March 8, 2002

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT TO INCORPORATE THE GENERAL ELECTRIC DIGITAL POWER RANGE NEUTRON MONITORING SYSTEM (TAC NOS. MB2321 AND MB2322)

Dear Mr. Keenan:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 217 to Facility Operating License No. DPR-71 and Amendment No. 243 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The amendments change the Technical Specifications (TS) in response to your submittal dated June 26, 2001, as supplemented January 14, and February 1, 2002.

The amendments change the BSEP Units 1 and 2 TS to support installation of the General Electric Nuclear Measurement Analysis and Control Digital Power Range Neutron Monitoring System. In previous correspondence, Carolina Power & Light Company committed to confirm the applicability of the generic regional Delta Critical Power Ratio (CPR)/Initial CPR Versus Oscillation Magnitude curve to the oscillation power range monitor trip setpoint after the startup and power uprate above 110% during the March 2002 refueling outage.

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 by J.Goshen Acting for/***
Allen G. Hansen, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-325 and 50-324

Enclosures:
1. Amendment No. 217 to License No. DPR-71
2. Amendment No. 243 to License No. DPR-62
3. Safety Evaluation

cc w/enclosures: See next page

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cc w/enclosures: See next page
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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.217
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 June 26, 2001, as supplemented January 14, and February 1, 2002, 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. 217, 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 no later than start-up following refueling outage B114R1.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

Richard P. Correia, 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 8, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 217

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 |
|---|---|
| 3.2-4 thru 3.2-6 | --- |
| 3.3-1 thru 3.3-23 | 3.3-1 thru 3.3-23 |
| 3.4-1 | 3.4-1 |
| 3.10-20 and 3.10-21 | 3.10-20 and 3.10-21 |
| 5.0-20 and 5.0-21 | 5.0-20 and 5.0-21 |

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 243
License No. DPR-62

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

   A. The application for amendment filed by Carolina Power & Light Company (the licensee), dated June 26,2001, as supplemented January 14, and February 1, 2002, 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-62 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 243, 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 no later than start-up following refueling outage B216R1.

FOR THE NUCLEAR REGULATORY COMMISSION

***/RA/***

Richard P. Correia, 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 8, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 243

FACILITY OPERATING LICENSE NO. DPR-62

DOCKET NO. 50-324

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 |
|---|---|
| 3.2-4 thru 3.2-6 | --- |
| 3.3-1 thru 3.3-23 | 3.3-1 thru 3.3-23 |
| 3.4-1 | 3.4-1 |
| 3.10-20 and 3.10-21 | 3.10-20 and 3.10-21 |
| 5.0-19 and 5.0-20 | 5.0-19 and 5.0-20 |

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO LICENSE AMENDMENT NO. 217 TO FACILITY OPERATING LICENSE NO.

DPR-71 AND AMENDMENT NO. 243 TO FACILITY OPERATING LICENSE NO. DPR-62

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

DOCKET NOS. 50-325 AND 50-324

## 1.0 INTRODUCTION

By letter dated June 26, 2001, as supplemented January 14, and February 1, 2002, Carolina Power & Light Company (CP&L, the licensee) submitted a request for changes to the Brunswick Steam Electric Plant (BSEP) Units 1 and 2 Technical Specifications (TS) and associated Bases pages. The proposed changes will support installation of the digital General Electric (GE) Nuclear Measurement Analysis and Control (NUMAC) Power Range Neutron Monitoring (PRNM) system with the oscillation power range monitor (OPRM) upscale trip function. The digital GE NUMAC PRNM system has been classified as a Boiling Water Reactor (BWR) Owners Group (BWROG) Option III solution for the reactor long-term stability problem, and will replace the Enhanced Option I-A system, which was previously installed at BSEP Units 1 and 2 to alleviate the reactor stability concern.

The January 14, and February 1, 2002, letters provided clarifying information only, and did not change the initial no significant hazards consideration determination or expand the scope of the initial application.

## 2.0 BACKGROUND

The possibility of power oscillations due to thermal-hydraulic (TH) conditions in BWRs and the consequences of such events have been of concern for many years. To address these concerns, the BWROG initiated a project to investigate actions that should be taken to resolve the BWR stability issue. In 1988, in a letter to BWR utilities, GE recommended interim corrective actions (ICAs) and the staff issued NRC Bulletin 88-07, Supplement 1, approving the proposed BWROG/GE ICAs to detect and suppress BWR power oscillations. The BWROG later issued the following topical reports:

(1) NEDO-32645-A, "BWROG Reactor Core Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications," August 1996,

(2) NEDO-31960-A, "BWR Owners Group Long-Term Stability Solutions Licensing Methodology," November 1995,

(3) NEDO-31960-A, Supplement 1, "BWR Owners Group Long-Term Stability Solutions Licensing Methodology," November 1995, and

(4) NEDO-32465-A, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Application," August 1996.

The staff reviewed these topical reports and found four of the six long-term solutions recommended by these topical reports to be acceptable for mitigating TH instability events. The acceptable solutions are Options I-A and I-D (regional exclusions), Option II (BWR2 designs), and Option III and III-A (detect and suppress functions). In Option III, three diverse algorithms are used to detect and suppress reactor power instabilities.

In 1995, GE submitted for NRC's review Licensing Topical Reports (LTRs) NEDC-3241OP-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function," and in 1997, LTR NEDC-32410P-A, Supplement 1, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Plus Option III Stability Trip Function." These LTRs described the digital NUMAC PRNM system with the OPRM upscale trip function, and presented all the information licensees might need when modifying their plant design and TS to implement this digital PRNM system at their plant. The PRNM system consists of digital-based average power range monitors (APRMs) and OPRMs. The LTRs were approved by the staff via safety evaluation reports (SERs) dated September 5, 1995, and August 15, 1997, respectively. The staff SERs reviewed the GE NUMAC PRNM system configuration, its hardware and software requirements, and approved the PRNM system design and the effectiveness of the OPRM upscale trip function as an Option III reactor long-term stability solution for detecting and suppressing conditions that could lead to TH instability.

In 1998, in response to NRC Generic Letter 94-02, "Long-Term Solutions and Upgrade of interim Operating Recommendations for Thermal-Hydraulic Instabilities in BWRs," dated July 11, 1994, CP&L implemented BWROG Enhanced Option I-A as a solution to the reactor long-term stability concern. The implementation was a part of the conversion to the Improved Technical Specifications (ITS). The Enhanced Option I-A solution places operating restrictions on the permitted regions of the power and flow map. The licensee has determined that, after the planned power uprate at BSEP Units 1 and 2 is implemented, the operating restrictions of the Enhanced Option I-A solution will hinder the efficient operation of the plant. Also, the current Enhanced Option I-A has no provisions for an alternate method to continue operation with a generic solution, where as the Option III solution allows alternate monitoring through the use of ICAs. Therefore, prior to the planned power uprate at BSEP, the licensee decided to replace the current Enhanced Option I-A solution with the BWROG Option III solution by implementing GE's digital NUMAC PRNM system with the OPRM upscale trip function. The proposed changes in this submittal are associated with the installation of the new digital GE NUMAC PRNM system and the removal of the current Enhanced Option I-A solution.

## 3.0 EVALUATION

### 3.1 Proposed design changes:

In its submittal, the licensee proposed to replace the existing power range monitor system, including the APRM system, the rod block monitor (RBM) system, and the local power range monitor (LPRM) system with the GE NUMAC PRNM system. The current LPRM detectors and signal cables will be retained. The current 10-50 milliamp flow transmitters will be replaced with 4-20 milliamp transmitters. The Option III stability

solution is integrated into the GE NUMAC PRNM system electronics as the OPRM upscale trip function, which will provide automatic detection and suppression of reactor instabilities. The proposed changes include revision of setpoints and deletion of existing features of the current Enhanced Option I-A solution. The OPRM upscale trip function will be fully operational during the first startup following its installation, with all the related TS in place. Initially, the OPRM tuning parameters will be set based on the operating experience from several other plants that currently have the GE NUMAC PRNM system with the OPRM upscale trip function installed and operational. Adjustments to these tuning parameters will be made based on the OPRM's response observed during or after start-up of the system. The replacement flow transmitters will be classified as non-safety-related, will meet the criteria defined in item 3(3) of the attachment to the staff's SER dated July 12, 1993, for the LTRs, but will not be qualified for the high energy line break (HELB) and/or for loss-of-coolant accident (LOCA) environments. In its submittal, the licensee stated that except for few deviations, the proposed changes are consistent with the GE LTRs, and the staff's SERs approving these LTRs.

Evaluation:

The GE LTRs describe the design of GE's generic digital NUMAC PRNM system with the OPRM upscale trip function, provide associated TS changes, and present all the information required to implement this system at any BWR plant. The staff's SERs for the GE LTRs evaluated the generic design of the GE's digital PRNM system with the OPRM upscale trip function, and the suggested TS changes, to ensure that the system design-configuration, its hardware and software requirements, and the related TS changes are acceptable. The staff's evaluation concluded that the design of the GE NUMAC PRNM system is acceptable and its OPRM upscale trip function meets the GDC 10 and 12 requirements by automatically detecting and suppressing design basis TH oscillations prior to exceeding the fuel minimum critical power ratio (MCPR) safety limit. In its submittal, the licensee stated that the design of the proposed NUMAC PRNM system is similar to that which was described in the LTRs and was previously reviewed and approved by the staff. The replacement flow transmitters are qualified for all operating conditions under which the OPRM upscale trip function or the APRM simulated thermal power - high function are required to operate. The licensee determined that HELB and LOCA conditions do not occur simultaneously with the conditions for which the OPRM upscale trip function or the APRM simulated thermal power - high function are credited with providing a scram trip. The staff finds the proposed design changes acceptable.

3.2 TS changes

A TS changes based on removal of Enhanced Option I-A

A.1 Delete TS 3.2.3, "Fraction of Core Boiling Boundary (FCBB)" and the associated Bases.

A.2 Delete TS 3.3.1.3, "Period Based Detection System (PBDS)," and the associated Bases.

A.3 Revise TS 5.6.5, "Core Operating Limits Report (COLR)," as follows:

a. Revise the COLR to eliminate requirements associated with Enhanced Option I-A by deleting TS 5.6.5.a.3 associated with the APRM simulated thermal power - high allowable values.

b. Add a new requirement for the OPRM period-based detection algorithm (PBDA) setpoint limits associated with TS 3.3.1.1

c. Revise references to the analytical methods used to determine the core operating limits (i.e., TS 5.6.5.b) by deleting references associated with Enhanced Option I-A. The PBDA setpoint methodology is documented by reference in NEDE-24011 -P-A, "General Electric Standard Application for Reactor Fuel," which is already listed in TS 5.6.5.b.

Evaluation:

In its submittal, the licensee stated that TS 3.2.3, TS 3.3.1.3, and TS 5.6.5 were previously established to support implementation of the Enhanced Option I-A stability solution. With removal of the Enhanced Option I-A and implementation of the NUMAC PRNM system with the OPRM upscale trip, TS 3.2.3 and 3.3.1.3 are not required. Therefore, these TS and associated Bases are being deleted. TS 5.6.5 is revised to reflect the changed requirements associated with removal of the Enhanced Option I-A solution and implementation of the NUMAC PRNM system with OPRM upscale trip. This is acceptable to the staff.

B TS changes based on implementation of the NUMAC PRNM system with OPRM upscale trip

B.1 TS 3.3.1.1, "Reactor Protection System (RPS) Instrumentation" - APRM-Related RPS Functions.

Functions

a. The APRM "Neutron Flux - High, Startup" scram function will be retained, but the name will be changed to APRM "Neutron Flux - High (Setdown)."

b. The APRM "Flow Biased Simulated Thermal Power - High" scram function will be retained, but the name will be changed to APRM "Simulated Thermal Power - High."

c. The APRM "Fixed Neutron Flux-High" scram function will be retained, but the name will be changed to APRM "Neutron Flux - High."

d. The APRM "Downscale" scram function will be eliminated.

e. The APRM "Inop" scram function will be retained, but logic of the function will be changed somewhat to reflect the new NUMAC PRNM system and

to delete the minimum LPRM detector count from this trip. The minimum LPRM detector count will be retained in the Inop alarm.

f. A new pseudo APRM function called "2-Out-Of-4 Voter" will be added.

g. A new "OPRM Upscale" scram function will be added to detect and suppress anticipated TH power oscillations, thereby providing protection against exceeding the fuel MCPR safety limit.

B.2 Minimum Number of Operable APRM Channels

a. The required minimum number of operable APRM channels will change from four to three channels.

b. A new requirement for the minimum number of 2-out-of-4 voter channels will be added; all four 2-out-of-4 voter channels must be operable.

c. The minimum number of operable LPRMs per APRM channel required for APRM channel operability will increase from 11 to 17 per APRM channel and from 2 to 3 for each of the four LPRM axial levels.

d. A new requirement for the minimum number of operable OPRM channels will be added; three channels must be operable. The OPRM upscale function will have operability requirements associated with OPRM cells with a minimum of two LPRMs per cell for a cell to be operable, and a minimum of 18 OPRM cells per OPRM channel for channel operability. The specific numerical values for these two parameters are identified as "plant-specific" in the PRNM LTRs.

B.3 Applicable Modes of Operation

a. The new APRM 2-out-of-4 voter scram function will be required to be operable in Modes 1 (i.e., Power Operation) and 2 (i.e., Startup).

b. The new OPRM upscale scram function will be required to be operable only in Mode 1 (i.e., Power Operation) with Reactor Power $\geq$ 20% Rated Thermal Power (RTP).

B.4 Channel Check Surveillance Requirements

a. The channel check requirement for the APRM scram functions will be the same except the frequency will be reduced from once per 12 hours to once per 24 hours.

b. The new APRM 2-out-of-4 voter and OPRM Upscale functions will have channel check requirements of once per 24 hours.

B.5 Channel Functional Test Surveillance Requirements

a. For the APRM Neutron Flux - High (Setdown) function, the channel functional test requirement will be changed from a frequency of every 7 days to every 184 days. The Channel Functional Test will include both the APRM channels and the 2-out-of-4 Voter channels.

b. For the APRM Simulated Thermal Power - High function, a Channel Functional test requirement for testing every 184 days has been added to support a decrease in the Channel Calibration frequency. The Channel Functional test will include both the APRM channels and the 2-out-of-4 Voter channels plus the flow input processing, excluding the flow transmitters.

c. For the APRM Neutron Flux - High function, a Channel Functional test requirement for testing every 184 days has been added to support a decrease in the channel calibration frequency. The Channel Functional test will include both the APRM channels and the 2-out-of-4 voter channels.

d. For the APRM Inop function, the Channel Functional test requirement will be changed from a frequency of every 92 days to 184 days. The Channel Functional test will include both the APRM channels and the 2-out-of-4 voter channels.

e. For the new OPRM Upscale function, a Channel Functional test requirement for testing every 184 days has been added. The Channel Functional test will include both the OPRM channels and the 2-out-of-4 voter channels plus the flow input processing, excluding the flow transmitters.

f. For the Automatic Scram Contactor Functional test, surveillance requirements (SRs) of 3.3.1.1.5 will continue to apply to the APRM scram functions, and will also be applied to the new OPRM upscale function and the new 2-out-of-4 voter function.

B.6 Channel Calibration Surveillance Requirements

a. For the APRM Neutron Flux - High (Setdown) function, the Channel Calibration frequency will be changed from every 92 days to every 24 months.

b. For the APRM Simulated Thermal Power - High function, the channel calibration frequency will be changed from every 92 days to every 24 months. Calibration of flow transmitters that feed the APRMs will be included in overall channel calibration of this function at 24-month intervals. The current requirement (i.e., SR 3.3.1.1.14) to verify the APRM Simulated Thermal Power - High time constant is $\leq$7 seconds every 24 months is being deleted, consistent with the LTRs.

c. For the APRM Neutron Flux - High function, the channel calibration frequency will be changed from every 92 days to every 24 months.

d. For the APRM Inop function, no channel calibration applies. Therefore, no change in requirement is proposed.

e. The new OPRM Upscale function will have a channel calibration requirement (SR 3.3.1.1.13) with a frequency of every 24 months. The current LPRM calibration requirement (SR 3.3.1.1.8) with a frequency of every 1100 megawatt days per ton (MWD/T) average core exposure will also be applied to the OPRM upscale function. Channel calibration of the recirculation loop flow channel will be included for this function (i.e., flow is an input to the auto enable logic of the OPRM upscale function), the same as the requirement for the APRM Simulated Thermal Power - High function at 24-month intervals.

f. The OPRM Upscale Function will have a new SR 3.3.1.1.19 with a frequency of every 24 months to confirm that the OPRM auto-enable setpoints are correctly set.

g. The current SR 3.3.1.1.18 for Channel calibration surveillance for the Recirculation Drive Flow/Reactor Core Flow Alignment requires adjusting the flow control trip reference card to conform to reactor flow. The SR will be retained but revised to require only alignment of recirculation drive flow and reactor core flow. SR 3.3.1.1.18 will continue to apply to the APRM Simulated Thermal Power - High function and will be applied to the new OPRM Upscale function.

B.7 The Response Time Testing (RTT) requirement for the APRM Neutron Flux - High (Setdown) and Neutron Flux-High functions will be deleted, and none will be added for the new OPRM Upscale function. An RTT requirement for the 2-out-of-4 voter function will be added. That test will apply a response time requirement of 50 milliseconds, measured to include the voter outputs, the RPS logic, and the RPS contactors.

B.8 The Logic System Functional Testing (LSFT) SRs for the APRM Neutron Flux - High (Setdown), Simulated Thermal Power-High, Neutron Flux - High, and Inop functions will be deleted, and none will be added for the new OPRM Upscale function. An LSFT requirement will be added for the new 2-out-of-4 Voter Function with a frequency of 24 months.

B.9 Limiting Condition for Operation (LCO) Conditions and Actions

a. LCO 3.3.1.1 Condition A, and the associated Required Actions apply to the new OPRM Upscale function (Function 2.f) the same as for the APRM Functions 2.a, 2.b, 2.c, and 2.d in the new PRNM system. Similarly, Required Action A.2 and Condition B do not apply to function 2.f.

b. New LCO 3.3.1.1 Conditions I and J will be added with associated Required Actions and Completion Times. These new Conditions apply when the OPRM channel Condition A Required Actions and associated Completion Times are not met, when the OPRM Upscale function (Function 2.f) is not available due to less than two operable OPRM channels, or when the OPRM Upscale function is not available due to a design problem that renders all OPRM Channels inoperable. Required Action I.1 allows a Completion time of 12 hours to initiate alternate methods of detecting and suppressing TH instability oscillations. Condition J applies if the Completion Time for Required Action I.1 is not met. The Required Action J.1 will allow 4 hours to reduce thermal power to less than 20% RTP.

The alternate method for detection and suppression of TH instability oscillations required by Required Action I.1 is intended to be a temporary re-establishment of the ICAs specified in NRC Bulletin 88-07, Supplement 1, but controlled by plant procedures rather than TS.

B.10 Setpoints and Allowable Values (AVs)

a. Where justified by the setpoint calculations and the improved equipment performance specifications, AVs will be adjusted. Those changes are marked in the TS markups. (See Enclosures 8 and 9 to the June 26, 2001, submittal.)

b. There are no AVs associated with the OPRM upscale function. The OPRM PBDA upscale trip setpoints are determined based on the Option III licensing methodology developed by the BWROG and are described in LTR NEDO-32465-A, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Application," August 1996 (identified as Reference 4 in the licensee's submittal). The PBDA setpoints will be documented in the COLR.

c. The PBDA algorithm includes several "tuning" parameters. These are established in accordance with plant procedures as part of the system setup, and are not defined in the TS.

d. There are also TS-related setpoints for the auto-enable (i.e., not-bypassed) region that are established as nominal setpoints, as described in the TS Bases markup, and that are defined in SR 3.3.1.1.19.

e. The minimum operable OPRM cells and the setpoint defined by GE analyses based on selection of the OPRM cell assignments for BSEP and a minimum of two LPRMs per cell. The setpoint is established to conform to the licensing bases defined in LTR NEDO-31960-A (including Supplement 1), "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," November 1995 (identified as a Reference 1 in the licensee's submittal), and NEDO-32465-A, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload

Application," August 1996 (identified as a Reference 4 in the licensee's submittal). This setpoint, along with the selection of a minimum of two LPRMs per cell, is documented in the TS Bases as part of the operability requirement for the OPRM Upscale Function 2.f.

f. There are also setpoints for the "defense-in-depth" algorithms discussed in the OPRM upscale function description in the TS Bases markup. These are treated as nominal setpoints established by engineering judgment with no formal methodology. They are documented only in the plant procedures. A note will be added to TS Table 3.3.1.1-1 for the OPRM upscale function to state that OPRM PBDA setpoints limits are defined in the COLR.

B.11 TS 3.3.2.1 "Control Rod Block Instrumentation"

a. The thermal power range surveillance limits associated with each rod block monitor (RBM) upscale function (i.e., Low Power, Intermediate Power, and High Power Ranges) will be modified to specify only the lower limit, rather than both the lower and upper limits, to reduce the risk of potential surveillance compliance problems in the future. These changes have no functional impact. The MCPR limits for RBM functions are being moved to the COLR.

b. The Channel Functional Test surveillance frequency is being changed from every 92 days to every 184 days for the RBM functions.

c. The RBM "Downscale" rod block function will be deleted from the TS.

B.12 TS 3.4.1, "Recirculation Loops Operating"

The reference to the APRM "Flow Biased Simulated Thermal Power-High" scram function will be replaced with APRM "Simulated Thermal Power-High" to reflect the change in the name of the function. The statement relating to resetting the APRM Simulated Thermal Power - High Allowable Value for single-loop operation is also reworded slightly to recognize that the required value for the single-loop operation adjustment is described in a note to TS 3.3.1.1 Table 3.3.1.1-1.

B.13 TS 3.10.8, "Shutdown Margin (SDM) Test - Refueling"

The APRM 2-out-of-4 voter scram function (Function 2.e) will be added to LC0 3.10.8.a and SR 3.10.8.1 since it is required to be operable in Mode 2 (Startup).

Evaluation:

In its submittal, the licensee stated that the basis for the above-listed proposed TS changes is documented in the BWROG LTRs, which have been approved by the staff. The proposed TS changes are consistent with the Option III solution and industry practices that established the ICAs as suitable boundaries to preclude instability events,

and are based on experience from plants that have implemented the Option III solution. The proposed changes are consistent with the staff-approved LTRs; therefore, they are acceptable to the staff. The staff noted that Supplement 1 of the LTR LCO 3.3.1.1 requires that Action A.2 and Condition B are not applicable to functions 2.a, 2.b, 2.c, 2.d, and 2.f. The licensee's submittal, Section B9, page E1-8, paragraph 1 identified only function 2.f. In the response to the staff's RAI dated December 19, 2001, the licensee stated that the description contained in paragraph 1 under Section B9 on page E1-8 of its submittal does not clearly state the intent of the proposed PRNM change. LCO 3.3.1.1 Condition A and associated Required Action A.1 will be applicable to the new OPRM Upscale function 2.f along with other APRM Functions 2.a, 2.b, 2.c, 2.d, and 2.e. OPRM Upscale Function 2.f will be excluded from Required Action A.2 and Condition B, similar to other APRM Functions 2.a, 2.b, 2.c, and 2.d. The licensee further stated that proposed changes to LCO 3.3.1.1 are consistent with Supplement 1 of the PRNM LTR. This is acceptable to the staff.

From the licensee's submittal, it was not clear if the current design has a requirement to initiate a rod block signal when the count of operable LPRM detectors falls below its normal minimum. In a response to the staff's RAI dated December 19, 2001, the licensee stated that in the current PRNM system, the minimum number of LPRM detectors is controlled procedurally with no automatic actions or alarms. But, in the proposed new system, if the number of LPRM detectors falls below the minimum required, an automatic rod block will be initiated and the APRM trouble alarm will be activated. The low LPRM count is not included in the automatic APRM Inop Trip in order to eliminate unnecessary trips. Since the minimum LPRM count is a worst-case limit, the APRM channel will in fact be performing satisfactorily in many cases even if the minimum count is reached. Since LPRM detector count affects only one APRM channel, even if the channel is inoperable, per TS requirements the operator will have a minimum of 6 hours to resolve the problem. This is acceptable to the staff.

C. Additional Changes: The following additional changes and plant-specific exceptions were not discussed in the staff-approved LTRs.

C.1 TS 3.3.1.1 - APRM-Related RPS Instrumentation Functions.

a. The LTRs do not discuss specific assignment of LPRMs per OPRM cell, the minimum number of LPRMs required for an OPRM cell operability, or the minimum number of OPRM cells required for an OPRM channel operability, but provide a selection methodology for these attributes for a plant-specific application. The LPRM assignment methodology of the LTRs has been previously approved by the staff. Based on the LTR methodology, the licensee has selected an LPRM-to-OPRM cell assignment pattern that includes either three or four LPRMs per OPRM cell, and set two LPRMs as the minimum number of LPRMs required for establishing operability of an OPRM cell. In its submittal, the licensee stated that GE performed an analysis to establish PBDA setpoint limit criteria, and determined that a minimum of 18 OPRM cells are required for an OPRM channel to be operable. Since the LPRM assignment methodology of the LTRs has been previously approved by the staff, the selected values for the minimum number of LPRMs required for

establishing operability of an OPRM cell and the minimum OPRM cells required for an OPRM channel to be operable are acceptable to the staff.

The licensee further stated that it had clarified the LTRs Bases description of the OPRM power level for operability (20% RTP) and for "trip enable" (25% RTP and 60% recirculation flow), but had no change in the technical content. The power level operability values are identified in the LTRs as plant-specific, and the proposed values selected for BSEP are based on background and guidance provided in a BWROG letter to NRC dated September 17, 1996. The values selected are nominal values with no additional margin added to determine the actual setpoints. This is acceptable to the staff.

b. Action I.2 prescribing 120 days for the LCO completion time to resolve inoperability of OPRM channels is excluded from the proposed TS changes. In its submittal, the licensee stated that the industry experience shows that effective resolution of an OPRM design problem, if the problem involves a fundamental part of the design, is likely to take substantially longer than 120 days. Therefore, to avoid the risk of an otherwise unnecessary plant shutdown, LTR Required Action I.2 has not been included in the proposed TS. Required Action I.1 will continue to require implementation of alternate methods, which are defined to be procedurally established ICAs. Also, the OPRM trip being a safety system problem leading to entry in to Condition I must be corrected in a timely fashion per 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," which requires that conditions adverse to quality be promptly identified and corrected. Therefore, not including this action in the proposed TS changes is acceptable to the staff. Previously, the staff has approved a similar change for the Perry Nuclear Power Plant by License Amendment No. 118 dated February 26, 2001.

c. For the Channel Functional Test, SR 3.3.1.1.11, a note applicable to functions 2.b (Average Power Range Monitor Simulated Thermal Power - High), and 2.f (Average Power Range Monitor OPRM upscale) has been added to the SR to state that the SR includes the recirculation flow input processing, excluding the flow transmitters. This note was not included in the LTRs but has been included in the proposed TS changes and in the Bases description to clarify that the actual setpoints of the OPRM trip auto-enable function are confirmed by SR 3.3.1.1.19, which verifies that OPRM is not bypassed when APRM Simulated Thermal Power is $\geq$25% and recirculation flow is $\leq$60%. Since flow transmitters are included in SR 3.3.1.1.19, which is performed during each refueling outage (24-month frequency), the licensee's clarification for removing flow transmitters from the channel functional test is acceptable to the staff.

d. For the Channel Calibration SR 3.3.1.1.13, a note applicable to functions 2.b (Average Power Range Monitors Simulated Thermal Power - High), and 2.f (Average Power Range Monitors OPRM Upscale) has been added to the SR to state that the SR includes the recirculation flow

transmitters that feed the APRMs. This note was not in LTRs. The Bases description has been modified slightly from that in the LTRs to include discussion of this note, and to reference SR 3.3.1.1.18 for the recirculation drive flow alignment with reactor core flow. This modification is proposed to improve clarity and to recognize that the OPRM upscale function requires recirculation flow calibration to support the auto-enable function. This clarification is acceptable to the staff.

e. The current SR 3.3.1.1.18 was added to support Enhanced Option I-A, and was not discussed in the LTRs. But the recirculation drive flow alignment with reactor core flow is still required for the NUMAC PRNM system to support the flow-biased scram setpoint for the Simulated Thermal Power - High function (2.b), and for the auto-enable function of the OPRM Upscale Trip function (2.f). Therefore, SR 3.3.1.1.18 is retained with appropriate modifications. The corresponding Bases has been similarly modified. Retention of this SR in the revised TS is acceptable to the staff.

f. The LTRs delete RTT requirements except for the 2-out-of-4 voter Function 2.e. The LTRs also discusses application of staggered testing as applied to the voter function, but shows no specific changes to the SR or the Bases to define the testing requirements. To address this, the TS SR 3.3.1.1.17 for RTT is revised to add a note to define "n" for Function 2.e (Average Power Range Monitors 2-Out-Of-4 Voter), and to add a discussion to the Bases on how to satisfy the staggered testing requirements. While the LTRs justified a reduced RTT frequency for this function, no TS markups were included. Therefore, Note 4 has been added to TS SR 3.3.1.1.17 to define "n=8" for this function, requiring testing of APRM and OPRM outputs to alternate. These changes are within, and slightly more conservative than, the limits justified in the LTRs. Therefore, the addition of this note to clarify the total number of voter channels is acceptable to the staff.

g. The improved performance specifications for the PRNM system equipment compared to the current equipment provide additional margin between the setpoints or AVs and the corresponding analytical limits or design basis values. In its submittal, the licensee stated that part of that margin will be consumed to offset the effects of increased surveillance intervals. The remaining margin, where available, is used to justify relaxing the AVs. This is acceptable to the staff.

C.2 TS 3.3.2.1 - APRM Control Rod Block Functions

a. The thermal power range surveillance limits associated with each RBM upscale function (i.e., Low Power, Intermediate Power, and High Power ranges) will be modified to specify only the lower limit, rather than both the lower and upper limits, to reduce the risk of potential surveillance compliance problems in the future. These changes have no functional impact and accomplish the same technical objective without the literal

compliance problem. Since the proposed changes have no functional impact, they are acceptable to the staff.

b. The RBM downscale trip function is deleted from the TS and from the related discussion in the Bases. Deletion of this trip from the TS is not discussed in the LTRs. In its submittal, the licensee stated that this downscale trip function detects substantial reductions in the RBM local flux after a "null" is completed, which occurs after a new rod selection. This function, in combination with the RBM “Inop” function, is intended to detect problems or abnormal conditions in the RBM equipment and system. However, no credit is taken for this function in establishing analytical limits or setpoints for the RBM upscale trip function.

In the original analog RBM system, inclusion of a downscale trip in addition to the RBM “Inop” function had some merit because the analog equipment had some failure modes that could result in a reduced signal but not a total failure. Also, unlike other neutron monitoring system downscale functions (e.g., APRM downscale), there are no normal operating conditions that are intended to be detected by the RBM downscale function. One effect of replacing the analog with the digital system is to eliminate the types of failures that were detected by the downscale trip function. Also, the RBM Inop function is enhanced by use of digital automatic self-test and internal logic to increase the detectability of abnormal conditions and to include these conditions directly in the RBM Inop function. Therefore, in the NUMAC APRM, RBM, and TS Improvement Program, there is no incremental value or benefit provided by the RBM Downscale Trip. Also, this trip function does not meet the 10 CFR 50.36 criteria for inclusion in the TS; therefore, this trip is being removed. However, the RBM Inop Function will be retained. The deletion of the RBM downscale trip is acceptable to the staff.

c. The LTRs did not include discussion of TS 3.4.1, "Recirculation Loops Operating." In its submittal, the licensee stated that TS 3.4.1 must be revised to be consistent with the proposed APRM TS changes for implementing the NUMAC PRNM system. Revision of TS 3.4.1 to make it consistent with other proposed TS changes associated with implementing the NUMAC PRNM system is acceptable to the staff.

3.3 Reactor Systems Evaluation

A The Revised Technical Specifications

A.1 TS 3.2.3 - Fraction of Core Boiling Boundary (FCBB)

The licensee proposed to delete TS 3.2.3 along with its associated Bases.

Evaluation

The staff has reviewed the proposed change and found it acceptable because this TS was established to support the implementation of the Enhanced Option

I-A stability solution, which is no longer needed for the implementation of the NUMAC PRNM system with OPRM, the Option III stability solution.

A.2 LCO 3.3.1.1 - The RPS Instrumentation for each Function in Table 3.3.1.1-1 shall be OPERABLE.

The licensee has proposed to delete LCO 3.3.1.1 Required Action I.2, which is included in the PRNM LTR Supplement 1 with a Completion Time of 120 days.

The licensee has justified that the 120-day LCO 3.3.1.1 I.2 completion time is not needed for the following reasons:

(1) The Required Action I.1 allows a completion time of 12 hours to initiate an alternate method to detect and suppress thermal hydraulic instability oscillations;

(2) The alternate ICA function is maintained in TS, plant procedures, and operator training;

(3) Any design problem leading to an entry into Condition I would be required to be corrected in a timely fashion by 10 CFR 50 Appendix B Criterion XVI, “Corrective Action,” which requires that conditions adverse to quality be promptly identified and corrected; and

(4) CP&L will continue to operate BSEP Unit 1 with the OPRM trip function operable if the existing generic regional Delta Critical Power Ratio (CPR)/Initial CPR Versus Oscillation Magnitude (DIVOM) curve is applicable, or enabled but declared inoperable if the generic curve is not bounding for BSEP operation.

Evaluation

The staff has reviewed the licensee’s justification for the removal of the 120-day LCO and has found it acceptable because the licensee will use the OPRM trip function if the existing generic DIVOM curve is applicable to BSEP operation. Otherwise, ICAs and maintenance rules described in 10 CFR 50 Appendix B Criterion XVI, “Corrective Action” will be applied if the generic curve is not bounding for BSEP operation.

A.3 TS 3.3.1.3 - Period Based Detection System

The licensee has proposed to delete TS 3.3.1.3 along with its associated Bases.

Evaluation

The staff has reviewed the proposed TS change and found it acceptable because it is no longer needed for the implementation of the NUMAC PRNM system with OPRM for Option III stability solution.

A.4 TS 5.6.5 - Core Operating Limits Report

The licensee has proposed to replace TS 5.6.5.a.3 “The Allowable Value for Function 2.b, APRM Flow Biased Simulated Thermal Power - High, for Specification 3.3.1.1" by “The period based detection algorithm (PBDA) setpoint for Function 2.f, Oscillation Power Range Monitor (OPRM) Upscale, for Specification 3.3.1.1" and delete items 2, 3, and 4 in TS 5.6.5.b.

Evaluation

The staff has reviewed the proposed changes and found them acceptable because TS 5.6.5.a.3 is intended to support the implementation of the NUMAC PRNM system with OPRM for Option III stability solution and items 2, 3, and 4 are the approved licensing topical reports, which are already included in an approved licensing topical report NEDE-24011-P-A of TS 5.6.5.b.1.

B Generic Issues

B.1 10 CFR Part 21 on DIVOM Curve

By letter dated June 29, 2001, GE Nuclear Energy notified CP&L of a reportable condition under 10 CFR Part 21 regarding a non-conservative deficiency for the high peak bundle power-to-flow ratio in the generic regional DIVOM curve contained in NEDO-32465-A, “Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications.” This non-conservatism could result in Option III stability trip system setpoints that do not provide MCRP safety limit protection for a limiting instability event. By letter dated August 31, 2001, GE Nuclear Energy provided information concerning the non-conservative reload licensing calculation for stability Option III detect and suppress trip systems. As defined in that letter, BSEP Units 1 and 2 are Category 2 plants, and CP&L has chosen the third resolution option for Category 2 plants (i.e., implement the system with non-conservative setpoint and immediately declare the system inoperable). Until long-term resolution of this issue is finalized by the BWROG in the fourth quarter of 2002, CP&L will continue to operate BSEP Unit 1 with the OPRM trip function either operable, or enabled but declared inoperable.

Evaluation

The staff has reviewed the licensee’s position on the 10 CFR Part 21 DIVOM curve issue and finds the proposed position to continuously operate BSEP Unit 1 with the OPRM trip function either operable, or enabled but declared inoperable, acceptable. The figure of merit calculation described in GE Nuclear Energy’s letters to the NRC dated June 29, 2001, and August 31, 2001, will be performed by CP&L during the March 2002 refueling outage to determine if the existing generic regional mode DIVOM curve is applicable to BSEP Unit 1, and to determine the operating status of the OPRM trip function either “operable” or “enabled but declared inoperable” based on the results of the figure of merit calculation.

B.2 Change to the BWROG Long-Term Stability Option

The licensee proposed a TS amendment to support its change from the Long-Term Stability Solution Option E1A to the Option III stability solution using GE NUMAC PRNM system with OPRM. The reasons for CP&L's proposed change to the Option III stability Option are given as follows:

(1) The BSEP's extended power uprate upgrade to a new digital electronics PRNM system provides an opportunity to convert to Option III at a reasonable incremental cost;

(2) E1A prohibits intentional entry into the Restricted Region unless the FCBB is less than or equal to 1; and

(3) Option III in contrast provides automatic detection and suppression of reactor instability.

Evaluation

The staff has reviewed the licensee's proposal to change from Option E1A to Option III, and has determined that it is acceptable because the licensee has proposed to implement the new stability solution in accordance with previously reviewed and approved guidance.

## 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 amendments. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATIONS

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change the SRs. The NRC staff has determined that the amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding (66 FR 38759). Accordingly, the amendments meet 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 amendments.

## 6.0 CONCLUSION

The NRC finds that the request by CP&L to revise the TS for BSEP Units 1 and 2 to implement the BWROG Long-Term Stability Solution Option III using the GE NUMAC PRNM system with OPRM is acceptable because the proposed TS changes are in accordance with the approved methodology.

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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

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