March 25, 2003

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 AMENDMENTS RE: STANDBY LIQUID CONTROL SODIUM PENTABORATE SOLUTION CONCENTRATION AND REQUIREMENTS (TAC NOS. MB5680 AND MB5681)

Dear Mr. Keenan:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 227 to Facility Operating License No. DPR-71 and Amendment No. 255 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The amendments are in response to your application dated July 24, 2002, as supplemented February 21, 2003.

The amendments revise Technical Specification (TS) 3.1.7, "Standby Liquid Control (SLC) System," Surveillance Requirement 3.1.7.8, Figures 3.1.7-1 and 3.1.7-2, and the corresponding TS Bases to reflect modifications being made to the system as a result of a transition to the GE14 fuel design. The revised TS reflect the planned SLC system modifications necessary for BSEP Units 1 and 2 to satisfy the reactivity control requirements specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion 26, and 10 CFR 50.62, "Anticipated Transient without Scram."

The proposed TS changes and modifications would support the reactivity control needed for transition to GE14 fuel. Amendments 222 and 247 authorized uprating the BSEP Units 1 and 2 maximum operating power to 2923 MWt, which is 20 percent above the original licensed thermal power. To achieve the higher operating power and meet the cycle energy requirements, CP&L is transitioning to GE14 fuel design, using higher U-235 enrichment and increasing the batch fraction. With the loading of the second batch of GE14 fuel, the boron concentration required to satisfy the cold shutdown reactivity control changes from 660 ppm natural boron to a concentration equivalent to 720 ppm natural boron.

These amendments also authorize the removal of the license conditions that were included in Appendix B, "Additional Conditions," upon issuance of Amendments 222 and 247 of the BSEP Units 1 and 2 Operating Licenses DPR-71 and DPR-62. The licensee's amendment request and the SLC system modifications and corresponding TS changes have satisfied these license conditions.

The SLC system changes are planned for the Cycle 16 refueling outage in March 2003 for BSEP Unit 2, and the Cycle 15 refueling outage in March 2004 for BSEP Unit 1.

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 Nos. 50-325 and 50-324

Enclosures:
1. Amendment No. 227 to
   License No. DPR-71
2. Amendment No. 255 to
   License No. DPR-62
3. 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
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-325 and 50-324

Enclosures:
1. Amendment No. 227 to License No. DPR-71
2. Amendment No. 255 to License No. DPR-62
3. Safety Evaluation

cc w/enclosures: See next page

DISTRIBUTION:

PUBLIC	B. Mozafari	G. Hill (4 copies)	Z. Abdullahi
PDII-2 R/F	E. Dunnington	R. Dennig	
S. Moore	OGC	P. Fredrickson, RII	
A. Howe	ACRS	R. Caruso	

TSPages: ML030850039 & ML030850040
ADAMS Accession No. ML030840350 Package: ML030840368

OFFICE	PM:PDII/S2	LA:PDII/S2	SC:PDII/S2	OGC
NAME	BMozafari	EDunnington	AHowe	RHoefling
DATE	3/14/03	3/14/03	3/21/03	3/20/03

OFFICIAL RECORD COPY

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 227
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 July 24, 2002, as supplemented February 21, 2003, 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. 227, are hereby incorporated in the license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications.

3. Also, paragraph 3 of Facility Operating License No. DPR-71 is hereby amended to read as follows:

3. Additional Conditions

The Additional Conditions contained in Appendix B, as revised through Amendment No. 227, are hereby incorporated into this license. Carolina Power & Light Company shall operate the facility in accordance with the Additional Conditions.

4. This license amendment is effective as of the date of its issuance and shall be implemented prior to startup from the B115R1 refueling outage for Unit 1.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Allen G. Howe, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications and Appendix B

Date of Issuance: March 25, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 227

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

Replace the following pages of the Appendix A Technical Specifications and Appendix B, "Additional Conditions," 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
3.1-21	3.1-21
3.1-22	3.1-22
3.1-23	3.1-23
3.1-24	3.1-24
Appendix B	Appendix B

APPENDIX B

Additional Conditions

Amendment Number	Additional Conditions	Implementation Date
203	The licensee is authorized to relocate certain requirements included in Appendix A and the former Appendix B to licensee-controlled documents. Implementation of this amendment shall include the relocation of these requirements to the appropriate documents, as described in the licensee's letters dated November 1, 1996, October 13, 1997, February 26, 1998, April 24, 1998, and May 22, 1998, evaluated in the NRC staff's Safety Evaluation enclosed with this amendment.	This amendment is effective immediately and shall be implemented within 90 days of the date of this amendment.

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 255
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 July 24, 2002, as supplemented February 21, 2003, 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. 255, are hereby incorporated in the license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications.

3. Also, paragraph 3 of Facility Operating License No. DPR-62 is hereby amended to read as follows:

3. Additional Conditions

The Additional Conditions contained in Appendix B, as revised through Amendment No. 255, are hereby incorporated into this license. Carolina Power & Light Company shall operate the facility in accordance with the Additional Conditions.

4. This license amendment is effective as of the date of its issuance and shall be implemented prior to startup from the B216R1 refueling outage for Unit 2.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Allen G. Howe, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications and Appendix B

Date of Issuance: March 25, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 255

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 and delete page 2 of Appendix B, “Additional Conditions.” The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages	Insert Pages
3.1-21	3.1-21
3.1-22	3.1-22
3.1-23	3.1-23
3.1-24	3.1-24
Page 2 of Appendix B	---

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 227 TO FACILITY OPERATING LICENSE NO. DPR-71

AND AMENDMENT NO. 255 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 July 24, 2002 (Reference 1), supplemented on February 21, 2003 (Reference 2), Carolina Power & Light Company (CP&L), the licensee for Brunswick Steam Electric Plant (BSEP), Units 1 and 2, proposed changes to Technical Specifications (TS) 3.1.7, "Standby Liquid Control (SLC) System," Surveillance Requirement (SR) 3.1.7.8, Figures 3.1.7-1 and 3.1.7-2, and the corresponding Bases. The February 21, 2003, supplement contained clarifying information only and did not change the initial no significant hazards consideration determination or expand the scope of the initial *Federal Register* notice.

Amendments 222 and 247 (Reference 3) authorized increasing the BSEP Units 1and 2 maximum operating power to 2923 MWt, which is 20 percent above the original licensed thermal power. To achieve the higher operating power, meet the 24-month cycle energy requirements, and operate within the thermal limits, CP&L is transitioning to the GE14 fuel design, using a higher U-235 enrichment and increasing the batch fraction. In the application requesting the extended power uprate (EPU) (Reference 4), CP&L stated that loading the second batch of GE14 fuel would require a change in the boron concentration to satisfy the cold shutdown reactivity control from 660 ppm natural boron to a concentration equivalent to 720 ppm natural boron. As a result, modification to the Standby Liquid Control (SLC) system is required to increase the injection capability. The licensee stated that the options considered to support transition to GE14 fuel include: (1) raising the minimum sodium pentaborate solution volume limits for the SLC tank, (2) increasing the boron atomic enrichment to the amount required to meet EPU for two-pump operation, and (3) increasing the boron atomic enrichment to a higher value to meet the EPU normal and anticipated transient without scram (ATWS) shutdown requirements with single-pump operation. CP&L has elected to increase the neutron absorber concentration equivalent to 720 ppm natural boron by using sodium pentaborate solution enriched in the Boron-10 isotope.

Since the EPU application did not identify the specific SLC modifications that would be implemented to account for the EPU core design reactivity changes, the licensee formalized the commitment into a license condition, which was included in the BSEP Unit 1 and 2 operating licenses with the issuance of Amendments 222 and 247. Since this amendment request identifies the planned SLC system modifications and proposes the corresponding TS changes, CP&L stated that this application satisfies the conditions in Appendix B of the BSEP Unit 1 and 2 Operating Licenses. CP&L requested that the license conditions be removed.

2.0 REGULATORY EVALUATION

The SLC system is an independent reactivity control system that provides shutdown capability under normal and ATWS conditions.

The shutdown capability requirements of the SLC system during normal operation is specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 26. Compliance with GDC 26 requires that two independent reactivity control systems of different design principles be provided, with one of the systems being capable of holding the reactor core subcritical under cold conditions. The control rods provide the normal method for reactivity control, and are capable of maintaining the reactor subcritical, including allowance for a stuck rod, without the addition of any soluble neutron absorber to the reactor coolant.

The SLC system acts as a backup to the insertion of control rods to provide a diverse means of making the reactor subcritical. To comply with GDC 26, the SLC system must have an adequate amount of neutron absorber in solution, and the capability to inject at a rate sufficient to bring the reactor from rated power to cold shutdown, at any time in core life, with the control rods remaining withdrawn in the rated power pattern, taking into account the reactivity gains from complete decay of the rated power xenon inventory, an allowance for imperfect mixing and leakage, and dilution by the residual heat removal system. As fuel bundle enrichment and core reactivity increase to meet the cycle energy requirements, the SLC system shutdown boron concentration must be increased to continue to satisfy the reactivity control requirements of GDC 26. A cycle-specific SLC shutdown concentration is calculated for each cycle's core design to confirm that the SLC system boron concentration will satisfy the cold shutdown capability requirements.

The ATWS requirement for the SLC system is specified in paragraph (c)(4) of 10 CFR 50.62, which states, in part:

> "Each boiling water reactor must have a standby liquid control system (SLCS) with the capability of injecting into the reactor pressure vessel a borated water solution at such a flow rate, level of boron concentration and boron-10 isotope enrichment, and accounting for reactor pressure vessel volume, that the resulting reactivity control is at least equivalent to that resulting from injection of 86 gallons per minute of 13 weight percent sodium pentaborate decahydrate solution at the natural boron-10 isotope abundance into a 251-inch inside diameter reactor pressure vessel for a given core design."

The purpose of the ATWS rule is to reduce the risk from ATWS by ensuring adequate shutdown capability. The plant-specific equivalent reactivity control can be obtained by increasing the pump flow rate, boron concentration, and/or the boron enrichment. In response to the ATWS rule, General Electric provided guidance for the equivalency determination in topical report NEDE-31096-P-A (Reference 5). A letter from Gus Lainas to T. A. Pickens (Reference 6) issued the safety evaluation report (SER) accepting topical report NEDE-31096-PA .

3.0 TECHNICAL EVALUATION

The licensee determined that it is necessary to increase the SLC system boron concentration from 660 ppm of natural boron to a concentration equivalent to 720 ppm natural boron in order to meet the SLC shutdown requirements during the next cycles of operation with GE14 fuel (Cycle 15 for Unit 1 and Cycle 16 for Unit 2). The SLC system concentration required to meet the cold shutdown requirements were determined using NRC-approved methods and codes described in Revision 14 of General Electric Standard Application for Reactor Fuel (GESTAR II), NEDC 24011-P-A (Reference 7).

The analysis assumed that each BSEP unit is loaded with an equilibrium core of GE14 fuel, operating at 2923 Mwt, with a 24-month operating cycle. The licensee states that the analysis demonstrated that a shutdown margin greater than 1.0-percent deltaK/K can be maintained using a minimum concentration equivalent to 720 ppm natural boron. The BSEP TS 3.1, "Shutdown Margin (SDM)," requires an SDM of greater than or equal to 0.38-percent deltak/K for both GE13 and GE14 fuel types. In the February 21, 2003 supplement, the licensee expanded further on the cold shutdown requirement for mixed GE13 and GE14 core, stating that with similar fuel enrichment, the GE14 fuel is more reactive than the GE13 fuel. The new GE14 lattice design and the corresponding high batch fraction causes the increase in the required cold shutdown boron concentration. In subsequent cycles, the BSEP cores will be transitioning to GE14 fuel. During each new cycle-specific reload, the shutdown margin for the specific core design will be calculated assuming the 720 ppm boron concentration. The licensee states that the available shutdown margin based on the 720 ppm boron concentration is sufficient and bounding for upcoming cycles and for the currently planned future core designs. The SLC system shutdown capability will be confirmed in subsequent cycles based on the cycle-specific core design.

The existing SLC system design requires that the SLC inject a quantity of boron that is 25 percent above that needed for an in-vessel boron concentration of 660 ppm. This additional 25 percent is injected to compensate for imperfect mixing, leakage, and volume in other small piping connected to the reactor. The licensee states that the margin 25 percent above the amount needed for an in-vessel boron concentration equivalent to 720 ppm natural boron will be maintained and will also be injected into the reactor if called upon.

To satisfy the ATWS rule (10 CFR 50.62), licensees demonstrate that the SLC system has minimum flow capacity and boron concentration equivalent to 86 gpm of 13 weight percent sodium pentaborate solution. The ATWS requirement is based on the use of natural boron, which contains 19.8 atom percent of Boron-10 (B_{10}). The equivalent reactivity control can be obtained by varying the pump flow rate, the boron concentration, and/or the boron enrichment. B_{10} has a large neutron absorption capability (cross-section), and sodium pentaborate solution enriched with B_{10} isotope provides a faster negative reactivity insertion rate relative to the same quantity of sodium pentaborate with natural boron. CP&L has elected to increase the neutron absorber concentration equivalent to 720 ppm natural boron by using sodium pentaborate solution enriched in the Boron-10 isotope.

The following equivalency equation is used to establish the required ATWS reactivity control capability for each plant-specific SLC system.

$$\frac{Q}{86} \times \frac{M251}{M} \times \frac{C}{13} \times \frac{E}{19.8} \geq 1$$

Where,

Q = the expected SLC system flow rate
M = the mass of water in the vessel and recirculation system at hot rated condition (lbm)
C = the sodium pentaborate solution concentration in weight percent
E = the B_{10} isotope enrichment in atom percent (natural boron concentration is 19.8 percent)
M251 = the mass of water in a BWR/6 reactor vessel (lbm).

Based on the use of one SLC pump injecting at the design flow rate, the mass of the water in the BSEP reactor vessel and recirculation systems, 8.5 weight percent of sodium pentaborate solution and 47 atom percent of B_{10}, the BSEP SLC equivalency equation is as follows.

$$\frac{43}{86} \times \frac{628,300}{485500} \times \frac{8.5}{13} \times \frac{47}{19.8} = 1.004$$

The licensee states that with one SLC pump operating, and using the proposed B_{10} enrichment solution concentration, the above equivalency equation demonstrates that the BSEP SLC systems meet the equivalency requirements of 10 CFR 50.62.

In its initial response to the issuance of the ATWS rule (Reference 8), CP&L modified the SLC system so that both SLC pumps would operate simultaneously. The licensee will continue to start both pumps and both will inject into the reactor vessel upon confirmation of an ATWS event as described in the emergency operating procedures (EOPs). However, the licensee wants to improve the BSEP Units' Probabilistic Safety Assessment (PSA) success criteria for meeting the ATWS requirements. Therefore, CP&L will use enriched B_{10} so that the operation of only one SLC pump is necessary to provide the reactivity control at sufficient flow rate to meet the ATWS rule. The BSEP risk assessment for the EPU did not take credit for the single pump/squib valve success criteria. Therefore, from a risk prospective, the proposed single pump/squib valve success criteria represents a safety enhancement.

In meeting the equivalency equation based on single pump/squib valve success criteria, the licensee is decreasing the pump flow rate (from the previous minimum two pump injection criterion of 66 gpm to 43 gpm for single pump) and increasing the boron enrichment (from natural 19.8 atom percent B_{10} to 47 atom percent B_{10}) and reducing the sodium pentaborate concentration (from 13 weight percent to 8.5 weight percent). The licensee states that using the design flow rate (43 gpm) is consistent with the NRC-accepted ATWS topical report, NEDE-31096-P-A, which states that the use of the "expected or nominal plant-specific values in determining the equivalency is consistent with the use of nominal parameters and initial conditions in the analyses of NEDE-24222." In addition, the topical report states that, "Also, in the case of SLC system flow rate, the use of the design pump flow rate (as verified by vendor test) is more reasonable for calculation purposes than using a Technical Specification minimum value that may be several gpm lower than the design value." In the February 21, 2002, Request for Additional Information (RAI) response, the licensee reported that the recent surveillance test data, when corrected for actual fluid density and adjusted for possible instrumentation uncertainty, showed that all four SLC pumps (for Unit 1 and 2) are currently delivering greater than 43.5 gpm. Due to the variation in the SLC solution density during the testing, the licensee

stated that the indicated flow may be less than the actual flow rate by 1 or 2 gpm in the current system configuration. The licensee added that use of the design flow rate is acceptable because the equivalency equation presented in the NRC-accepted NEDE-31096-P-A (Page 1-7) recommends the use of design flow rate, and the BSEP Units' SLC pumps are rated for and have the capacity to deliver 43.5 gpm.

As stated in the February 21, 2003, RAI response, there are no data or specific analysis indicating that the BSEP Units' SLC pumps cannot provide the rated design flow rate. In addition, the BSEP EOPs will continue to require simultaneous start and injection of both SLC pumps upon confirmation of ATWS. With both SLC pumps injecting, the system flow rate will exceed 43 gpm and will meet the equivalency equation. In addition, although the SER accepting NEDE-31096-P-A did not explicitly discuss the topical report's recommendation to use the design flow rate in the equivalency calculation, the 86 gpm rate cited in 10 CFR 50.62 and discussed in the NRC staff's SER approving NEDE-31096-P-A does not account for instrument uncertainties or pump degradation. Moreover, from a risk perspective, the use of design flow rate is also acceptable, and the capability to inject the minimum boron concentration using a single SLC pump will make the BSEP Unit 1 and 2 operation safer in terms of ATWS. Although the 8.5 weight-percent solution concentration value represents the minimum-required concentration to meet the ATWS equivalency, in actuality the SLC tank will be maintained within a 2-percent concentration operating band (8.5 percent to 10.5 percent). Therefore, based on the above discussion, the NRC staff finds it acceptable to use the single SLC pump design flow rate in the equivalency equation. The NRC staff also finds that the licensee had demonstrated that, with the proposed parameters (47 atom percent B_{10}, 8.5 weight percent sodium pentaborate concentration, with single-pump injection), BSEP Units 1 and 2 will meet the cold shutdown requirement of 720 ppm and the ATWS reactivity control as specified in the equivalency equation.

A. Changes to TS Figure 3.1.7-1 and SR 3.1.7.8

The amendment revises the BSEP volume-concentration limits of TS Figure 3.1.7-1 based on the minimum sodium pentaborate concentration of 8.5 weight percent used in the equivalency equation. The minimum-allowed sodium pentaborate solution is changed from 13 weight percent (based on the natural B_{10} concentration) to 8.5 weight percent (based on 47 atom percent B_{10}). The allowed sodium pentaborate solution range is defined by the minimum required concentration and minimum volume of solution required with single-pump injection and the 2-percent concentration operating band. Therefore, based on the above discussion, the NRC staff finds the revised solution volume-concentration limit in Figure 3.1.7-1 acceptable since the figure incorporates the sodium pentaborate concentrations necessary to provide the current reactivity control requirements.

SR 3.1.7.5 requires the licensee to verify that the concentration of the boron solution is within the limits of Figure 3.1.7-1. The SR is performed every 31 days, once within 24 hours after water or boron is added to the solution, and once within 24 hours after the solution temperature is restored within the limits of Figure 3.1.7-2. The licensee also proposes adding a new SR 3.1.7.8 that would verify that the sodium pentaborate enrichment is 47 atom percent B_{10} or greater prior to adding to the SLC tank. Bases Section 3.1.7 is also revised, adding the following statement. "Enriched sodium pentaborate solution is made by mixing granular, enriched sodium

pentaborate with water. Isotopic tests on the granular sodium pentaborate to verify the actual B_{10} enrichment must be performed prior to addition to the SLC tank in order to ensure that the proper B_{10} atom percentage is being used."

The NRC staff finds the new SR 3.1.7.8, as described in Bases Section 3.1.7.8, provides additional assurance that the 47 atom percent B_{10} enrichment will be confirmed. The NRC staff also finds the SR 3.1.7.8 Bases adds clarity to how the SR will be accomplished. In addition, SR 3.1.7.5. provides similar assurance that the required concentration will be maintained in the tank. Therefore, the NRC staff finds the new SR 3.1.7.8 added to the BSEP TS acceptable.

B. Change to TS Figure 3.1.7-2 and SR 3.1.7.3

The licensee proposed revising Figure 3.1.7-2, "Sodium Pentaborate Solution Volume Versus Concentration Requirements," to reflect the required solution temperatures to prevent crystallization for the proposed sodium pentaborate concentration range. In the current TS, the acceptable concentration ranges from 13 to 21 weight percent based on the natural B_{10} concentration. Figure 3.1.7-2 currently shows the corresponding required solution temperatures, ranging from approximately 66°F to 98°F. Typically, the solution temperature is maintained by the auto-initiated tank heaters and pipe heat tracing. With the proposed enrichment and the corresponding sodium pentaborate solution concentration of 8.5 percent to 10.5 percent, the required temperature range drops to between 35°F and 51°F. The licensee stated that because of a lack of solution saturation temperature data below 9 weight percent, the temperature limit for the 8.5 percent concentration is maintained at the value for 9 weight percent. The licensee will continue to maintain, in the revised TS Figure 3.1.7.2, the 5°F margin to the saturation temperature that is specified in the TS Bases. This 5°F margin provides additional margin for inaccuracies associated with the solution temperature in the tank. The licensee also proposed a change to Figure 3.1.7-2 to incorporate the required temperatures for the proposed concentration range.

In the February 21, 2003, RAI response, the licensee explained its plan to remove the heat tracing, stating that maintaining the heat trace during the winter months would require significant effort. With the lower sodium pentaborate concentration, the temperature required to prevent crystallization is lowered, eliminating the need for heat tracing. The heat tracing system relies on active protection provided by thermostats and the passive protection provided by piping insulation. The licensee stated that by eliminating the heat tracing, the reliability of the SLC system is improved significantly. The local thermocouples that are used to verify the piping temperature will not be removed and the existing TS SRs will continue to monitor and confirm the piping temperature. The licensee states that although the temperature of the building housing the SLC system is not expected to drop below 57°F (for the required solution temperature range of 35°F to 51°F), contingency plans include placing temporary heaters in service if needed. The licensee adds that the concentration can also be reduced by adding water (only for the high concentration range-10.5 percent), if the building temperature drops close to the minimum-required solution temperature. Note that the SLC tank solution concentration must be 8.5 percent or greater at all times. The solution temperature corresponding to the minimum concentration is 35°F for the expected minimum SLC building temperature of 57°F.

SR 3.1.7.2 requires that the licensee verify that the temperature of sodium pentaborate solution is within the limits of Figure 3.1.7-2 every 24 hours. In addition, SR 3.1.7.3 requires

that the licensee verify that the temperature of the pump suction piping is within the limits of Figure 3.1.7-2 every 24 hours. The licensee proposes revising SR 3.1.7.3 to state, "verify temperature of pump suction and discharge piping up to the SLC injection valves is within the limits of Figure 3.1.7-2."

The NRC staff confirmed the minimum sodium pentaborate solution temperatures (35°F to 51°F) required to prevent crystallization problems for the proposed concentration range (8.5 percent to 10.5 percent). In addition, the NRC staff finds that maintaining SR 3.1.7.2 (verifying solution temperature) and 3.1.7.3 (verifying piping temperature) in the TS provides added assurance that the required temperature range without the heat tracing would be monitored, especially in the winter. Since the proposed changes would incorporate the temperatures necessary to maintain the sodium pentaborate in the solution, the NRC staff accepts the changes to Figure 3.1.7-2, "Sodium Pentaborate Solution Temperature Versus Concentration Requirements." Since the licensee will extend the verification at the pump suction piping temperature to include the discharge piping, the NRC staff also finds the proposed change to SR 3.1.7.3 acceptable.

C. Additional SLC System Modification

In the February 21, 2003, RAI response, the licensee discussed additional planned SLC system configuration modifications. Notably, the licensee will replace the SLC pump discharge relief valves, which will increase the setpoints by 50 psig. The licensee selected the new relief valves to improve the reliability of the setpoint verifications during the inservice testing. The setpoint changes will also improve the margins in response to NRC Information Notice 2001-13, "Inadequate Standby Liquid Control Relief Valve Margin." This modification will increase the available margin for the BSEP SLC relief valves, and the NRC staff finds this modification enhances the BSEP Units' response to an ATWS event.

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 CONSIDERATION

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 Surveillance Requirements. 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 (67 FR 53984). 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 staff reviewed the proposed increase in the cold shutdown boron concentration for BSEP Units 1 and 2 from 660 ppm natural boron to 720 ppm equivalent and the corresponding TS changes. The NRC staff finds that the proposed TS changes are acceptable since the SLC system will continue to provide the required shutdown margin under normal operating condition pursuant to 10 CFR Part 50, Appendix A, GDC 26, and ATWS conditions pursuant to 10 CFR 50.62.

In addition, since the licensee had identified the specific SLC modifications and submitted the corresponding TS changes necessary to account for reactivity control changes associated with the EPU core designs, CP&L has satisfied the conditions specified in Appendix B of the BSEP TS.

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.

7.0 REFERENCES

1. Letter from Carolina Power & Light Company to the U.S. Nuclear Regulatory Commission, "Brunswick Steam Electric Plant, Unit Nos. 1 and 2: Docket Nos 50-325 and 50-324/License Nos. DPR-71 and DPR-62: Request for License Amendments -Technical Specification 3.1.7, "Standby Liquid Control System," Sodium Pentaborate Solution Requirements," July 24, 2002.

2. Letter from Carolina Power & Light Company to the U.S. Nuclear Regulatory Commission, "Brunswick Steam Electric Plant, Unit Nos. 1 and 2: Docket Nos 50-325 and 50-324/License Nos. DPR-71 and DPR-62: Response to Request for Additional Information Regarding Technical Specification 3.1.7, "Standby Liquid Control System," Sodium Pentaborate Solution Requirements," February 21, 2003.

3. Letter from the U.S. Nuclear Regulatory Commission to Mr. John S. Keenan, "Issuance of Amendments re: Extended Power Uprate," May 31, 2002.

4. NEDC-33039P, "Safety analysis Report For Brunswick Units 1 and 2 Extended Power Uprate," August 2002.

5. Topical Report NEDE-31096-P-A, "Anticipated Transients Without Scram, Response to NRC ATWS Rule, 10 CFR 50.62," February 1987.

6. Letter from the U.S. Nuclear Regulatory Commission to Mr. Terry A. Pickens, "Acceptance for Referencing of Topical Report NEDE-31096-P, "Anticipated Transients Without Scram; Response to NRC ATWS Rule, 10 CFR 50.62," October 21, 1986.

7. Topical Report NEDE 24011-P-A, “General Electric Standard Application For Reactor Fuel (GESTAR II),” Revision 14.

8. Safety Analysis Report, NEDC-30858, “Brunswick Units 1 and 2 ATWS Assessment,” December 1984.

Principal Contributor: Z. Abdullahi

Date: March 25, 2003

cc:

Mr. William D. Johnson
Vice President and Corporate Secretary
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

Mr. Donald E. Warren
Brunswick County Board of Commissioners
Post Office Box 249
Bolivia, North Carolina 28422

Resident Inspector
U. S. Nuclear Regulatory Commission
8470 River Road
Southport, North Carolina 28461

Mr. John H. O'Neill, Jr.
Shaw, Pittman, Potts & Trowbridge
2300 N Street NW.
Washington, DC 20037-1128

Ms. Beverly Hall, Acting Director
Division of Radiation Protection
N.C. Department of Environment
and Natural Resources
3825 Barrett Dr.
Raleigh, North Carolina 27609-7721

Mr. W. C. Noll
Plant Manager
Carolina Power & Light Company
Brunswick Steam Electric Plant
Post Office Box 10429
Southport, North Carolina 28461

Public Service Commission
State of South Carolina
Post Office Drawer 11649
Columbia, South Carolina 29211

Ms. Margaret A. Force
Assistant Attorney General
State of North Carolina
Post Office Box 629
Raleigh, North Carolina 27602

Mr. Robert P. Gruber
Executive Director
Public Staff - NCUC
4326 Mail Service Center
Raleigh, North Carolina 27699-4326

Mr. C. J. Gannon
Director - Site Operations
Carolina Power & Light Company
Brunswick Steam Electric Plant
Post Office Box 10429
Southport, North Carolina 28461

Mr. Norman R. Holden, Mayor
City of Southport
201 East Moore Street
Southport, North Carolina 28461

Mr. Dan E. Summers
Emergency Management Coordinator
New Hanover County Department of
Emergency Management
Post Office Box 1525
Wilmington, North Carolina 28402

Mr. Terry C. Morton, Manager
Performance Evaluation and
Regulatory Affairs CPB 7
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602-1551

Mr. Edward T. O'Neil
Manager - Support Services
Carolina Power & Light Company
Brunswick Steam Electric Plant
Post Office Box 10249
South Port, North Carolina 28461