

June 30, 2006

Mr. Richard Anderson  
Vice President  
FirstEnergy Nuclear Operating Company  
Mail Stop A-PY-A290  
P.O. Box 97, 10 Center Road  
Perry, Ohio 44081

SUBJECT: PERRY NUCLEAR POWER PLANT, UNIT 1 - ISSUANCE OF AMENDMENT  
RE: OSCILLATION POWER RANGE MONITOR INSTRUMENTATION  
(TAC NO. MC7489)

Dear Mr. Anderson:

The Commission has issued the enclosed Amendment No. 138 to Facility Operating License No. NPF-58 for the Perry Nuclear Power Plant, Unit 1. This amendment revises the technical specifications (TSs) in response to your application dated July 5, 2005, as supplemented by letter dated March 22, 2006.

This amendment modifies the existing TS 3.3.1.3, "Oscillation Power Range Monitor (OPRM) Instrumentation," Surveillance Requirement 3.3.1.3.5. Specifically, the thermal power level at which the OPRMs are "not bypassed" (enabled to perform their design function) will be change from  $> 28.6$ -percent rated thermal power to  $\geq 23.8$ -percent rated thermal power.

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/**

Stephen J. Campbell, 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. 138 to NPF-58
2. Safety Evaluation

cc w/encls: See next page

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Perry Nuclear Power Plant, Unit 1

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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

FACILITY OPERATING LICENSE

Amendment No. 138  
License No. NPF-58

1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for license amendment filed by FirstEnergy Nuclear Operating Company, et al., (the licensee) dated July 5, 2005, as supplemented by letter dated March 22, 2006, 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. 138 are hereby incorporated into this 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 its issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA KNJabbour for/**

Daniel S. Collins, Chief  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical Specifications

Date of Issuance: June 30, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 138

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

License Page 4  
3.3-14b

Insert

License Page 4  
3.3-14b

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 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. 138, 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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 138 TO FACILITY OPERATING LICENSE NO. NPF-58

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

OHIO EDISON COMPANY

PERRY NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-440

## 1.0 INTRODUCTION

By letter to the Nuclear Regulatory Commission (NRC, the Commission) dated July 5, 2005, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML051940205) as supplemented by letter dated March 22, 2006 (ADAMS Accession No. ML060890652), FirstEnergy Nuclear Operating Company, et al. (the licensee) requested changes to the technical specifications (TSs) for the Perry Nuclear Power Plant (PNPP), Unit 1. The March 22, 2006, supplement contained clarifying information and did not change the NRC staff's initial proposed finding of no significant hazards consideration.

The proposed changes would revise the enabled region for the oscillation power range monitors (OPRMs). The proposed amendment would modify the existing TS 3.3.1.3, "Oscillation Power Range Monitor (OPRM) Instrumentation," Surveillance Requirement (SR) 3.3.1.3.5. Specifically, the thermal power level at which the OPRMs are "not bypassed" (enabled to perform their design function) will be changed from  $> 28.6$ -percent rated thermal power to  $\geq 23.8$ -percent rated thermal power. The proposed change will also incorporate a bounding value for enabling the OPRMs within the TSs, such that the number of future TS changes to the "not bypassed" (enabled) value will be minimized.

## 2.0 REGULATORY EVALUATION

As a result of concerns about the possibility of power oscillations due to thermal-hydraulic instabilities in boiling water reactors (BWRs), the NRC issued Generic Letter (GL) 86-02, "Technical Resolution of Generic Issue B-19 Thermal Hydraulic Stability." The GL requested BWR licensees to examine each core reload and to impose operating limitations, as appropriate, to ensure compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, "General Design Criteria" (GDC) 10, "Reactor design," and GDC 12, "Suppression of reactor power oscillations." GDC 10 requires that the reactor core be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences. GDC 12 requires that the reactor core and associated coolant, control, and protection systems shall be designed to assure that power oscillations which can result in conditions exceeding specified acceptable fuel design limits are not possible or can be reliably and readily detected and suppressed.

### 3.0 TECHNICAL EVALUATION

In addition to the requirements stated in Section 2.0 above, the NRC staff requested the BWR Owners' Group (BWROG) to perform generic evaluations of BWR plant response to core thermal-hydraulic instabilities. On June 15, 1988, the NRC staff issued NRC Bulletin No. 88-07, "Power Oscillations in Boiling Water Reactors (BWRs)." The purpose of the bulletin was to ensure that licensees who operated BWRs had adequate operating procedures and instrumentation available and provided adequate operator training to prevent the occurrence of uncontrolled power oscillations during all modes of BWR operation. Uncontrolled power oscillations may be asymmetric with respect to the core locations and can lead to high local neutron flux levels caused by low flow and low power operations. In addition, as indicated in the bulletin, the NRC staff, as a separate action, requested that the BWROG perform generic evaluations of the BWR plant response to core hydraulic instabilities.

In November 1988, General Electric (GE) issued a letter entitled, "Interim Recommendations for Stability Actions" to BWR licenses. The NRC staff reviewed the interim corrective actions (ICAs) recommended by GE and found them acceptable for those plants which have automatic scram protection for regional oscillations, such as PNPP. On December 30, 1988, the NRC issued Bulletin 88-07, Supplement 1, "Power Oscillations in Boiling Water Reactors," approving the proposed BWROG/GE interim recommendations for stability actions with some operating conditions applied. That Bulletin supplement also discussed long-term corrective actions. Such corrective actions might include hardware modifications or additions to facilitate automatic or protective responses to avoid neutron flux oscillations or to suppress oscillations should they occur. In June 1991, the BWROG issued NEDO-31960, "BWR Owner's Group Long-Term Stability Solutions Licensing Methodology," which documented proposed long-term solutions to the stability issue as well as methodologies that had been developed to support the design of these long-term solutions. Supplement 1 to NEDO-31960 was issued in March 1992 and contained final methodology details and additional information requested by the NRC. By letter dated July 1993, the NRC staff found the solutions of NEDO-31960 and Supplement 1 to be acceptable for referencing in license applications to the extent specified, and under the limitations delineated in NEDO-31960 and Supplement 1 and the associated NRC technical evaluations.

The OPRM enabled region is the area on the power to flow map where, if an instability is detected, a scram signal will be automatically generated. The enabled region was purposely dimensioned to encompass the scram, controlled entry, and immediate exit regions as defined in the ICAs. The criteria for development of this region was defined in NEDO 32465-A, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications." The region was specified to be at a reactor power level greater than 30 percent of original rated thermal power, and a core flow less than 60 percent of the rated core flow. The bases for this region was documented in a GE letter entitled, "Guidelines for Stability Option III Enabled Region," (OG96-630-169), dated September 12, 1996.

The current PNPP TS SR 3.3.1.3.5 states that the OPRMs are "not bypassed" (enabled) when thermal power is > 28.6-percent and reactor recirculation system drive flow is less than the value which corresponds to 60 percent core flow. Since the average power range monitors measure reactor recirculation system drive flow and use it as an indication of core flow, the core flow setpoint is converted into a drive flow setpoint for use by the OPRMs.

By letter dated June 29, 2001, GE submitted a notification pursuant to 10 CFR Part 21, "Reporting of Defects and Noncompliance." This notification indicated that stability reload

licensing calculations using the generic DIVOM (Delta Critical Power Ratio (CPR)/Initial CPR Versus Oscillation Magnitude) curve could result in OPRM reactor protection system trip setpoints, which may not provide minimum CPR safety limit protection.

By letter dated September 30, 2003, the BWROG proposed a resolution for the 10 CFR Part 21 notification. The resolution will require the licensee to use the plant-specific DIVOM curve, which will be generated or confirmed for each reload fuel cycle consistent with the process described in NEDO-32465-A. The plant-specific curves will be reasonably conservative, but not necessarily bounding, for a particular fuel cycle. In conjunction with the 95/95 statistical approach of the licensing methodology, the plant-specific DIVOM curves will result in a high probability that the fuel cladding integrity safety limit will not be violated as a result of anticipated instability events.

With respect to the 10 CFR Part 21 issues associated with the OPRMs, the ICA regions experienced the same issues as the OPRM settings. There previously was no check in the core design process to ensure the assumptions used to set the ICA regions were not being exceeded. As fuel and core designs evolved and operating strategies changed, the margin of protection provided by the ICAs had decreased. In order to restore this margin, GE determined that the ICA regions should be expanded. Furthermore, core stability is very sensitive to the final feedwater temperature. Operating within the OPRM enabled region (low flow and high power) with reduced feedwater temperatures presents the greatest potential for instability. GE calculations have shown the ICA regions should be enlarged to provide protection under these conditions. The OPRM Enabled region also should be enlarged, accordingly.

GE has developed an analytical method that can be used to expand the ICA and enabled regions. The methodology is called the Backup Stability Protection (BSP) analysis. The analysis is used to redraw the ICA regions on the power flow map. The BSP analysis uses plant-specific inputs to develop decay ratios. The decay ratios are then used to adjust the ICA regions in order to provide stability protection for conditions of reduced feedwater temperature. The BSP analysis also combines the original three ICA regions (the scram region, the exit region, and the controlled entry region) into two regions, the scram region and the controlled entry region. The operator actions in the two BSP regions are similar to those taken in the original ICA scram and controlled regions.

The NRC staff reviewed the PNPP-specific BSP analysis that was performed in accordance with the GE analytical methodology. A PNPP core design was developed in accordance with the NRC-approved Licensing Topical Report NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel" (GESTAR II) (reference PNPP Updated Final Safety Analysis Report, Section 4.2). This topical report describes the processes by which the fuel vendor develops fuel and core designs, and how these designs are evaluated and limits are established.

To accomplish this, a decay ratio analysis was performed using the ODYSY procedure and ODYSY computer code. The current version of the ODYSY procedure and ODYSY computer code are discussed in the NRC-approved Licensing Topical Report, NEDC-32992P-A, "ODYSY, Application for Stability Licensing Calculations," dated July 2001. The PNPP-specific decay ratio parameters used in the current PNPP Cycle 11 fuel and core design stability evaluation were developed using this version of the ODYSY procedure and computer code.

Although the PNPP-specific BSP analysis results indicate the power setpoint should be 27.2 percent, a value of  $\geq 23.8$  percent is being requested in this amendment. This value

results in the OPRMs being enabled at the same point that they are to be OPERABLE, and is conservative to the BSP analysis. Additionally, since the stability analysis is performed on an operating cycle basis, the NRC staff expects that the setpoint of  $\geq 23.8$  percent will bound future calculated power setpoint values, thereby minimizing the need to request future TS changes to revise the setpoint. The NRC staff finds the conducted analysis and the results to be acceptable because all of the calculations were conducted with approved methodologies and resulted in values within the acceptable limits.

As a result of the BSP analysis, the power setpoint currently specified in SR 3.3.1.3.5 is non-conservative. Therefore, PNPP is currently operating the OPRMs to be enabled at  $\geq 23.8$  percent rated thermal power, which is a more restrictive rated thermal power limit, using administrative controls per NRC Administrative Letter 98-10, "Dispositioning of Technical Specifications That Are Insufficient to Assure Plant Safety." These controls will remain in place until such time that this license amendment is approved.

#### 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 SR. 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 48206; dated August 16, 2005). 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.

Principal Contributor: A. Attard

Date: June 30, 2006