

March 31, 2005

Mr. Lew W. Myers
Chief Operating Officer
FirstEnergy Nuclear Operating Company
76 South Main Street
Akron, OH 44308

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT 1 - ISSUANCE OF AMENDMENT
RE: SINGLE RECIRCULATION LOOP OPERATION (TAC NO. MC4224)

Dear Mr. Myers:

The Commission has issued the enclosed Amendment No. 134 to Facility Operating License No. NPF-58 for the Perry Nuclear Power Plant, Unit 1. This amendment revises Technical Specification 3.4.1, "Recirculation Loops Operating," associated with single recirculation loop operation by incorporating limits for the linear heat generation rate fuel thermal limit into the limiting condition for operation, in response to your application dated August 31, 2004.

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/

William A. Macon, Jr., Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-440

Enclosures: 1. Amendment No. 134 to NPF-58
2. Safety Evaluation

cc w/encls: See next page

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*No major changes to SE dated 3/1/05

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Perry Nuclear Power Plant, Unit 1

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Perry Nuclear Power Plant, Unit 1

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FIRSTENERGY NUCLEAR OPERATING COMPANY

DOCKET NO. 50-440

PERRY NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 134
License No. NPF-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by the FirstEnergy Nuclear Operating Company (the licensee) dated August 31, 2004, 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. 134, are hereby incorporated into this license. The FirstEnergy Nuclear Operating Company 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 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Gene Y. Suh, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the
Technical Specifications

Date of Issuance: March 31, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 134

FACILITY OPERATING LICENSE NO. NPF-58

DOCKET NO. 50-440

Replace the following pages of the 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

3.4-1

3.4-2

Insert

3.4-1

3.4-2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 134 TO FACILITY OPERATING LICENSE NO. NPF-58
FIRSTENERGY NUCLEAR OPERATING COMPANY
PERRY NUCLEAR POWER PLANT, UNIT 1
DOCKET NO. 50-440

1.0 INTRODUCTION

By application to the U.S. Nuclear Regulatory Commission (NRC, Commission) dated August 31, 2004 (Ref. 1), FirstEnergy Nuclear Operating Company (the licensee) requested changes to the Technical Specifications (TSs) for the Perry Nuclear Power Plant, Unit 1 (PNPP).

Specifically, the proposed changes would revise TS 3.4.1, "Recirculation Loops Operating," associated with single recirculation loop operation by incorporating limits for the linear heat generation rate fuel thermal limit into the limiting condition for operation (LCO). Currently, TS 3.4.1 only contains thermal limits for the average planar linear heat generation rate and the minimum critical power ratio. Thermal limits associated with the recirculation two loop operations are contained in TS 3.2.1, "Average Planar Linear Heat Generation Rate (APLHGR)," TS 3.2.2, "Minimum Critical Power Ratio (MCPR)," and TS 3.2.3, "Linear Heat Generation Rate (LHGR)." The proposed TS changes will reflect a consistency with the existing two recirculation loop LCOs by including the same three thermal limits into the single recirculation loop LCO.

PNPP TSs currently have LCO requirements that the APLHGR operating limit and the MCPR operating limit shall be modified during recirculation single loop operations (SLO) conditions, as specified in the core operating limits report (COLR). The proposed TS changes add the LCO requirement to also modify the LHGR operating limit for SLO in the COLR. Currently, with no TS requirement, administrative controls are used to ensure that the LHGR operating limits are appropriately adjusted. The LHGR operating limit provides thermal-mechanical protection against fuel cladding damage and failure for normal operation and anticipated operational occurrences (AOOs). The APLHGR operating limit provides emergency core cooling system (ECCS) protection for loss-of-coolant accident (LOCA) events. The MCPR operating limit provides protection against fuel damage from cladding overheating.

The proposed TS changes will allow PNPP to use the latest NRC-approved nuclear modeling methods from the General Electric licensing topical report NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel" (GESTAR II), for determining the core operating thermal limits to ensure that the fuel design limits are not exceeded during normal operation, including AOOs.

LHGR operating limits were included in the TSs for most boiling water reactor plants. However, in 1987 the NRC staff approved GESTAR II Amendment 19 which allowed the option for the LHGR operating limits to be monitored as part of the APLHGR TSs. Under this option,

monitoring and adhering to the APLHGR operating limits also ensures compliance to the LHGR operating limit.

In 1999, the NRC staff approved GESTAR II Amendment 26 (Ref. 2) which describes improved nuclear design and monitoring methods using the PANAC11 nuclear model. These improved methods increase the accuracy in core monitoring analyses such that separate monitoring of LHGR and APLHGR operating limits may provide more design and operating flexibility. Licensees who adopted the composite APLHGR limit approach in GESTAR II Amendment 19, or who have used another fuel vendor's thermal-mechanical (T-M) and LOCA criteria to monitor limits, are now choosing to use the PANAC11 model in GESTAR II Amendment 26 to monitor LHGR and APLHGR operating limits separately. Licensees may reexamine their TSs for potential changes to reestablish separate LHGR monitoring.

The NRC staff notes that licensees have not consistently addressed the separation of the LHGR and APLHGR operating limits, which has resulted in different implementations of GESTAR II Amendment 19. The Hatch plant, for example, adopted the optional use of composite ECCS and T-M APLHGR operating limits, but removed references to the LHGR operating limits from its TSs.

The NRC staff reviews of the Dresden, LaSalle, and Quad Cities TS change requests (Ref. 3) provided the precedent for this review, in that these reviews presented the approach to reincorporate the LHGR operating limit into the TS LCO. Also, GESTAR II Amendment 27 (Ref. 4) contains administrative changes to clarify the two options identified in GESTAR II Amendment 19. Using this approach, the T-M criteria may be monitored either by a composite APLHGR limit which includes the effects of both the ECCS-LOCA and T-M limits, or by separate APLHGR and LHGR operating limits where the APLHGR operating limits are used to impose ECCS-LOCA limits and the LHGR operating limits are used to impose the T-M constraints.

The licensee is using the PANAC11 model for core licensing calculations and has identified TS changes to add an LCO requirement that modifies the LHGR operating limit for SLO. These changes to monitor LHGR and APLHGR operating limits separately will allow PNPP to fully implement the GESTAR II Amendment 26 methodology.

2.0 REGULATORY EVALUATION

The Commission's regulatory requirements related to the content of TSs are set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical Specifications." This regulation requires, among other things, that the TSs will include items in the following categories: 1) safety limits, limiting safety system settings and limiting control settings, 2) limiting conditions for operation, 3) surveillance requirements, 4) design features, and 5) administrative controls.

Additionally, Criterion 2 of 10 CFR 50.36(c)(2)(ii)(B) requires that an LCO of a nuclear reactor must be established 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. Since the LHGR operating limits satisfies Criterion 2, the LCO must be included in the TSs.

Criterion 10 of 10 CFR 50, Appendix A, "General Design Criteria [GDC] for Nuclear Power Plants," requires that the reactor core and associated coolant, control, and protection systems

shall be designed with appropriate margin to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of normal operation, including the effects of AOOs.

Section 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," establishes the acceptance criteria for the design-basis LOCA. Specifically, paragraph (b)(1), "Peak cladding temperature" (PCT), requires the calculated maximum fuel element cladding temperature to not exceed 2200 degrees Fahrenheit.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP), Section 4.2, "Fuel System Design," DRAFT Rev. 3 - April 1996, defines the basis for the acceptance criteria for NRC staff reviews. These criteria consist of three parts: (1) design bases that describe SAFDLs as depicted in GDC 10 to 10 CFR Part 50, Appendix A, (2) design evaluation that demonstrates that the design bases are met, and (3) testing, inspection, and surveillance plans that show that there is adequate monitoring and surveillance of irradiated fuel. The design bases include: (1) fuel system damage, (2) fuel rod failure, and (3) fuel coolability. The LHGR and APLHGR limits are part of the SAFDLs.

3.0 TECHNICAL EVALUATION

SRP Section 4.2 provides the guidance for safety evaluation reviews of the fuel system design. The fuel system consists of arrays of fuel rods including fuel pellets and tubular cladding, spacer grids, end plates, and reactivity control rods. The objectives of the fuel system safety review are to provide assurance that: (1) the fuel system is not damaged as a result of normal operation and anticipated operational occurrences, (2) fuel system damage is never so severe as to prevent control rod insertion when it is required, (3) the number of fuel rod failures is not underestimated for postulated accidents, and (4) coolability is always maintained. As indicated above, the LHGR operating limits provides protection against fuel cladding damage and failure for normal operation and AOOs, and the APLHGR operating limits provides protection for LOCA events.

The NRC staff has reviewed the licensee amendment request for proposed revisions to the PNPP TSs. The NRC staff reviewed the licensee's submittal in accordance with the requirements of 10 CFR 50.36, 10 CFR 50.46, 10 CFR Part 50, Appendix A, and the guidance set forth in the applicable sections of NUREG-0800. Based on the NRC staff's evaluation, as set forth below, the NRC staff concludes that the proposed TS revisions are acceptable.

3.1 Linear Heat Generation Rate (LHGR)

The LHGR is defined as the power generated in a fixed length of a fuel rod. The plant monitoring system continuously monitors LHGR on a six-inch-segment basis for each fuel rod in units of kilowatts per foot (kW/ft). The LHGR is monitored and compared to the limit to ensure that fuel T-M design limits (e.g., 1 percent plastic strain, PCT, etc.) which prevent fuel cladding failure are not exceeded during normal operation and AOOs.

With the approval of GESTAR II Amendment 26, licensees planning to use the improved models may need to add (or restore) an LCO related to the LHGR operating limit included in the power distribution section of the TSs. This LCO addresses plant monitoring and limitation requirements of the LHGR operating limit. The LCO contains required action, completion time, and surveillance requirements. Like the existing APLHGR and MCPR LCOs, the added LHGR operating limit is applicable at a reactor power greater than 23.8 percent rated thermal power

(RTP). Consequently, inability to meet the LHGR operating limit within the specified completion time will require that the power be reduced to below 23.8 percent RTP. The surveillance requirements include the frequency of surveillance.

3.2 Technical Specifications Affected

The TSs potentially affected by separate monitoring of the LHGR include: (1) LHGR definition, (2) LHGR limit, (3) recirculation loops operating, (4) COLR, and (5) TS Bases.

3.2.1 TS Section 1.1, Definitions, Linear Heat Generation Rate

Since the current TS definition is consistent with the LHGR definition in TS Section 3.2.3, the NRC staff concludes that the definition is acceptable.

3.2.2 TS Section 3.2.3, Linear Heat Generation Rate (LHGR), LCO 3.2.3

The proposed LCO 3.2.3 establishes the required action, completion time, and surveillance requirements for the LHGR operating limit at a reactor power greater than 23.8 percent RTP. Failure to meet the LHGR operating limit within the specified completion time will result in a power reduction to below 23.8 percent RTP. Based on the consistency with the description in TS Section 1.1, the NRC staff concludes that the proposed TS LCO 3.2.3 is acceptable.

3.2.3 TS Section 3.4.1, Recirculation Loops Operating, LCO 3.4.1

LCO 3.4.1 addresses reactor operation with one or two recirculation loops. Reactor operation with one recirculation loop is generally more limiting than with two recirculation loops. Currently, the LCO addresses the APLHGR operating limit, MCPR operating limit, and reactor protection system instrumentation and control rod block instrumentation requirements. The licensee proposes to add a line item LHGR limit to LCO 3.4.1. The proposed line item states that the LHGR operating limit will be modified when the reactor is operating with one recirculation loop (SLO) using the limit value contained in the COLR. Based on the similar approach for the other thermal limits (MCPR and APLHGR), the NRC staff concludes that the proposed line item inclusion of an SLO LHGR operating limit in LCO 3.4.1 is acceptable.

3.2.4 TS Section 5.6.5, Core Operating Limits Report

Core operating limits shall be established prior to each reload cycle and will be documented in the COLR. The proposed LCO 3.2.3 states that the SLO LHGR operating limits shall be less than or equal to the limits specified in the COLR. The licensee will add the SLO LHGR operating limit value to the COLR requirements. Since it is consistent with the other COLR requirements, the NRC staff concludes that the including the proposed LCO LHGR limit value in COLR is acceptable.

3.2.5 TS Bases

The licensee stated that the LHGR Bases 3.2.3 and 3.4.1 sections are to be revised to include references to the LHGR operating limit. The NRC staff examined these Bases revisions and notes that they appropriately support the TS changes.

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

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or changes a surveillance requirement. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluent 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding (70 FR 401). Accordingly, this amendment meets 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 this amendment.

6.0 CONCLUSION

The NRC staff 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 this amendment will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter from L. W. Myers (FENOC) to U.S. NRC, "License Amendment Request Pursuant to 10 CFR 50.90: Revision of Technical Specification 3.4.1, "Recirculation Loops Operating" Associated with Single Recirculation Loop Operation," dated August 31, 2004 (ADAMS ML042530087).
2. Letter from S. A. Richards (NRC) to G. A. Watford (GE Nuclear Energy), "Amendment 26 to GE Licensing Topical Report NEDE-24011-P-A, GESTAR II, Implementing Improved GE Steady-State Methods," dated November 10, 1999 (ADAMS ML993230184).
3. Letter from D.V. Pickett (NRC) to C.M. Crane (Exelon), "LaSalle, Dresden, Quad Cities, Issuance of Amendments," October 2, 2004 (ADAMS ML042320388).
4. Letter from H. N. Berkow (NRC) to M. Harding (GNF), "Final Safety Evaluation for Global Nuclear Fuel (GNF) Licensing Topical Report NEDE-24011P, GESTAR II, Amendment 27 (TAC No. MC0347)," dated July 16, 2004 (ADAMS ML042010353).

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Date: March 31, 2005