March 26, 2004

Mr. C. J. Gannon, Vice President
Brunswick Steam Electric Plant
Carolina Power & Light Company
Post Office Box 10429
Southport, North Carolina 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1 - ISSUANCE OF AMENDMENT RE: MINIMUM CRITICAL POWER RATIO SAFETY LIMIT (TAC NO. MC1249)

Dear Mr. Gannon:

The Commission has issued the enclosed Amendment No. 231 to Facility Operating License No. DPR-71 for Brunswick Steam Electric Plant, Unit 1. The amendment is in response to your application dated October 31, 2003, as supplemented on March 4, March 12, and March 19, 2004.

The amendment revises the values of the Safety Limit Minimum Critical Power Ratio (SLMCPR) contained in Technical Specification (TS) 2.1.1.2. The revised MCPR would be greater than or equal to 1.11 for two recirculation loop operation and greater than or equal to 1.12 for single recirculation loop operation. Also, a second proposed change would add topical report NEDE-32906P-A, "TRACG Application for Anticipated Operational Occurrences (AOO) Transient Analyses," to the list of documents specified in TS 5.6.5 describing the approved methodologies used to determine the core operating limits.

In a separate amendment request (ADAMS Accession No. ML023240227), the licensee submitted an application to expand the operating domain from the current maximum extended load line limit analysis (MELLLA) upper operating boundary to the maximum extended load line limit analysis plus (MELLLA+). The licensee states that the proposed SLMCPR values are applicable to Cycle 15 operation both prior to and following the implementation of MELLLA+. Operation in the higher MELLLA+ domain is under NRC staff review, including the evaluation of the impact of the MELLLA+ operation on the SLMCPR. Therefore, the staff concludes that, at this time, the proposed SLMCPR values are not applicable or valid for operation in the MELLLA+ domain.

As part of the analytical methods and code performance assessment for the new operating strategies, the NRC staff recommends that the licensee evaluate and compare the calculation and the measurements of key reactor parameters for the upcoming cycle. The uncertainty treatment should also be based on NRC-approved or industry-accepted methods. In addition, when comparing measured data to assess the performance of GE's methods, the uncertainty treatment should be consistent with GE's SLMCPR uncertainty combination.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's bi-weekly *Federal Register* Notice.

Sincerely,

/RA/

Brenda L. Mozafari, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-325

Enclosures:
1. Amendment No. 231 to License No. DPR-71
2. Safety Evaluation

cc w/enclosures: See next page

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's bi-weekly *Federal Register* Notice.

Sincerely,
/RA/
Brenda L. Mozafari, Senior Project Manager, Section 2
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CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 231
License No. DPR-71

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

   A. The application for amendment filed by Carolina Power & Light Company (the licensee), dated October 31, 2003, as supplemented by letters dated March 4, March 12, and March 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-71 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 231, are hereby incorporated in the license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented prior to startup for Unit 1 Cycle 15 operation.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA K. Jabbour for/

William F. Burton, Acting Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 26, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 231

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

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 Pages	Insert Pages
2.0-1	2.0-1
5.0-20	5.0-20

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 231 TO FACILITY OPERATING LICENSE NO. DPR-71

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1

DOCKET NO. 50-325

1.0 INTRODUCTION

By letter dated October 31, 2003, as supplemented by letters dated March 4, March 12, and March 19, 2004, Carolina Power & Light Company (the licensee), also doing business as Progress Energy Carolinas, Inc., requested two changes to the Brunswick Steam Electric Plant (BSEP), Unit 1,Technical Specifications (TS). The requested changes would revise the Safety Limit for Minimum Critical Power Ratio (SLMCPR) values in TS 2.1.1.2 from greater than or equal to 1.12 to greater than or equal to 1.11 for two recirculation loop operation. For single recirculation loop operation, the licensee requested to change the SLMCPR value from greater than or equal to 1.14 to greater than or equal to 1.12. In addition, the licensee requested the addition of topical report NEDE-32906P-A, "TRACG Application for Anticipated Operational Occurrences (AOO) Transient Analyses," to the list of licensing documents referenced in TS 5.6.5. This was approved separately under Amendment 27 to GESTAR II dated August 18, 2003 (ADAMS Accession ML032300504).

The licensee’s March 4, March 12, and March 19, 2004, letters provided clarifying information that did not change the scope of the proposed amendment as described in the original notice of proposed action published in the *Federal Register* and did not change the initial proposed no significant hazards consideration determination.

2.0 REGULATORY EVALUATION

Fuel Design and Operation

Fuel bundles are designed to ensure that (a) they are not damaged during normal steady-state operation and AOOs; (b) any damage to them will not be so severe as to prevent control rod insertion when required; (c) the number of fuel rod failures during accidents is not underestimated; and (d) the ability to cool the core is always maintained. For each fuel vendor, use of NRC-approved fuel design acceptance criteria and analysis methodologies assures that the fuel bundles perform in a manner that is consistent with the objectives of Sections 4.2 and 4.3 of the NUREG-0800, “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants” (SRP) and the applicable general design criteria (GDC) of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, “General Design Criteria for Nuclear Power Plants.” The fuel vendors perform thermal-mechanical, thermal-hydraulic, neutronic, and material analyses to ensure that the fuel system design can meet the fuel design limits during steady-state, AOO, or accident conditions.

Appendix A to 10 CFR Part 50 establishes the fundamental regulatory requirements with respect to the reactivity control systems. Specifically, GDC-10, "Reactor design," in Appendix A to 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 specified acceptable fuel design limits are not exceeded.

SRP 4.2 specifies the acceptance criteria for the evaluation of the fuel design limits as they relate to the thermal limits. SRP 4.4 provides guidance on the review of the thermal-hydraulic design in meeting the requirement of GDC-10 and the fuel design criteria established in SRP 4.2. For the critical power correlation, there should be a 95-percent probability at a 95-percent confidence level that the hot rod in the core does not experience a departure from nucleate boiling or boiling transition condition during normal operation or AOO. For the Critical Power Ratio (CPR) correlations, the limiting (minimum) CPR is to be established such that 99.9 percent of the fuel rods in the core would be expected not to experience boiling transition during normal operation or AOOs. SRP 4.4 also states that the uncertainties in the values of process parameters, core design parameters, and calculational methods used in the assessment of the thermal margin should be treated with at least 95-percent probability at a 95-percent confidence level.

For each fuel design, the boiling transition is predicted using correlations (critical power correlation) derived from test data. The reactor core should be designed and operated within the applicability range of the correlation. To meet GDC-10, the SLMCPR is calculated such that 99.9 percent of the fuel rods do not experience boiling transition during steady-state operation. The operating limit minimum critical power ratio (OLMCPR) assures that the SLMCPR will not be exceeded as a result of an AOO.

For this application, the licensee is proposing to change the current TS SLMCPR value to a cycle- and core design-specific value that would meet the applicable fuel design criteria and regulation.

NRC Generic Letter (GL) 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," provides guidance on modifying cycle-specific parameter limits in TS. For each fuel vendor and/or licensee, NRC approves the licensing and analytical method and codes used to perform the safety analyses. For each operating cycle, the licensee or the fuel vendor performs the cycle-specific safety analyses using the NRC-approved licensing methodology and the NRC-approved analytical methods and codes. The cycle core operating limit report (COLR) provides the cycle-specific core operating parameter. Section 5.0 of the TS references the applicable documents that describe the NRC-approved licensing and analytical methods. Therefore, the licensee can perform the reload analyses and establish the cycle operating parameters under 10 CFR 50.59 because (1) the required reload analyses are specified in the NRC-approved licensing methodology, and (2) the analyses are performed using NRC-approved analytical methods and codes. However, any significant changes or modifications to the NRC-approved licensing methodology, analytical methods, or codes or the use of a code or analytical method that does not meet the 10 CFR 50.59 criteria would require NRC review and approval before using these analytical methods or codes to perform the reload safety analyses. For TS 5.6.5, the licensee proposed adding topical report NEDE-32906P-A, "TRACG Application for Anticipated Operational Occurrences (AOO) Transient Analyses," to the list of licensing bases documents referenced in TS 5.6.5.

3.0 TECHNICAL EVALUATION

TS 2.1.1 - REACTOR CORE SAFETY LIMITS

The licensee proposes changing the SLMCPR values in TS 2.1.1.2 for BSEP, Unit 1, Cycle 15 operation from greater than or equal to 1.12 to greater than or equal to 1.11 for the two recirculation loop operation (TLO). For single recirculation loop operation (SLO), the licensee proposes changing the SLMCPR for BSEP, Unit 1, Cycle 15 from greater than or equal to 1.14 to greater than or equal to 1.12. The reactor core operation with the SLMCPR is applicable when the reactor steam dome pressure is greater than or equal to 785 psig and the core flow greater than or equal to 10 percent of rated flow. SLMCPR is not considered as a safety concern for reactor operation below 785 psig dome pressure at core flow of less than 10 percent of rated core flow.

The licensee loaded the first batches of General Electric (GE) 14 designed fuel into Unit 1 during Cycle 14. In the same cycle, the licensee implemented a power uprate of 16 percent above the originally licensed thermal power. For Cycle 15, the licensee plans to load additional GE14 fuel to replace the currently loaded GE13 fuel. The licensee also plans to implement the second phase of the power uprate (a 4-percent uprate) during the upcoming cycle.

3.1 Background on the Licensing Methodology

The Cycle 15 SLMCPR analysis was performed by Global Nuclear Fuel - Americas, LLC (GNF)-A using plant- and cycle-specific fuel and core parameters and NRC-approved methodologies. The GNF-A methodology for determining the SLMCPR is included in the overall GE licensing methodology topical report NEDE-24011-P-A, (GESTAR) Revision 14, and US Supplement NEDE-24011-P-A-US, June 2000, which incorporates Amendment 26. GNF-A SLMCPR methodology and analytical methods, and procedures are further specified in (1) NEDC-32505P, Revision 1 (R-Factor Calculation Method for GE11, GE12, and GE13 Fuel); (2) NEDE-10958-A (GETAB); (3) NEDC-32601P (Methodology and Uncertainties for Safety Limit MCPR Evaluations); and (4) NEDC-32694P (Power Distribution Uncertainties for Safety Limit MCPR Evaluation). Amendment 26 to GESTAR provides the methodology and uncertainties required for implementation of the cycle-specific SLMCPR. Amendment 27 to GESTAR includes additional NRC-approved codes (e.g., TRACG) to the GNF-A licensing methodology and makes several administrative changes. BSEP, Unit 1, TS 5.6.5 references the licensing bases documents used to perform the reload licensing analyses.

3.2 Comparison of BSEP Unit 1, Cycle 14 and Cycle 15

For BSEP, Unit 1, Cycle 14, the licensee increased the TS SLMCPR from 1.10 to 1.12 for TLO and from 1.11 to 1.14 for SLO. However, for the upcoming Cycle 15, the licensee proposes reducing the SLMCPR by of 0.01 for TLO and 0.02 for SLO. The licensee compared (1) the relevant input parameters, (2) the key indicators used to assess the impact of the bundle-to-bundle and pin-by-pin power distribution on the SLMCPR, (3) the power distribution methodology used, and (4) the power and non-power distribution uncertainty method used for each cycle’s SLMCPR calculation.

GNF uses indicators that quantify the impact of the fuel loading pattern on the SLMCPR. These indicators correlate the SLMCPR value to the (1) flatness of the core bundle-to-bundle power distribution and (2) the flatness of the pin-by-pin power and R-factor distribution. Therefore, these indicators also form the means to assess and compare the differences between core designs. The licensee states that, based on the power distribution indicators, Unit 1, Cycle 15, has a slightly flatter core MCPR distribution, but more significantly, peaked pin-by-pin bundle power distributions. The licensee states that the uncontrolled pin-by-pin power distribution, characterized in terms of R-factors, show that Cycle 14 bundles are flatter than the bundles used for Cycle 15. Using mathematical manipulation of the SLMCPR sensitivity indicators and an independent SLMCPR calculation method, the licensee concluded that the calculated SLMCPR for BSEP, Unit 1, Cycle 15, is consistent with what would be expected, including higher SLMCPR for Cycle 14.

The NRC staff questioned why the core design intended to meet the energy needs for operation at the expanded operating domain (MELLLA+) at 20-percent uprated power for the same cycle length would require less flat or more skewed pin-by-pin power distribution than the previous cycle (16 percent uprate). In addition, the October 31, 2003, submittal also indicated a bundle-to-bundle flatness indicator for Cycle 15 calculated at beginning of cycle (BOC) and at end of cycle (EOC) 2000 for Cycle 14. By Request for Additional Information (RAI) responses dated March 4 and March 12, 2004, the licensee provided the details of the core design attributes that resulted in the different limiting exposure point for the SLMCPR sensitivity indicators and yielded the lower SLMCPR for Cycle 15 relative to Cycle 14.

The BSEP, Unit 1, Cycle 14 and Cycle 15 bundle and core designs were developed to meet different design constraints. The control blade sequencing in Cycle 15 was conventional, while Cycle 14 sequencing was "Control Cell," resulting in more frequent changes of control blade sequences than Cycle 15. This is because Cycle 14 was designed for 105-percent original licensed thermal power (OLTP) at BOC and mid-cycle uprate to 112-percent rated power, with the first GE14 reload and operation at a flow window of 91.1 percent to 104.3 percent of core flow. Cycle 14 was also designed for an OLMCPR of 1.48 at BOC, changing later in the cycle to 1.48 percent, based on ODYN methodology. Cycle 15 was designed for full 120 percent of the OLTP operation throughout the cycle, with a second GE14 reload, a flow window of 88.8 percent to 104.5 percent, and a design OLMCPR of 1.28 at BOC changing later in the cycle to 1.33 percent (TRACG methodology). The core simulation for the two cycles resulted in different isotopes as each cycle progressed, resulting in different core radial and axial power profiles. The SLMCPR accounts for all of these differences (e.g. the power distribution, the OLMCPR, the design control rod pattern, and the core flow), which are used as inputs for the SLMCPR calculations. In addition, the R-factor distribution for the limiting bundles for Cycle 15 is similar to Cycle 14 at BOC. However, at the end-of-rated (EOR) exposure, the Cycle 15 limiting bundles have a flattened R-factor distribution, but it is not as flat as Cycle 14. While the reported R-factor distribution for Cycle 15 is significantly lower than the R-factor for Cycle 14, the values are comparable at EOR exposure. The submittal reported the values for the limiting SLMCPR exposure, which may not necessarily represent the limiting indicator values.

Through the RAI responses dated March 4 and March 12, 2004, the NRC staff finds that the licensee has demonstrated the reasons the SLMCPR for Cycle 15 is not more limiting relative to Cycle 14, although Cycle 15 implements a 4-percent power uprate and is designed for operation at the expanded MELLLA+ operating domain.

3.3 Increases in the GEXL Uncertainties

The SLMCPR calculations are performed at different exposure points. For the exposure points analyzed, the licensee examined the predicted axial power distributions for BSEP, Unit 1, Cycle 15. The licensee concluded that the evaluation did not indicate any axial power profiles requiring increases in the GEXL uncertainties. The NRC staff concurs with the licensee's analysis.

3.4 Power Distribution Uncertainties

BSEP, Unit 1, uses the POWERPLEX II core monitoring system, which uses the CASMO-3G/ MICROBURN-B methodology. However, GNF-A, as the fuel vendor, performed the SLMCPR calculation using GE methods. Therefore, the power distribution uncertainties associated with the core simulator used in POWERPLEX II code systems differ from the uncertainties treatment and values associated with the GNF-A code systems and methodologies. The power distribution uncertainties are used in the SLMCPR calculations. In the RAI response dated March 4, 2004, GNF-A states that for plants using another vendor's core monitoring system, all SLMCPR evaluations to date have been performed using the NRC-approved GE methodology with the existing GETAB uncertainties or higher uncertainties that are justified by the responsible utility. In addition, GNF-A does not use the reduced power distribution uncertainties values in NEDC-32694P in the SLMCPR calculation for plants that do not use the 3D-Monicore core monitoring system, unless the applicability of the reduced uncertainty can be demonstrated.

The licensee states that the higher (more conservative) GETAB uncertainty values were used for both Cycle 14 and Cycle 15. The licensee confirmed that GETAB uncertainties bound those uncertainties associated with the POWERPLEX-II (based on CASMO-3G/MICROBURN-B) core monitoring system. Table 1 of the enclosure to the application shows that for the non-power distribution uncertainties, the licensee used the generic and lower uncertainties values given in the NEDC-329694P-A revised methodology for both Cycles 14 and 15. For the power distribution uncertainties, the licensee used the more conservative GETAB values for both cycles. However, for Cycle 15, the licensee used the revised methodology in NEDC-329694P-A for the SLMCPR method and uncertainty treatment, although the GETAB power distribution uncertainties values were used. For Cycle 14, the licensee had used both the more conservative GETAB uncertainty values and uncertainty treatment in the SLMCPR calculation.

Therefore, for the upcoming Cycle 15, the lower SLMCPR value relative to Cycle 14 can be attributed to the manner in which the power distribution uncertainties were combined and used in the statistical component of the SLMCPR calculation as specified in the revised methodology. The licensee gained additional benefit through the use of the revised power distribution methodology. Since the licensee confirmed that the plant-specific power distribution uncertainty values (based on CASMO-3G/MICROBURN-B) were lower than the GETAB uncertainties values and the treatment of the uncertainties are consistent with the SLMCPR methodology and the codes systems used to generate the key input parameters, the NRC staff finds this approach acceptable.

3.5 Applicability of the Proposed SLMCPR Value to the MELLLA+ Operation

In a separate amendment request dated November 12, 2002, the licensee submitted an application to expand the operating domain from the current maximum extended load line limit analysis (MELLLA) upper operating boundary to the maximum extended load line limit analysis plus (MELLLA+). The licensee states that the proposed SLMCPR values are applicable to Cycle 15 operation both prior to and following implementation of MELLLA+. Operation in the higher MELLLA+ domain is under NRC staff review, including the evaluation of the impact of the operation at the higher operating domain on the SLMCPR value. Therefore, the NRC staff concludes that the proposed SLMCPR values are not applicable or valid for operation in the MELLLA+ domain. Upon completion of the MELLLA+ review, the NRC staff will discuss in its safety evaluation for MELLLA+ the applicability of the GE methods to the MELLLA+ process and whether additional information will be needed from licensees before the NRC staff can approve operation in the MELLLA+ operating domain.

3.6 Applicability of Generic Power Distribution Uncertainties to Current High /Void Operating Conditions

Current operating strategies (e.g., operation at the higher uprated powers, higher operating domains MELLLA, MELLLA+, longer cycle lengths, the use of advanced fuel designs, and new core design strategies) could result in operation at high hot channel exit void conditions that differ from the experience base of past operations. Therefore, the validation and benchmark data used to establish the uncertainties of key parameters (e.g., power distribution uncertainties) that are important to the SLMCPR need to be valid for the current high void conditions.

For BSEP, Unit 1, Cycle 15, the hot channel exit voids are predicted to be 85.7 percent for the uprated statepoint of 120-percent power/104-percent core flow. The 104.5-percent core flow is the maximum licensed core flow, although the achievable core flow for the uprated condition could be around 99-percent core flow. For the MELLLA+ statepoint of 120-percent power, 85-percent core flow, the hot channel exit voids are predicted to be 89.8 percent. For the MELLLA+ boundary limit of 55-percent core flow at 93-percent power, the hot channel exit voids could be 91.3 percent. The range of core exit voids depend on many parameters and conditions, including initial operating limit and the design rod pattern assumed for the specific cycle point analyzed.

The Safety Evaluation Report approving NEDC-32694P, "Power Distribution Uncertainties Safety Limit MCPR Evaluation," describes the NRC-approved uncertainty treatment for the SLMCPR calculation. In the NRC approval of the revised SLMCPR calculation method and associated power distribution uncertainty values and treatment, the NRC staff placed three restrictions to the approval of the SLMCPR methodology. In one of the restrictions, the NRC staff concluded that since changes in the fuel and core designs can have significant effect on the calculational accuracy, the 3D MONICORE (GNF-A core monitoring system) bundle power calculational uncertainty should be verified when applied to fuel and core designs not included in the benchmark comparison of Tables 3.1 and 3.2 of NEDC-32694P. During the approval of the licensing SLMCPR method and codes, the core conditions differed from the core conditions for the current operating strategies in some key parameters.

The flatness of the bundle power distribution and the core MCPR distribution are the important contributors to the SLMCPR. The effect of the radial and bundle power distribution are accounted for in the plant-specific SLMCPR calculations, based on the cycle specific core configuration. The primary uncertainties that affect the SLMCPR are the (axially integrated) bundle power uncertainty and the uncertainty associated with the R-factor, with the integral bundle power uncertainty being the most dominant. The pin power model uncertainty accuracy is an important component of the R-factor uncertainty. However, the SLMCPR is only moderately sensitive to R-factor uncertainty. The radial bundle power uncertainty is considered to be statistical combination of, (1) the uncertainty in the four bundle power associated with TIP location (σ_{P4B}) and (2) the uncertainty in the allocation of the four bundle power to the individual bundles (σ_{PAL}). The four bundle power uncertainty is determined by comparison of the predicted and measured TIP responses and the uncertainty in the power allocation is determined by comparisons of calculated and measured (gamma-scan) bundle powers. The GEXL uncertainty and bias are also key inputs and the range of validity in GEXL correlation validation range must be sufficient to cover the expected operating range.

The NRC staff asked the licensee to demonstrate that the power distribution uncertainties used in the SLMCPR calculation for Cycle 15 are applicable or conservative for the high void conditions predicted for the Cycle 15 operation, when the second phase of the extended power uprate would be implemented.

In a meeting on March 17, 2004, GNF-A presented some core tracking data that extended the power distribution uncertainty calculations to the high void conditions. For the GEXL correlation, GNF-A provided data that demonstrated that the GE14 GEXL correlation range of validity extended to the high void condition range (e.g., bundle critical power, inlet mass flux, inlet subcooling, core pressure testing range extended to the high void conditions).

In the RAI response dated March 19, 2004, the licensee provided confirmation that the GETAB TIP uncertainties used in the SLMCPR calculation were conservative for the BSEP, Unit 1, Cycle 15, core-specific conditions. However, the core tracking confirmations provided the bases for the licensee to identify if the core tracking comparison of the measured and predicted four-bundle TIP integrated data for the recent operating cycles indicates increase in the power distribution uncertainties for operation with hot channels exit voids greater than 70 percent or for the uprated conditions. The licensee compared core follow data for Cycles 12, 13, and 14 against the MICROBURN-B predictions, using 15, 18 and 19 TIP readings for each cycle, respectively. The licensee reported that the maximum channel void fractions calculated by the POWERPLEX II for Cycles 12, 13, and 15 were 84.3 percent, 84.9 percent, and 83.8 percent, respectively. The cited void fractions corresponded to the "as operated conditions," calculated using the MICROBURN-B core simulator. The licensee determined that the largest cycle averaged 4-bundle TIP uncertainty corresponded to the pre-uprate Cycle 13, and not Cycle 14, where the first phase of the power uprate was implemented, and the first reload batch of GE14 was loaded into the core. The licensee predicted that the cycle maximum channel exit void would be 85.6 percent for Cycle 15, based on the planned rod patterns for the cycle (not limiting rod patterns), and also assuming MELLLA+ operation. The predicted void fraction is based on the CASMO-3G/MICROBURN-B simulation. This range would place the Cycle 15 core conditions within the range of the last three cycles' core conditions, indicating that the core monitoring system power distribution uncertainty may not change significantly for the upcoming cycle. In addition, the lattice physics code CASMO-4G generated cross-sections extended to 80-percent void fraction.

In the next step for verifying the power distribution uncertainty used in Cycle 15, the licensee sought to confirm that the integral bundle power distribution uncertainty used in the GNF-A SLMCPR calculations bound the BSEP, Unit 1, specific comparison of the axially integrated TIP signal from the previous cycles and the predicted values from the 3-D simulator. The Brunswick-specific application is complicated by the use of another vendor's core lattice depletion code (CASMO-3G) and core simulator code (MICROBURN-B) in the core monitoring system, while the SLMCPR calculation is based on GNF code systems (PANACEA). The licensee developed a "hybrid" uncertainty treatment approach in order to translate the uncertainties obtained from the comparison of the POWERPLEX II predictions and against the measured to the GNF-A uncertainties statistics. The licensee calculated an uncertainty value which is bounded by the GNF-A generic value used in the Cycle 15 SLMCPR calculation (based on GETAB generic uncertainty values and the revised power distribution uncertainty treatment method).

The NRC staff evaluated whether the power distribution uncertainties derived during the SLMCPR analytical methods and codes validation process remain applicable or are conservative for the current uprated high exit void core conditions. Based on the discussion above, the NRC staff accepts the licensee's proposal to change the SLMCPR values in TS 2.1.1.2 for BSEP, Unit 1, Cycle 15, operation from greater than or equal to 1.12 to greater than or equal to 1.11 for the TLO and for SLO from greater than or equal to 1.14 to greater than or equal to 1.12.

As part of the analytical methods and code performance assessment for the new operating strategies, the NRC staff recommends that the licensee evaluate and compare the calculation and the measurements of key reactor parameters for the upcoming cycle. The uncertainty treatment should also be based on NRC-approved or industry-accepted methods. In addition, when comparing measured data to assess the performance of GE's methods, the uncertainty treatment should be consistent with GE's SLMCPR uncertainty combination.

3.7 Technical Conclusions

Based on the results of the review, RAI responses, and the material provided in the March 17, 2004, GNF-A presentation, the NRC staff finds that the SLMCPR analysis for BSEP, Unit 1, Cycle 15, operation uses appropriate plant- and cycle-specific parameters in conjunction with the approved method, and is acceptable. The proposed Cycle 15 SLMCPR values 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 regarding acceptable fuel design limits. The NRC staff has also concluded that the justification for analyzing and determining the SLMCPR value of 1.11 for TLO and of 1.12 for SLO is acceptable for BSEP, Unit 1, Cycle 15. Also, the licensee's analysis has appropriately considered any potential penalties, given the power shape throughout the cycle. The NRC staff, therefore, finds the change acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of North Carolina 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 693). 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

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2. Letter from John S. Keenan to USNRC, "Brunswick Steam Electric Plant, Unit No. 1, Docket No. 50-325/License No. DPR-71, Response for Additional Information - Technical Specification 2.1.1.2, Reactor Core Safety Limits Minimum Critical Power Ratio Safety Limit and Revision to References in Technical Specification 5.6.5, Core Operating limits Report (COLR)," (NRC TAC No. MC1249), March 4, 2004.

3. Letter from John S. Keenan to USNRC, "Brunswick Steam Electric Plant, Unit No. 1, Docket No. 50-325/License No. DPR-71, Response for Additional Information - Technical Specification 2.1.1.2, Reactor Core Safety Limits Minimum Critical Power Ratio Safety Limit and Revision to References in Technical Specification 5.6.5, Core Operating limits Report (COLR)," (NRC TAC No. MC1249), March 12, 2004.

4. Letter from John S. Keenan to USNRC, "Brunswick Steam Electric Plant, Unit No. 1, Docket No. 50-325/License No. DPR-71, Response for Additional Information - Technical Specification 2.1.1.2, Reactor Core Safety Limits Minimum Critical Power Ratio Safety Limit and Revision to References in Technical Specification 5.6.5, Core Operating limits Report (COLR)," (NRC TAC No. MC1249), March, 19, 2004.

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9. Letter, G.A. Watford (GNF) to R. Pulsifer (NRC), "Request for Additional Information-GE14 Review-Power Distribution Uncertainties and GEXL Correlation Development Procedure," FLN-2001-004, March 27, 2001.

10. Letter, G.A. Watford (GNF-A) to U.S. Nuclear Regulatory Commission Document Control Desk with attention to R. Pulsifer (NRC), "Confirmation of 10X10 Fuel Design Applicability to Improved SLMCPR, Power Distribution and R-factor Methodology," FLN-2001-016, September 14, 2001.

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