used with WCAP-13749-P-A for

¹⁶ ADAMS Accession Nos. ML14245A151 and ML13149A354.

the current cycle. The NRC staff determined that identification in the COLR of the physics code being used is consistent with GL 88-16 and will clarify which physics codes are being used for the near-EOL MTC each cycle. The NRC staff notes that the technical positions and requests discussed in GL 83-11, Supplement 1 apply to the use of PARAGON and NEXUS for the applications described in that GL.

WCAP-13749-P-A, Condition 2

Condition 2 requires the predictive correction to be re-evaluated if new measured-minus-predicted MTC data show a "significant effect" on the predictive correction or if core fuel design changes could have such an effect. The staff considered a significant effect to be a change in the standard deviation of measured-minus-predicted EOC HFP MTC such that the predictive correction MTC is no longer bounding. The staff considers such changes to include, but not be limited to an increase in the allowable core thermal power of greater than 2 percent, a significant change in typical design operating cycle length from the current strategy, or the introduction of a new reload batch fuel product line, excluding Lead Test Assembly programs.

In Section 3.0 and in Attachment 4 of its application, the licensee states that it will evaluate each cycle's use of WCAP-13749-P-A by: use of a reload risk checklist to identify changes in methodology, fuel design, and core design that could impact MTC predictions and measurements; evaluation of core performance benchmark criteria as required in WCAP-13749-P-A; continued measurement of the BOC HZP MTC per TS 3.1.1.3; and evaluation of the BOC HZP MTC (measured-minus-predicted) to evaluate if the EOC HFP MTC predictive correction remains conservative.

The staff reviewed the licensee's description of the actions it will perform for each reload cycle to determine the continued applicability of WCAP-13749-P-A for Turkey Point, and the staff determined that Condition 2 is satisfied.

3.2 Exceptions to WCAP-13749-P-A

In its application, the licensee proposed to take exceptions to WCAP-13749-P-A regarding providing: (1) the Most Negative [MTC] Limit Report, as described in Section 3.3.3 of WCAP-13749-P-A, and (2) a cycle-specific figure similar to Figure 3-1 as part of that cycle's TSs or COLR, as described in the fourth paragraph in Section 3.2.1 of WCAP-13749-P-A.

The staff agrees with the licensee's assessment that the timing specified in WCAP-13749-P-A for providing the Most Negative MTC Limit Report to the NRC is flawed because it is impossible to both complete the report within 60 days of reaching 300 ppm and for the report to contain all of the required data for the revised predicted MTC. In addition, the staff determined that the Most Negative MTC Limit Report provides no additional technical support to justify eliminating the near-EOL MTC surveillance. Instead of a figure similar to Figure 3-1 (i.e., MTC versus cycle burnup), the licensee proposes to include this information in the plant surveillance procedure associated with the EOC MTC measurement. For these reasons, the staff determined that the licensee's justification for taking these exceptions to WCAP-13749-P-A is acceptable and consistent with past precedents that implement WCAP-13749-P-A.

3.3 Changes to the TSs

The NRC staff found both conditions of WCAP-13749-P-A to be satisfied and, therefore, the NRC staff determined that the licensee's use of WCAP-13749-P-A is acceptable for justifying the proposed change to SR 4.1.1.3.b. The NRC staff reviewed the proposed change to SR 4.1.1.3.b and determined it to be acceptable because it continues to meet 10 CFR 50.36(c)(3) in that the proposed change assures that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that LCO 3.1.1.3 will be met.

The licensee proposed to add WCAP-13749-P-A to TS 6.9.1.7 as a reference methodology used in the preparation of the COLR. Because the NRC staff determined that the use of WCAP-13749-P-A was acceptable at Turkey Point, the NRC staff finds that the proposed change to TS 6.9.1.7 is acceptable. In its letter dated March 25, 2016, the licensee proposed adding the PHOENIX-P, PARAGON, and NEXUS physics codes to TS 6.9.1.7 as analytical methods used for the near-EOL MTC and WCAP-13749-P-A. The staff determined that the proposed changes to TS 6.9.1.7 are acceptable and continue to meet 10 CFR 50.36(c)(5).

3.4 Summary

The NRC staff reviewed the licensee's application and determined that WCAP-13749-P-A is acceptable for Turkey Point with the physics code systems discussed in the following topical reports: WCAP-11596-P-A; WCAP-16045-P-A; and WCAP-16045-P-A, Addendum 1-A.

The staff concludes that the proposed change to SR 4.1.1.3.b is acceptable based on the applicability of the WCAP-13749-P-A methodology and the licensee meeting all conditions specified in the NRC's safety evaluation for WCAP-13749-P-A. Because the NRC staff determined that the use of WCAP-13749-P-A was acceptable at Turkey Point, and that the COLR will identify and clarify which physics codes from TS 6.9.1.7 are used for the near-EOL MTC each cycle, the NRC staff finds that the proposed changes to TS 6.9.1.7 are acceptable.

The NRC staff notes that the technical positions and requests discussed in GL 83-11, Supplement 1 apply to the use of PARAGON and NEXUS for the applications described in that GL.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the NRC staff notified the State of Florida official (Ms. Cynthia Becker, M.P.H., Chief of the Bureau of Radiation Control, Florida Department of Health) on May 3, 2016,¹⁷ of the proposed issuance of the amendments. The State official had no comments.

¹⁷ The NRC staff notified the State official by telephone and by email. The email is in ADAMS under Accession No. ML16124A924.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve NSHC, which was published in the FR on March 8, 2016 (81 FR 12141), and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). The amendments also change the requirements with respect to TS administrative controls associated with the COLR. As such, the amendments relate to recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the amendments also meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(10)(ii). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

Based on the aforementioned considerations, the NRC staff finds that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Nicholas L. Domenico

Date: June 20, 2016

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The NRC staff's safety evaluation of the amendments is enclosed. A Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Audrey L. Klett, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosures:

1. Amendment No. 271 to DPR-31
2. Amendment No. 266 to DPR-41
3. Safety Evaluation

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*by memorandum

**by email

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