

December 22, 2004

Mr. A. Christopher Bakken, III  
President & Chief Nuclear Officer  
PSEG Nuclear LLC-X15  
Post Office Box 236  
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION - ISSUANCE OF AMENDMENT RE:  
SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (TAC NO. MC3093)

Dear Mr. Bakken:

The Commission has issued the enclosed Amendment No. 158 to Facility Operating License No. NPF-57 for the Hope Creek Generating Station. This amendment consists of changes to the Technical Specifications in response to your application dated April 27, 2004, as supplemented by letters dated September 9, 2004, and December 2, 2004. The amendment revises the Safety Limit Minimum Critical Power Ratio values for two recirculation loop and one recirculation loop operation for all fuel types to be used in the core.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

**/RA/**

Daniel S. Collins, Sr. Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-354

Enclosures: 1. Amendment No. 158 to  
License No. NPF-57  
2. Safety Evaluation

cc w/encls: See next page

Hope Creek Generating Station

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PSEG NUCLEAR LLC

DOCKET NO. 50-354

HOPE CREEK GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 158  
License No. NPF-57

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by PSEG Nuclear LLC dated April 27, 2004, as supplemented by letters dated September 9, 2004, and December 2, 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 set forth in 10 CFR Chapter I;
  - 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-57 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 158, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into the license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Darrell J. Roberts, Chief, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: December 22, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 158

FACILITY OPERATING LICENSE NO. NPF-57

DOCKET NO. 50-354

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

2-1

B 2-1

Insert

2-1

B 2-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 158 TO FACILITY OPERATING LICENSE NO. NPF-57

PSEG NUCLEAR LLC

HOPE CREEK GENERATING STATION

DOCKET NO. 50-354

1.0 INTRODUCTION

By letter dated April 27, 2004 (see Agencywide Documents and Management System (ADAMS) Accession No. ML041270432), as supplemented by letters dated September 9, 2004 (ML042660196), and December 2, 2004 (ML043510056), PSEG Nuclear LLC (PSEG or the licensee) requested changes to the Hope Creek Generating Station (Hope Creek) Technical Specifications (TSs). The supplements dated September 9, 2004, and December 2, 2004, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards determination as published in the *Federal Register* on June 22, 2004 (69 FR 34704).

The amendment would revise the Safety Limit Minimum Critical Power Ratio (SLMCPR) values for two recirculation loop and one recirculation loop operation for all fuel types to be used in the Cycle 13 core from 1.10 and 1.12 to 1.06 and 1.08, respectively. The Cycle 13 mixed core given in Figure 1 of Attachment 1 to Reference 3 has 764 fuel assemblies, of which there are 164 fresh GE14 bundles, 232 once burned SVEA96 bundles, 237 twice burned SVEA96 bundles, and 131 thrice burned SVEA96 bundles.

2.0 REGULATORY EVALUATION

The licensee identified the applicable regulatory requirements in Section 5 of its April 27, 2004, submittal. The regulatory requirements that the Nuclear Regulatory Commission (NRC or the Commission) staff considered in its review of the application are in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36, "Technical Specifications," and 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 10.

Section 50.36(c)(1)(i)(A) of 10 CFR requires that limits be established upon important process variables that are found to be necessary to reasonably protect the integrity of the physical barriers that guard against the uncontrolled release of radioactivity. Maintaining the actual critical power ratio equal to or greater than the SLMCPR protects the integrity of the fuel cladding which is the first physical barrier against the uncontrolled release of radioactivity.

Appendix A to 10 CFR Part 50, GDC 10 requires that the reactor core and associated coolant, control, and protective system 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. To ensure compliance with GDC 10, the NRC staff evaluates the licensee's plant-specific SLMCPR analyses using NRC-approved methodologies as prescribed in NUREG-0800, Standard Review Plan, Section 4.4. The SLMCPR ensures that sufficient conservatism exists in the operating MCPR limit such that, in the event of an anticipated operational occurrence, 99.9% of the fuel rods in the core are not expected to experience boiling transition for the power distribution within the core, including all uncertainties.

### 3.0 TECHNICAL EVALUATION

The NRC staff reviewed: 1) the applicability of the approved methodologies used to perform this analyses, 2) the licensee's justification for the change to the SLMCPR values, and 3) the licensee's response to the 10 CFR Part 21 issue for analyzing the SLMCPR at an off-rated flow and rated power condition.

In this submittal, the licensee references NRC-approved methodologies to calculate the proposed SLMCPR values. Global Nuclear Fuel (GNF) performed the SLMCPR analysis using plant- and cycle-specific fuel and core parameters. In addition, GNF used the NRC-approved methodologies, which include NEDE-32505P, Revision 1, "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel;" NEDO-10958-A, "General Electric Boiling Water Reactor Thermal Analysis Basis (GETAB): Data, Correlation and Design Application;" NEDC-32601P, "Methodology and Uncertainties for Safety Limit MCPR Evaluations;" NEDC-32694P, "Power Distribution Uncertainties for Safety Limit MCPR Evaluations;" Amendment 25 to NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel" (GESTAR II); and NEDC-33107P Revision 0, "GEXL80 Correlation for SVEA96+ Fuel."

In response to questions from the NRC staff, PSEG explained the overall reduction of the SLMCPR values for the Hope Creek Cycle 13 operation with respect to that for the Cycle 12 operation in Reference 2. Subsequently, the justification for the changes of the SLMCPR values was revised in Reference 3, which was submitted because of the changes introduced during the redesign of the Cycle 13 core due to the early shutdown from Cycle 12, the removal of two defects found during offload, and the changes introduced because of the different core flow rates in which the SLMCPR calculation was performed. PSEG stated that the net decrease in the SLMCPR was attributable to differences in nuclear evaluation methodologies and differences in the GEXL correlation bias uncertainty. The NRC staff reviewed the licensee's justification to address the reduction of the SLMCPR values. The NRC staff has found the justification for the changes to be acceptable because the licensee has performed SLMCPR evaluations using NRC-approved methodologies.

Tables 1 through 4 in Reference 3 also provide SLMCPR comparisons due to the effects of each core design parameter, which were also clarified through several conference calls during the staff review. The licensee also stated in its submittal that no penalties were applied to the Hope Creek Cycle 13 core due to upskew power shape.

By letter dated August 24, 2004, GE Nuclear Energy (GENE) notified the NRC that GNF and GENE had identified that the current GNF process for determination of the SLMCPR could result in a non-conservative SLMCPR. This letter was submitted pursuant to 10 CFR 21.21(d). The letter identified that analysis of operating state points allowed by expanded operating domains such as Extended Load Line Limit Analysis (ELLLA), under which Hope Creek



currently operates, and Maximum Extended Load Line Limit Analysis (MELLLA), which Hope Creek has requested NRC approval to use, may result in a more limiting SLMCPR. Traditionally, the SLMCPR was evaluated with an initial condition of 100% rated core flow and 100% rated thermal power. The August 24, 2004, letter identified that initial conditions (that are possible when operating using ELLLA or MELLLA) where the reactor was operating at 100% RTP with less than 100% rated core flow may result in a lower calculated SLMCPR.

To resolve this issue, PSEG performed the SLMCPR calculation at a reduced core flow rate of 76.6% rated flow at rated thermal power as well as the current Hope Creek licensing basis minimum allowable core flow of 87% rated flow at rated thermal power, proposing the most conservative SLMCPR values shown in Table 4 of Reference 3. This table also demonstrates that the SLMCPR evaluation at rated power for the revised Reference Loading Pattern core design at the low flow condition of 76.6% results in an SLMCPR value that is equivalent to or will conservatively bound SLMCPR calculations performed at higher core flow rates of 87% and 100% rated core flow. The licensee's proposed SLMCPR values are based on the conservative SLMCPR values which are analyzed at low flow condition of 76.6%.

Based on the above review of PSEG's application, including the supplemental submittals, the NRC staff has concluded that the licensee's proposed SLMCPR is acceptable because the calculation results were developed using NRC-approved methodologies such that the proposed SLMCPR values will ensure that 99.9% of the fuel rods in the core will not experience boiling transition, which satisfies the requirements of GDC 10 and 10 CFR 50.36 regarding acceptable fuel design limits. Additionally, the NRC staff finds that PSEG has adequately resolved the 10 CFR Part 21 issue by evaluating the SLMCPR value at reduced flow conditions and demonstrating that these are equivalent or conservative to the 100% rated flow condition. Therefore, the staff has concluded that revision of the SLMCPR values for two recirculation loop and one recirculation loop operation for all fuel types to be used in the cycle 13 core from 1.10 and 1.12 to 1.06 and 1.08, respectively, is acceptable.

It should be noted that the discussion of the analysis of the SLMCPR value at 76.6% rated core flow in this SE, which corresponds to the limiting point associated with the implementation of the MELLLA operating domain, does not constitute NRC approval of a change to the Hope Creek licensing basis. The current licensing basis for Hope Creek is defined by ELLLA, which is addressed by evaluating the SLMCPR at 87% rated core flow. The application to allow implementation of the MELLLA operating domain for Hope Creek is currently under NRC staff review and available in the ADAMS under accession number ML041760324.

#### 4.0 STATE CONSULTATION

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

#### 5.0 ENVIRONMENTAL CONSIDERATION

The 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. 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 finding (69 FR 34704). Accordingly, the 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 the amendment.

## 6.0 CONCLUSION

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 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 (LR-N04-0183) from Michael H. Brothers to USNRC, "Request for Change to Technical Specifications Safety Limit Minimum Critical Power Ratio Hope Creek Generating Station Facility Operating License NPF-57 Docket No. 50-354," April 27, 2004.
2. Letter (LR-N04-0375) from Michael H. Brothers to USNRC, "Response to Request for Additional Information Safety Limit Minimum Critical Power Ratio Hope Creek Generating Station Facility Operating License NPF-57 Docket No. 50-354," September 09, 2004.
3. Letter (LR-N04-0524) from Michael H. Brothers to USNRC, "Supplement to Request for Change to Technical Specifications Safety Limit Critical Power Ratio Hope Creek Generation Station Facility Operating License NPF-57 Docket No. 50-354," December 2, 2004.

Principal Contributors: T. Huang  
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Date: December 22, 2004