



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

April 18, 2011

Mr. Mark B. Bezilla
Site Vice President
FirstEnergy Nuclear Operating Company
Mail Stop A-PY-A290
P.O. Box 97, 10 Center Road
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF
AMENDMENT RE: LICENSE AMENDMENT TO MODIFY TECHNICAL
SPECIFICATION 2.1.1, "REACTOR CORE SLS," TO INCORPORATE REVISED
SAFETY LIMIT MINIMUM CRITICAL POWER RATIO VALUES
(TAC NO. ME4925)

Dear Mr. Bezilla:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 155 to Facility Operating License No. NPF-58 for Perry Nuclear Power Plant, Unit No. 1 (PNPP). This amendment revises the Technical Specifications in response to your application dated October 21, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102980446), as supplemented by letters dated February 2, 2011 (ADAMS Accession No. ML110400136) and March 17, 2011 (ADAMS Accession No. ML110880095).

This license amendment modifies Technical Specification 2.1.1, "Reactor Core SLs," by incorporating revised safety limit minimum critical power ratio values resulting from a plant-specific analysis performed for PNPP's operating cycle 14 core.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Mahoney".

Michael Mahoney, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:

1. Amendment No. 155 to NPF-58
2. Safety Evaluation

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FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

OHIO EDISON COMPANY

DOCKET NO. 50-440

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 155
License No. NPF-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for license filed by FirstEnergy Nuclear Operating Company, et al., (the licensee, FENOC) dated October 21, 2010, as supplemented by letters dated February 2, 2011 and March 17, 2011, 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 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 Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-58 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 155 are hereby incorporated into this license. FENOC 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 its issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by EBrown for/

Robert D. Carlson, Chief
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications and Facility Operating License

Date of Issuance: April 18, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 155

FACILITY OPERATING LICENSE NO. NPF-58

DOCKET NO. 50-440

Replace the following pages of the Facility Operating License and Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

Insert

License NPF-58
Page 4

License NPF-58
Page 4

TSs
2.0-1

TSs
2.0-1

renewal. Such sale and leaseback transactions are subject to the representations and conditions set forth in the above mentioned application of January 23, 1987, as supplemented on March 3, 1987, as well as the letter of the Director of the Office of Nuclear Reactor Regulation dated March 16, 1987, consenting to such transactions. Specifically, a lessor and anyone else who may acquire an interest under these transactions are prohibited from exercising directly or indirectly any control over the licenses of PNPP Unit 1. For purposes of this condition the limitations of 10 CFR 50.81, as now in effect and as may be subsequently amended, are fully applicable to the lessor and any successor in interest to that lessor as long as the license for PNPP Unit 1 remains in effect; these financial transactions shall have no effect on the license for the Perry Nuclear facility throughout the term of the license.

- (b) Further, the licensees are also required to notify the NRC in writing prior to any change in: (i) the terms or conditions of any lease agreements executed as part of these transactions; (ii) the PNPP Operating Agreement; (iii) the existing property insurance coverage for PNPP Unit 1; and (iv) any action by a lessor or others that may have an adverse effect on the safe operation of the facility.
- C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now and hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

FENOC is authorized to operate the facility at reactor core power levels not in excess of 3758 megawatts thermal (100% power) in accordance with the conditions specified herein.

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 155 are hereby incorporated into the license. FENOC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan. |

(3) Antitrust Conditions

- a. FirstEnergy Nuclear Generation Corp. and Ohio Edison Company

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be $\leq 23.8\%$ RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow $\geq 10\%$ rated core flow:

The Minimum Critical Power Ratio (MCPR) shall be ≥ 1.10 for two recirculation loop operation or ≥ 1.11 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.



UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 155 TO FACILITY OPERATING LICENSE NO. NPF-58

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

OHIO EDISON COMPANY

PERRY NUCLEAR POWER PLANT, UNIT NO. 1

DOCKET NO. 50-440

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC, the Commission) dated October 21, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102980446), as supplemented by letters dated February 2, 2011 (ADAMS Accession No. ML110400136) and March 17, 2011 (ADAMS Accession No. ML110880095), the FirstEnergy Nuclear Operating Company (FENOC, the licensee) proposed changes to the Technical Specifications (TS) for the Perry Nuclear Power Plant, Unit No. 1 (PNPP). The requested changes include revising the safety limit minimum critical power ratio (SLMCPR) values in TS 2.1.1.2 for the PNPP's cycle 14 operation. The PNPP operating cycle 14 core has 748 General Electric (GE) fuel assemblies, of which there are 284 fresh GE-14 bundles, 280 once burned GE-14 bundles, and 184 twice burned GE-14 bundles. The February 2, 2011 and March 17, 2011 supplements contained clarifying information and did not change the NRC staff's initial proposed finding of significant hazards consideration published in the *Federal Register* (76 FR 1649, January 11, 2011).

2.0 REGULATORY EVALUATION

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36, "Technical specifications," state that the safety limits (SLs) for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity.

The purpose of the SLMCPR is to ensure that specified acceptable fuel design limits (SAFDLs) are not exceeded during steady state operation and analyzed transients. The fuel cladding is one of the physical barriers that separate the radioactive materials from the environment. The integrity of this cladding barrier is related to its relative freedom from perforations or cracking. Fuel cladding perforations can result from thermal stresses, which can occur from reactor operation significantly above design conditions. Since the parameters that result in fuel damage are not directly observable during reactor operation, the thermal and hydraulic conditions that result in the onset of transition boiling have been used to mark the beginning of the region in which fuel cladding damage could occur.

The NRC-approved methodology, contained in Global Nuclear Fuels-Americas, LLC (GNF) proprietary Licensing Topical Report (LTR), GESTAR II, NEDE-24011-P-A, "General Electric Standard Application for Reload Fuel," Amendment 22, is used to determine the cycle-specific limit to be listed in PNPP TS 2.1.1.2. An NRC safety evaluation issued on July 23, 1990, provided the acceptance evaluation for this LTR. Criterion 10, "Reactor Design," of Appendix A, General Design Criteria (GDC) for Nuclear Power Plants, 10 CFR Part 50 states, in part, that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that SAFDLs are not exceeded.

NRC's NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Revision 2, March 2007 (ADAMS Accession No. ML070550060), provides guidance on the acceptability of the reactivity control systems, the reactor core, and fuel system design. Specifically, Section 4.2, "Fuel System Design," specifies all fuel damage criteria for evaluation of whether fuel designs meet the SAFDLs. Section 4.4, "Thermal Hydraulic Design," provides guidance on the review of thermal-hydraulic design in meeting the requirement of GDC-10 and the fuel design criteria established in Section 4.2.

3.0 TECHNICAL EVALUATION

The licensee requested a change to the PNPP Operating License in accordance with 10 CFR 50.90.

3.1 Proposed TS Changes

Currently, the license TS Section 2.1.1.2 reads as follows:

With the reactor steam dome pressure \geq 785 psig [pounds per square inch gauge] and core flow \geq 10% rated core flow:

The Minimum Critical Power Ratio (MCPR) shall be \geq 1.08 for two recirculation loop operation [TLO] or \geq 1.10 for single recirculation loop operation [SLO].

On the basis of the calculations for PNPP's core reload analysis for operating cycle 14, the calculated SLMCPR increases from 1.08 to 1.10 for TLO and 1.10 to 1.11 for SLO. Accordingly, PNPP TS Section 2.1.1.2 is revised to read as follows:

With the reactor steam dome pressure \geq 785 psig [pounds per square inch gauge] and core flow \geq 10% rated core flow:

The Minimum Critical Power Ratio (MCPR) shall be \geq 1.10 for two recirculation loop operation or \geq 1.11 for single recirculation loop operation.

3.2 NRC Staff Evaluation

As stated earlier, the SLMCPR numeric values in PNPP's TS 2.1.1.2 are SLs. The SLMCPR limit is established such that at least 99.9 percent of the fuel rods in the core would not be expected to experience the onset of transition boiling as a result of normal operation and transients, which in turn ensures fuel cladding damage does not occur. The SLMCPR limit is

established such that fuel design limits are not exceeded during steady state operation, normal operational transients, and abnormal operational transients. As such, fuel damage is calculated not to occur if the limit is not violated. However, because fuel damage is not directly observable, a step-back approach is used to establish corresponding MCPR operating limits. The Operating Limit MCPR (OLMCPR) is established by summing the cycle-specific core reload transient analyses adds and the calculated SLMCPR values. The OLMCPRs are required to be established and documented in the Core Operating Limits Report for each reload cycle by PNPP' s TS 5.6.5, " Core Operating Limits Report (COLR)."

The absolute value of SLMCPR tends to vary from cycle to cycle, typically due to the introduction of improved fuel bundle types, changes in fuel vendors, and changes in core loading pattern. Following the determination of the cycle-specific SLMCPR values, the OLMCPR values are derived. The cycle-specific SLMCPR numeric values are listed in PNPP TS 2.1.1.2 and, therefore, must be revised using the license amendment process.

Global Nuclear Fuels-Americas, LLC performed the PNPP operating cycle 14 SLMCPR calculation, consistent with NRC-approved methodologies and uncertainties, as documented in LTRs NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 16 (GESTARII), and NEDC-33383-P, "GEXL97 Correlation Applicable to ATRIUM-10 Fuel," Revision 1, June 2008, and the following LTRs:

- NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations," dated August of 1999.
- NEDC-32694P-A, "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," dated August of 1999.
- NEDC-32505P-A, "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," Revision 1, dated July of 1999.
- NEDE-10958-PA, "General Electric [boiling-water reactor] BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application," dated January of 1977.

By letter dated August 29, 2008, GNF submitted to the NRC a report titled, "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-333270P, Revision 1" (ADAMS Accession No. ML082460763). This NRC-approved report provides generic information relative to the GNF fuel design and analysis applicable BWRs.

On the basis of the analysis performed by GNF, the licensee has proposed to amend the PNPP TS 2.1.1.2 to revise the SLMCPR for PNPP' s operating cycle 14. PNPP' s operating cycle 14 core has 748 GE fuel assemblies, of which there are 284 fresh GE-14 bundles, 280 once-burned GE-14 bundles, and 184 twice-burned GE-14 bundles.

The current required SLMCPR values in PNPP TS 2.1.1 is 1.08 for TLO and 1.10 for SLO. Calculations performed by GNF for PNPP' s operating cycle 14 resulted in a minimum calculated value of SLMCPR to be 1.10 for TLO and 1.11 for SLO. For PNPP' s operating cycle 14, the limiting SLMCPR occurs at the rated core flow condition. GNF's calculation of the revised plant-specific SLMCPR numeric values for PNPP' s operating cycle 14 was performed as part of the

reload licensing analysis for PNPP' s operating cycle 14 and is based upon NRC-approved methods, and therefore it is acceptable. In consideration of the information submitted by the licensee in support of the proposed license amendment, the NRC staff concludes that the licensee' s proposed amendment to update the TS to include cycle-specific SLMCPR numeric values is consistent with the regulatory requirements.

The NRC staff determined that the applicable regulations and requirements continue to be met and that analysis performed to calculate PNPP' s operating cycle 14 SLMCPR numeric values were based upon NRC-approved methodologies. The NRC staff also determined that the proposed changes do not require any exemptions or relief from regulatory requirements, other than the TS change. Applicable regulatory requirements of 10 CFR 50.36 will continue to be met, adequate defense-in-depth will be maintained, and sufficient safety margins will be maintained.

The licensee addressed NRC staff questions in relation to:

1. The final core loading pattern selection for the PNPP operating cycle 14 operation with respect to the combination of the input parameters such as cycle energy requirements, thermal limit margins, reactivity margins, discharge exposure limitations and other limits, desired control rod patterns, and channel distortion;
2. The SLMCPR calculation process with respect to the uncertainties associated with R-Factor, and core flow rate and random effective traversing in-core probe reading;
3. The bundle groupings for both the TLO and SLO SLMCPR calculations along with the number of bundles in the group, their contribution to percent number of rods in boiling transition (NRSBT) and group average exposure for both PNPP operating cycles 13 and 14 fuel assemblies; and
4. An updated TLO power/flow map and an updated SLO power/flow map for PNPP operating cycle 14, including stability option III features of the scram region and controlled entry region for back up stability protection.

The NRC staff reviewed the information presented in the responses to the NRC staff request for additional information (RAI) in letters dated February 2, 2011 and March 17, 2011, and concluded that the licensee provided sufficient data and description to answer the NRC staff RAIs.

Therefore, the proposed TS changes to the SLMCPR values for PNPP operating cycle 14 from 1.08 to 1.10 for TLO and from 1.10 to 1.11 for SLO are acceptable because:

1. Approved methodologies are used;
2. Qualitative descriptions of the final core loading pattern and critical power analysis are provided;
3. All factors related to any fuel-related 10 CFR Part 21, issues are included in the SLMCPR calculation;

4. Both updated TLO and SLO power/flow map for cycle 14 operation including the stability option III features of the scram region and the controlled entry region for backup stability protection are provided; and
5. Core map was provided and dominant fuel bundle locations were identified based on the PNPP's operating cycle 14 SLMCPR calculation in terms of percentage contribution to NRSBT.

The NRC staff reviewed the justification for the SLMCPR values of 1.10 for TLO and 1.11 for SLO using the approach stated in GESTAR-II, Revision 16. Based on the NRC staff's review of license amendment request, and the response to the RAIs, the NRC staff has concluded that the SLMCPR analysis for PNPP's cycle 14 operation using the plant- and cycle-specific calculation in conjunction with the approved method is acceptable. PNPP's operating cycle 14 SLMCPR will ensure that 99.9 percent of the fuel rods in the core will not experience boiling transition which satisfies the requirements of GDC-10 of Appendix A to 10 CFR Part 50 regarding acceptable fuel design limits.

The NRC staff concludes that the license amendment request meets the requirements of 10 CFR 50.36 and GDC-10. The NRC staff concludes that the justification for analyzing and determining the SLMCPR value of 1.10 for TLO and 1.11 for SLO for PNPP operating cycle 14 is acceptable since approved methodologies were used in conjunction with assumption of a higher R-Factor uncertainty, performance of a bounding calculation at rated core power and minimum core flow, and analysis on power shape for PNPP's cycle 14 operation resulting with no fuel axial power shape penalty.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Ohio State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes the requirements with respect to the installation or use of a facility's components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such findings published in the *Federal Register* on January 11, 2011 (76 FR 1649).

Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSIONS

The NRC staff has reviewed the licensee's proposed TS changes and supporting documentation. Based on the evaluation discussed above, the NRC staff concludes that the proposed amendment to PNPP TS 2.1.1.2 for both TLO and SLO are acceptable for PNPP's cycle 14 operation because the changes were analyzed based on the NRC-approved methods using PNPP cycle-specific inputs and the fuel bundles in the core for PNPP's cycle 14 operation.

The Commission has concluded, based on the considerations discussed above, 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) 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: T. L. Huang

Date of issuance: April 18, 2011

April 18, 2011

Mr. Mark B. Bezilla
Site Vice President
FirstEnergy Nuclear Operating Company
Mail Stop A-PY-A290
P.O. Box 97, 10 Center Road
Perry, OH 44081-0097

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT NO. 1 - ISSUANCE OF AMENDMENT
RE: LICENSE AMENDMENT TO MODIFY TECHNICAL SPECIFICATION 2.1.1,
"REACTOR CORE SLS," TO INCORPORATE REVISED SAFETY LIMIT MINIMUM
CRITICAL POWER RATIO VALUES
(TAC NO. ME4925)

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This license amendment modifies Technical Specification 2.1.1, "Reactor Core SLS," by incorporating revised safety limit minimum critical power ratio values resulting from a plant-specific analysis performed for PNPP's operating cycle 14 core.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Michael Mahoney, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures:

1. Amendment No. 155 to NPF-58
2. Safety Evaluation

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Amendment Accession No. ML110770315

*Memo Dated

OFFICE	DORL/LPL3-2/PM	DORL/LPL3-2/LA	DSS/SRXB/BC
NAME	MMahoney	SRohrer	AUises (SMiranda for)
DATE	3/29/11	3/21/11	*3/14/11
OFFICE	OGC/NLO w/ Changes	DORL/LPL3-2/BC	
NAME	SUttal	RCarlson (EBrown for)	
DATE	4/08/11	4/18/11	