November 16, 2004

Mr. Christopher M. Crane
President and Chief Nuclear Officer
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT OYSTER CREEK NUCLEAR GENERATING STATION - ISSUANCE OF AMENDMENT RE: SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (TAC NO. MC4205)

Dear Mr. Crane:

The Commission has issued the enclosed Amendment No. 252 to Facility Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station, in response to your application dated August 27, 2004, as supplemented by letters dated October 11 and 19, 2004.

The amendment revised the Technical Specifications, Section 2.1.A, changing the safety limit minium critical power ratio value from 1.09 to 1.10 for both four- or five-recirculation-loop operation, and from 1.10 to 1.12 for three-recirculation-loop operation.

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

Sincerely,

/RA/

Peter S. Tam, Senior Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosures: 1. Amendment No. 252 to DPR-16
2. Safety Evaluation

cc w/encls: See next page

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AMERGEN ENERGY COMPANY, LLC

DOCKET NO. 50-219

OYSTER CREEK NUCLEAR GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 252
License No. DPR-16

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by AmerGen Energy Company, LLC, et al., (the licensee), August 27, 2004, as supplemented by letters dated October 11 and 19, 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. DPR-16 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 252, are hereby incorporated in the license. AmerGen Energy Company, LLC, shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: November 16, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 252

FACILITY OPERATING LICENSE NO. DPR-16

DOCKET NO. 50-219

Replace the following page of Appendix A, Technical Specifications, with the attached revised page as indicated. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove	Insert
2.1-1	2.1-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 252

TO FACILITY OPERATING LICENSE NO. DPR-16

AMERGEN ENERGY COMPANY, LCC

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated August 27, 2004 (Accession No. ML042530150), and supplemented by letters dated October 11 (Accession No. ML042870459) and 19 (Accession No. ML043000307) 2004, AmerGen Energy Company, LLC (AmerGen, the licensee) proposed an amendment to change the Technical Specifications (TSs) for Oyster Creek Generating Station (OCNGS). The licensee proposed changing the safety limit minimum critical power ratio (SLMCPR) values in Section 2.1.A based on the cycle-specific analysis performed by Global Nuclear Fuel - Americas, LLC (GNF-A) for OCNGS, Cycle 20 operation.

The supplements cited above provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on September 14, 2004 (69 FR 55467).

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations,* Part 50 (10 CFR Part 50), Appendix A, General Design Criterion (GDC) 10 states, in part, that the reactor core and associated coolant, control, and protective system be designed to assure that the specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of steady-state operation, normal operational transients, and anticipated operational occurrences (AOOs).

Fuel design limits can likely be exceeded if the core exceeds critical power. Critical power is a term used for the power at which the fuel departs from nucleate boiling and enters a transition to film boiling. For boiling-water reactors (BWRs), the critical power is predicted using a correlation known as the General Electric (GE) critical quality boiling length correlation, or better known as the GEXL correlation. Due to core-wide and operational variations, the margin to boiling transition is most easily described in terms of a critical power ratio (CPR), which is defined as the rod critical power as calculated by GEXL divided by the actual rod power. The more a CPR value exceeds 1.0, the greater the margin to boiling transition is. The SLMCPR is

calculated using a statistical process that takes into account all operating parameters and the uncertainties. The operating limit MCPR (OLMCPR) is equal to the SLMCPR plus a CPR margin for transients. At the OLMCPR, at least 99.9 percent of the rods avoid boiling transition during steady state operation and transients caused by single operator error or equipment malfunction.

Safety Limits are required to be included in the TSs by 10 CFR 50.36. The SLMCPR is calculated on a cycle-specific basis because it is necessary to account for the core configuration-specific neutronic and thermal-hydraulic response.

3.0 TECHNICAL EVALUATION

3.1 OCNGS Cycle 20 Core

OCNGS is of a BWR/2 design which has five forced recirculation loops. The licensee proposed to change the SLMCPR value in Specification 2.1.A from 1.09 to 1.10 for both four- or five-recirculation-loop operation, and from 1.10 to 1.12 for three-recirculation-loop operation with the reactor vessel steam dome pressure greater than or equal to 800 psia and core flow greater than or equal to 10 percent of rated core flow.

OCNGS Cycle 20 core loading consists of 560 bundles total in the core. There will be 168 fresh GE11 fuel bundles, 190 once burned GE11 fuel bundles, 6 once burned GE9B bundles, 164 twice burned GE9B fuel bundles, and 32 thrice burned GE9B fuel bundles.

3.2 Methodology

GNF-A performed the revised Cycle 20 SLMCPR limit using NRC-approved methodologies and uncertainties. These are as follows:

- NEDC-32601-P-A “Methodology and Uncertainties for Safety Limit MCPR Evaluations,”
- NEDC-32694-P-A “Power Distribution Uncertainties for Safety Limit MCPR Evaluations,”
- NEDE-24011-P-A “General Electric Standard Application for Reactor Fuel,”
- NEDC-32505P-A “R-Factor Calculation Method for GE11, GE12 and GE13 Fuel,” and
- NEDO-10958-A “General Electric BWR Thermal Analysis Basis (GETAB): Data Correlation and Design Application.”

Plant-specific use of these methodologies must adhere to certain restrictions, as discussed below.

3.3 Methodology Restrictions

Based on NRC’s review of Topical Reports NEDC-32601-P-A, NEDC-32694-P-A, and Amendment 25 to NEDE-24011-P-A (GESTAR II), the NRC staff stated the following restrictions on the use of the topical reports:

1. The lattice physics code TGBLA fuel rod power calculational uncertainty should be verified when applied to fuel designs not included in the benchmark comparisions of Table 3.1 of NEDC-32601P, since changes in fuel design can have a significant effect on calculation accuracy.

2. The effect of the correlation of rod power calculation uncertainties should be reevaluated to insure the accuracy of R-Factor uncertainty when the methodology is applied to a new fuel lattice.

3. In view of the importance of MCPR importance factor (MIP) criterion and its potential sensitivity to changes in fuel bundle designs, core loading and operating strategies, the MIP criterion should be reviewed periodically as part of the procedural review process to insure that the specific value recommended in NEDC-32601-P is applicable to future designs and operating strategies.

4. The 3D-MON ICORE bundle power calculational uncertainty should be verified when applied to fuel and core designs not included in the benchmark comparisons in Tables 3.1 and 3.2 of NEDC-32694-P.

The licensee addressed the four restrictions in its October 11, 2004, letter. The licensee stated that it meets restriction (1) and (2) since the GE11 and GE9B fuel used in the Cycle 20 OCNGS core is specifically covered in NEDC-32601-P. The criterion in restriction (3) is still applicable to the current fuel and core design. Restriction (4) refers specifically to use of the reduced power uncertainties as defined in NEDC-32694-P which are applicable to plants which use the 3D MONICORE core monitoring system. OCNGS uses POWERPLEX-III (MICROBURN-B2) for core monitoring. The higher, more conservative GETAB NECO-10958-A uncertainties were used for the OCNGS Cycle 20 evaluation and have been confirmed by the licensee to bound those of the POWERPLEX-III Core Monitoring Software System.

The NRC staff finds that the licensee complies with the restrictions of the Topical Reports NEDC-32601P, NEDC-32694P, and Amendment 25 to NEDE-24011-P-A (GESTAR II), and that the use of these reports to evaluate the OCGS Cycle 20 SLMCPR is acceptable.

3.4 SLMCPR Calculation Result

The MCPR represents the rod at the lowest CPR in the core. In determining the SLMCPR, it is also important to consider how many rods are near the MCPR. A flatter MCPR distribution causes an increase in the SLMCPR limit because, although the power at which boiling transition occurs for the limiting rod may not increase, the number of rods that may potentially reach boiling transition may increase and jeopardize the criterion that 99.9 percent of all rods are to avoid boiling transition. Thus, the safety limit is increased accordingly.

These effects are characterized for each bundle using pin-by-pin power distributions, and then for the entire core using bundle-by-bundle MCPR distributions. GNF-A has performed calculations for OGNGS which show that the Cycle 20 core has a flatter MCPR distribution. This effect alone causes the SLMCPR to increase. The Cycle 20 core also has a more peaked pin-by-pin power distribution. This effect alone causes the SLMCPR to decrease. Given these

two competing effects, the licensee's calculations show that the flatter MCPR distribution is more dominant and, accordingly, the proposed SLMCPR limit has increased from the previous Cycle 19. The NRC staff has reviewed the results of the analysis for OCNGS Cycle 20 and finds the results of GNF-A's calculation acceptable.

3.5 Uncertainties

The uncertainties used for the SLMCPR calculation are listed in the following table.

SLMCPR Methodology Uncertainties	
Non-Power Distribution Uncertanties	**Power Distribution Uncertainties**
Feedwater system flow	GEXL R-factor
Feedwater temperature measurement	Random effective TIP reading
Reactor pressure measurement	Systematic effective TIP reading
Core inlet temperature measurement	Integrated effective TIP reading
Total core flow measurement	Bundle power
Channel flow area variation	Effective total bundle power uncertainty
Channel friction factor multiplier	
Channel to channel non-uniformity friction factor multiplier	

The non-power distribution uncertainties are described in NEDC-32601-P "Methodology and Uncertainties for Safety Limit MCPR Evaluations." OCNGS has used the approved values from NEDC-32601-P for each of the non-power distribution uncertainties. The NRC staff has reviewed these values and finds them applicable and, therefore, acceptable for OCNGS Cycle 20.

For all of the power distribution uncertainties but the GEXL R-Factor, GNF-A used uncertainties from GETAB NEDO-10958-A. NEDC-32694-P is the methodology used by GNF-A to apply these uncertainties. However, the uncertainty values are applicable for plants using a 3D-MONICORE core monitoring system. Since OCNGS uses a POWERPLEX-III (MICROBURN-B2) core monitoring system, the licensee is, instead, using the more conservative power distribution uncertainties from GETAB NEDO-10958-A. The licensee confirmed that the uncertainties in GETAB NEDO-10958-A bound those of the POWERPLEX-III core monitoring software system. Therefore, the NRC staff finds the use of these uncertainties acceptable for OCNGS Cycle 20.

The R-factor is an input into the GEXL correlation used to describe the local pin-by-pin power distribution, and the fuel assembly and channel geometry on the fuel assembly critical power. The R-factor uncertainty analysis includes an allowance for power peaking modeling

uncertainty, manufacturing uncertainty, and channel bow uncertainty. GNF-A has increased this uncertainty for all SLMCPR calculations to account for the potential impact of control blade shadow corrosion-induced bow. The licensee stated that it has no evidence that OCNGS is experiencing control blade shadow corrosion-induced bow. However, GNF-A has decided to conservatively account for this effect in all SLMCPR evaluations which would proactively account for this condition should it occur for a currently unaffected nuclear station.

The NRC staff finds that using the increased R-factor uncertainty is conservative. However, the NRC staff has not reviewed the adequacy of the increased value to account for the impact of control blade shadow corrosion-induced bow on OCNGS. Should OCNGS conclusively experience control blade shadow corrosion-induced bow, the licensee committed to submit to NRC for review justification for the higher R-factor uncertainty (see “Summary of Commitments” in the October 19, 2004, letter).

3.6 Potential Low-Flow Non-Conservatism

On August 24, 2004, GNF-A wrote a SLMCPR Part 21 Report, "Part 21 Reportable Condition and 60-Day Interim Report; Notification: Non-conservative SLMCPR" (MFN 04-081). GNF-A and GE Nuclear Energy (GENE) determined that the current GNF-A process for determination of the SLMCPR can result in a non-conservative SLMCPR. The SLMCPR is calculated at rated power/flow conditions. GNF-A discovered that it is possible that a lower flow condition at rated power can have a more limiting SLMCPR. In the instances where this concern was discovered, the control rod patterns used at the off-rated flow condition created a more limiting bundle-by-bundle MCPR distribution than the control rod patterns used at rated power/rated flow.

In response to the Part 21 report, the licensee performed a SLMCPR calculation at the minimum core flow statepoint (100 percent power/85 percent core flow). The licensee stated that the OCNGS rated power and rated flow (100 percent power/100 percent flow) SLMCPR value bounds the SLMCPR calculated at the minimum core flow statepoint (100 percent power /85 percent core flow).

In the current NRC-approved GNF SLMCPR licensing methodology (see NEDC-32601P-A), the limiting rod patterns are selected such that the calculated SLMCPR values would reasonably bound the plants’ SLMCPR responses based on the operating rod patterns. The limiting rod patterns used in the statepoint SLMCPR calculations is selected such that there is sufficient margin in the TS-specified cycle SLMCPR value without limiting the plant’s operating flexibility. The NRC staff asked the licensee to confirm that the limiting rod patterns used in calculating the rated and the minimum core flow SLMCPRs would produce bounding SLMCPR values in comparison with the rod patterns that OCNGS would operate with at these statepoints. The licensee stated that the SLMCPR calculation is based on rod patterns that would yield a more severe SLMCPR distribution relative to the planned rod patterns for the OCNGS off-rated and rated operation. In the SLMCPR calculational methodology, a more severe SLMCPR distribution would produce a more conservative SLMCPR value. Therefore, a nominal rod pattern, which results in a less severe SLMCPR distribution would produce a lower SLMCPR value. The NRC staff accepts the licensee’s assurance that it will operate OCNGS with rod patterns that would result in an SLMCPR response that is bounded by the calculated SLMCPR value for the rated and off-rated conditions.

3.7 Summary of Review

The NRC staff accepts the licensee's proposed Cycle 20 SLMCPR values. The NRC staff concludes that the justification for analyzing and determining the SLMCPR value of 1.12 for three-recirculation-loop operation and 1.10 for both four- or five-recirculation-loop operation is acceptable for OCNGS Cycle 20 since approved methodologies are used in accordance with NRC staff guidelines.

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 use of a facility component located within the restricted area as defined in 10 CFR Part 20, and changes surveillance requirements. 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 55467). 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 from C.N. Swenson (AmerGen Energy Company, LLC) to U.S. Nuclear Regulatory Commission Dated August 27, 2004, "Technical Specification Change Request No. 331 - Safety Limit Minimum Critical Power Ratio."

2. Letter from C.N. Swenson (AmerGen Energy Company, LLC) to U.S. Nuclear Regulatory Commission dated October 11, 2004, "Response to Request for Additional Information Relating to Proposed Amendment to license No. DPR-16."

3. Letter from C.N. Swenson (AmerGen Energy Company, LLC) to U.S. Nuclear Regulatory Commission dated October 19, 2004, "Revised Response to Request for Additional Information Relating to Proposed Amendment to License No. DPR-16."

4. Global Nuclear Fuels Licensing Topical Report NEDE-24011-P-A-14, “General Electric Standard Application for Reactor Fuel,” June 2000.

5. General Electric Nuclear Energy Licensing Topical Report NEDC-32601P-A, “Methodology and Uncertainties for Safety Limit MCPR Evaluations,” July 1999.

6. General Electric Nuclear Energy Licensing Topical Report NEDC-32505P-A, “R-Factor Calculation Method for GE11, GE12, and GE13 Fuel,” July 1999.

7. General Electric Nuclear Energy Licensing Topical Report NEDO-10958-A “General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application,” January 1977.

8. Letter, Frank Akstulewicz (NRC) to Glen A. Watford (GE), “Acceptance for Referencing of Licensing Topical Reports NEDC-32601P, Methodology and Uncertainties for Safety Limit MCPR Evaluations, NEDC-32694P, Power Distribution Uncertainties for Safety Limit MCPR Evaluation; and Amendment 25 to NEDE-24011-P-A on Cycle Specific Safety Limit MCPR,” March 11, 1999.

9. Letter from J.S. Post (GE), MFN 04-081 “Part 21 Reportable Condition and 60-Day Interim Report; Notification: Non-Conservative SLMCPR,” August 24, 2004.

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Date: November 16, 2004

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