CP&L
A Progress Energy Company

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U. S. Nuclear Regulatory Commission
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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
REQUEST FOR LICENSE AMENDMENTS - EXTENDED POWER UPRATE
(NRC TAC NOS. MB2700 AND MB2701)

Ladies and Gentlemen:

On August 9, 2001 (Serial: BSEP 01-0086), Carolina Power & Light (CP&L) Company requested a revision to the Operating Licenses (OLs) and the Technical Specifications for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The proposed license amendments increase the maximum power level authorized by Section 2.C.(1) of OLs DPR-71 and DPR-62 from 2558 megawatts thermal (MWt) to 2923 MWt. Subsequently, on October 10, 2001, the NRC provided an electronic version of a Request For Additional Information (RAI); which was followed by a conference call, on October 11, 2001, regarding the requested information. During the conference call, the questions were clarified and revised accordingly. The responses to the RAI are included in Enclosure 1. Enclosure 2 provides a list of regulatory commitments made in this submittal.

Please refer any questions regarding this submittal to Mr. David C. DiCello, Manager - Regulatory Affairs, at (910) 457-2235.

Sincerely,

John S. Keenan

MAT/mat

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Enclosure:

1. Response to Request For Additional Information (RAI) 3
2. List of Regulatory Commitments

John S. Keenan, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, and agents of Carolina Power & Light Company.

Dean D. Mash
Notary (Seal)

My commission expires: August 29, 2004

cc:

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ENCLOSURE 1

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
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Response to Request For Additional Information (RAI) 3

Background

On August 9, 2001 (Serial: BSEP 01-0086), Carolina Power & Light (CP&L) Company requested a revision to the Operating Licenses (OLs) and the Technical Specifications (TSs) for the Brunswick Steam Electric Plant (BSEP), Units 1 and 2. The proposed license amendments increase the maximum power level authorized by Section 2.C.(1) of OLs DPR-71 and DPR-62 from 2558 megawatts thermal (MWt) to 2923 MWt. Subsequently, on October 10, 2001, the NRC provided an electronic version of a Request For Additional Information (RAI); which was followed by a conference call, on October 11, 2001, regarding the requested information. During the conference call, the questions were clarified and revised accordingly. The responses to the RAI follow.

NRC Question 3-1

> Changes in Emergency and Abnormal Operating Procedures
>
> Section 11.1.2.4 of the PUSAR states that the plant EOPs will be reviewed for any effects of the EPU, and the EOPs will be updated as necessary. Provide a commitment to approve and implement the updated EOPs prior to increasing power above the current rated thermal power of 2558 MWt.

Response to Question 3-1

As an integral part of the Extended Power Uprate (EPU) project, the Emergency Operating Procedures (EOPs) are being reviewed and, where appropriate, are being updated to reflect uprated conditions. Changes made to the EOPs, as a result of the EPU effort, will be approved and implemented prior to raising unit thermal power above 2558 MWt (i.e., the currently licensed rated thermal power (RTP)) on the affected unit.

NRC Question 3-2

Changes to Risk-Important Operator Actions Sensitive to Power Uprate

Section 10.5.3.4 of the PUSAR states that the allowable time for level control actions during the most severe ATWS scenarios is reduced by 3 - 6 minutes given the EPU configuration. Provide a discussion of these operator actions, in particular, the indications that direct the operator to perform the actions, the number of manipulation involved, and direct feedback mechanisms on successful execution.

Response to Question 3-2

As stated in Section 10.5.3.4 for the PUSAR, four operator action basic events, associated with reactor pressure vessel (RPV) water level control during anticipated transient without scram (ATWS) events, were identified for human error probability re-calculation. The basis for the re-calculation was reduced operator response time caused by the increase in decay heat level associated with EPU. Table 1, "Risk-Important Operator Actions Sensitive to Power Uprate," provides the indications that direct the operator to perform the actions, and a discussion of manipulations and direct feedback mechanisms involved.

NRC Question 3-3

Changes to Control Room Controls, Displays and Alarms

Describe any changes the proposed power uprate will have on the operator interfaces for control room controls, displays and alarms. For example, what zone markings (e.g. normal, marginal and out-of-tolerance ranges) on meters will change? What setpoints will change? Describe any controls, displays, alarms that will be upgraded from analog to digital instruments as a result of the proposed power uprate.

Response to Question 3-3

There are no major changes to the control room controls, displays, or alarms as a result of EPU. Some changes are required to the instrumentation spans, alarm settings or actuation setpoints to accommodate increased process conditions or due to the installation of new equipment required for EPU. Where recorders, indicators, or instrumentation are changed to accommodate EPU, digital equipment may be selected where it is deemed technically acceptable. Banding will be reviewed and revised as necessary. The following lists of planned changes constitute planned actions on the part of CP&L. Further evaluations may identify the need for additional modifications or, on the contrary, obviate the need for some modifications. As such, these lists are not a formal commitment to implement the changes exactly as described.

Control board changes that will be implemented for EPU include:

- Feedwater flow indicators will be rescaled.

- Steam flow and feedwater flow recorders will be rescaled.
- The Unit 2 40% steam flow red line indicator on the Mlbs/hr steam flow instruments will be relocated.
- As a result of replacing the existing Power Range Neutron Monitoring (PRNM) system, existing displays, indicators, and controls at the plant operator's panel will be modified. Digital displays will be added and the existing average power range monitor (APRM) joystick bypass switches will be replaced with one optical joystick. The associated upgrade of the thermal-hydraulic stability long-term solution from the existing Boiling Water Reactor Owners' Group (BWROG) Enhanced Option I-A long-term solution to the BWROG Option III solution, will require addition of limited displays on the operator's panel.
- The 140% main steam line high flow trip unit scale will be replaced in the control room backpanel area to indicate higher steam line pressure drops.
- An annunciator window for "Power System Stabilizer Trouble" will be added.
- Instructional aids related to the Containment Atmosphere Control system, the High Pressure Turbine Exhaust Pressure versus Reactor Power relationship, and the Reactor Power versus Reactor Pressure relationship will be updated the on operator's panel.

The following setpoints will be changed to support the first phase of EPU (i.e., approximately 6% increase).

- Main Steam Line High Flow (Delta-P)
- Turbine First Stage Pressure Scram Bypass
- Intermediate Steam Pressure Input to Power Load Unbalance Setpoint
- Exhaust Hood Spray Initiation
- Reactor Feed Pump High Speed Stop
- Reactor Feed Pump Overspeed Trip
- Flow Biased Scram Setpoints from the APRMs
- APRM Trip Logic is changed from 1-out-of-2 taken twice to 2-out-of-4.

Switches, recorders, indicators and setpoints to be changed in the second phase of EPU (i.e., approximately 9% increase) will be based on final conditions. This list may be changed based on observed plant conditions. Anticipated changes include:

- Condensate Polishing flow rate, system differential pressure, and system total flow indication alarm setpoints
- Main Generator MegaWatt Indicator and Recorder
- Main Generator Amps and Volt-Amps indication, alarms, and trips
- Pressure indicators and alarm setpoints for Heater Drain Deaerator Pressure

The following analog to digital upgrades are planned.

- As part of the PRNM replacement, the APRMs will be upgraded from analog to digital equipment.
- The Steam Flow/Feed Flow recorder will be changed from analog to digital equipment in support of a generic plan to update obsolete equipment.
- The existing analog transformer impedance relay protecting the main generator will be replaced with a digital relay. This relay will also provide an additional level of protection, that being generator out-of-step protection. The existing analog impedance relays for each incoming transmission line will be replaced with digital relaying. This relaying also provides out-of-step blocking to maximize the availability of offsite power. An "anticipatory" out-of-step trip of the main generator will also be provided to quickly trip the main generator to preserve the stability of the grid during a generator out-of-step event. The alarms associated with the protection discussed above will be driven by the new digital relaying.

NRC Question 3-4

Changes on the Safety Parameter Display System

Section 11.1.2.4 of the PUSAR states that the Safety Parameter Display System (SPDS) may contain EOP curves and limits, which may be updated, if necessary. Provide a commitment to approve and implement SPDS changes resulting from EPU prior to increasing power above the current rated thermal power of 2558 MWt.

Response to Question 3-4

As a result of the EPU project, a population of the EOP curves and limits may be affected that are included on the SPDS. Any changes in the SPDS relating to the EOPs and resulting from the EPU project will be approved and implemented prior to raising power above 2558 MWt on the affected unit.

NRC Question 3-5

Changes to the Operator Training Program and the Control Room Simulator

Describe how the changes discussed in response to the previous questions will be incorporated into the operator training program and the plant reference control room simulator. Provide the implementation schedule for providing this training and making the required changes to the plant reference control room simulator. Provide a commitment to complete the training and simulator changes resulting from EPU prior to increasing power above the current rated thermal power of 2558 MWt.

Response to Question 3-5

Training Implementation

Brunswick Training Section (BTS) representatives are active in the EPU modification process, including Engineering Service Request reviews, feedback and approval. Designated training personnel in Operations training are responsible for implementing EPU training in accordance with the Systematic Approach to Training process as outlined in BTS procedures. Needs, Job, and Task analyses are being completed for each EPU modification and appropriate training materials are in the process of being generated and/or updated. CP&L's approach has been to introduce operators early and often to the systems and concepts of EPU via Licensed Operator Continuing Training (LOCT). Therefore, training has been scheduled through May 2002 and in some cases has already been presented as early as mid-2001 in LOCT classes. Specifically:

LOCT Cycle 01-3 (May – June, 2001): Conducted training session on the PRNM system, including system overview, power supplies and basic system operation.

LOCT Cycle 01-4 (July – August, 2001): Conducted training sessions on the Oscillation Power Range Monitor portion of PRNM system and on Alternative Source Term.

LOCT Cycle 01-5 (September – October, 2001): Conducted training sessions on APRM portion of PRNM, Alternative Source Term TSs, and Unit Trip Load Shed modification. Included topics in Operator Required Reading for 5A/5B Feedwater Heater and Condensate Filter Demineralizer modifications.

LOCT Cycle 01-6 (October – November, 2001): Conducted training sessions on review of PRNM system and PRNM TSs. Included topics in Operator Required Reading on Main Turbine Two-Arc admission, Reactor Feedpump turbine modification, Isophase Bus Duct Cooling modification and Condensate Cooling modification.

LOCT Cycle 02-1 (January – February, 2002): Scheduled to conduct the following classroom and simulator training topics:

- PRNM
- EPU detailed modifications review*
- EPU procedure changes*
- EPU EOP changes
- "The Strongest Link" (a game show-style review of EPU)*
- Classroom written exam
- PRNM simulator demonstration
- EPU modifications simulator demonstration training
- Plant startup simulator training using new PRNM, including establish heat-up rate, jump to placing first Reactor Feedpump in service, roll main turbine

- Plant shutdown simulator training to exercise General Plant Operating Procedure changes

Note: Items designated by "*" will also be attended by Auxiliary Operators.

LOCT Cycle 02-2 (April – May, 2002): Scheduled to conduct classroom training on 111.7% operation, new setpoints and associated plant modifications. Scheduled to conduct simulator training on power ascension to and operation at 111.7% power including detailed transient response/mitigation training and execution of new Abnormal Operation Procedure and EOP Procedure revisions.

LOCT Cycles 02-3 through 02-6 (i.e., remainder of 2002): Bulk of simulator training will shift to focus on Unit 1 111.7% power operation and transient response/mitigation.

LOCT Annual Dynamic Simulator Exam scheduled for late 2002: Focus will primarily be on Unit 1 111.7% operations.

In addition to LOCT, a new Initial License Class consisting of 12 candidates will begin a 14-month training program in January 2002. These students will receive detailed classroom and simulator training on EPU-related plant modifications during the course of this program and prior to their scheduled NRC initial license examinations in February 2003.

Simulator Modifications

The Brunswick Control Room Simulator is undergoing a two-phase process to install EPU modifications in order to support the above training plan. In December 2001, several plant modifications will be installed in the Control Room Simulator during a scheduled simulator outage to support training for LOCT Cycle 02-1. These modifications include PRNM, Alternative Source Term/Seismic Qualification, High Pressure Turbine, Reactor Feedpump Turbine, Generator Out-Of-Step Relaying, Generator Lockout Load Shed, Feedwater Heater replacement and Electro-Hydraulic-Control Admission Mode. In addition, several non-EPU modifications that interface with planned EPU modifications will also be installed at this time. These include PRNM Recorder Replacement and Main Turbine Stop Valve Logic Change.

In March 2002, in conjunction with the actual Unit 1 plant outage, the Control Room Simulator will undergo an additional outage that will include installation of core model changes necessary to support operation at 111.7% power to support training in LOCT 02-2 through 02-6. Several other EPU modifications will be installed at this time, including Isophase Bus Duct Cooling Upgrade, EPU Modification Setpoint changes, Main Generator Rewind, and Power System Stabilizer.

The above training plans and simulator modifications constitute planned actions on the part of CP&L. Further evaluations may identify the need for additional modifications or, on the contrary, obviate the need for some modifications. As such, the details associated with these plans and schedules are not a formal commitment. CP&L commits to complete the appropriate training and simulator upgrades necessary to support the first phase of EPU prior to increasing

power above the current RTP of 2558 MWt on the affected unit. Any additional training and simulator upgrades necessary to support the second phase of EPU will be completed prior to increasing power above the thermal power level achieved by the first phase of EPU on the affected unit.

Table 1 - Risk-Important Operator Actions Sensitive to Power Uprate		
Description	**Required Operator Actions**	**Comments**
Operator fails to control lowered water level with High Pressure Coolant Injection (HPCI) during an ATWS event.	**Recognition** For an ATWS condition with reactor power > 4%, the ATWS EOP directs the operators to intentionally lower reactor water level to < +90" (i.e., approximately 100" above top of active fuel (TAF)) by terminating and preventing injection from RPV injection sources including HPCI, Condensate/Feedwater, Residual Heat Removal (RHR) system and Core Spray (CS) system. If indications then confirm a direct threat to Primary Containment, the injection sources listed above are kept terminated and prevented until either TAF is reached or reactor power is < 4%. This strategy uses the benefits of negative reactivity from void formation as a means to suppress reactor power. **Manipulations** Securing HPCI is accomplished by one of two means. First, if HPCI has not yet initiated, it is prevented from injecting into the RPV by placing the turbine auxiliary oil pump control switch in pull-to-lock. If HPCI has already initiated, the turbine trip pushbutton is depressed until turbine speed is near zero and re-start is prevented by placing the turbine auxiliary oil pump control switch in pull-to-lock. The HPCI controls and indications are located on the main control board in close proximity to each other. Controls for the other sources that must be terminated and prevented are also on the main control board. A simple, single action is generally all that is required for terminating and preventing flow from these sources. When reactor vessel water level reaches the desired level, HPCI is typically used to prevent further reduction of level. This requires that the auxiliary oil pump control switch be taken out of pull-to-lock and then the flow controller setpoint is adjusted as needed to balance injection flow with the steam flow leaving the vessel. **Confirmation** Immediate task success feedback is available to the operator through main control board flow indications and additional confirmation is achieved when main control board indicators show expected reactor water level response.	The allowable time for level control actions during severe ATWS scenarios at the current RTP is approximately 30 minutes. This time is reduced by 3 to 6 minutes under EPU conditions. As a result, the human error probabilities (HEPs) were conservatively assumed to increase slightly. However, failure to control level via HPCI in itself does not impact core damage frequency (CDF). CDF is only increased if (1) the operators fail to control level with HPCI, which results in automatic depressurization of the reactor, and (2) during subsequent RPV level control using low pressure injection, the operators fail to prevent boron washout.

Table 1 - Risk-Important Operator Actions Sensitive to Power Uprate		
Description	**Required Operator Actions**	**Comments**
Operator fails to control water level with Reactor Core Isolation Cooling (RCIC) during an ATWS.	**Recognition** For an ATWS condition with reactor power > 4%, the ATWS EOP directs the operators to intentionally lower reactor water level to < +90" (i.e., approximately 100" above TAF) by terminating and preventing injection from RPV injection sources including HPCI, Condensate/Feedwater, RHR and CS. If indications then confirm a direct threat to Primary Containment, the injection sources listed above are kept terminated and prevented until either top of active fuel is reached or reactor power is < 4%. This strategy uses the benefits of negative reactivity from void formation as a means to suppress reactor power. After adequate Standby Liquid Control (SLC) solution is injected, the EOPs direct operators to increase vessel level to establish natural circulation and promote boron mixing. **Manipulations** Controls for terminating and preventing injection are on the main control board as previously discussed. For less severe but more probable ATWS events, enough SLC solution may be injected to achieve hot shutdown after the initial terminate and prevent steps, but before reactor vessel water level approaches TAF. If HPCI and Feedwater are not available, the combined injection rate of available low capacity systems (i.e., RCIC, SLC and possibly Control Rod Drive (CRD)) may be sufficient to restore level. Operators would be expected to increase RCIC and CRD flow using controllers on the main control board as needed. **Confirmation** Immediate task success feedback is available to the operator through main control board flow indications and additional confirmation is achieved when main control board indicators show expected reactor water level response.	The allowable time for level control actions during severe ATWS scenarios at the current RTP is approximately 30 minutes. This time is reduced by 3 to 6 minutes under EPU conditions. The probabilistic safety analysis sequences, relying on RCIC operation, are not modeled in sufficient detail such that the affect of change in time available for any specific action could be quantified. Therefore, a simplified, conservative estimate of HEP increase was based on the overall reduction in time available for level control during a severe ATWS.

Table 1 - Risk-Important Operator Actions Sensitive to Power Uprate		
Description	**Required Operator Actions**	**Comments**
Operator fails to preclude boron washout during low pressure injection.	**Recognition** EOPs direct operators to raise RPV water level to the normal band once Hot Shutdown Boron Weight is achieved (i.e., 40% of SLC Storage Tank remaining to be injected) to mix boron. **Manipulations** The low pressure injection sources can be secured using the pump control switch or the flow can be reduced by throttling an injection valve. The actions to be taken are at the main control board. **Confirmation** Individual system flow indicators, pump running lights, valve position lights and reactor vessel level indicators are all on the main control board.	Normal level band would be +170" to +200". If the injection flow rate is not reduced or terminated after +200" is reached, level could increase to above +260" and spill over into the main steam lines. With unborated flow into the vessel and borated flow out of the vessel, boron concentration would be reduced.

ENCLOSURE 2

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
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LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Carolina Power & Light (CP&L) Company in this document. Any other actions discussed in the submittal represent intended or planned actions and are not regulatory commitments. Please notify the Manager - Regulatory Affairs at the Brunswick Steam Electric Plant of any questions regarding this document or any associated regulatory commitments.

Commitment	Schedule
1. Changes made to the Emergency Operating Procedures (EOPs), as a result of the Extended Power Uprate (EPU) effort, will be approved and implemented.	Prior to raising unit thermal power above 2558 megawatts thermal (MWt) on the affected unit.
2. Changes in the Safety Parameter Display System (SPDS) relating to the EOPs and resulting from the EPU project will be approved and implemented.	Prior to raising unit thermal power above 2558 MWt on the affected unit.
3. The appropriate training and simulator upgrades, necessary to support the first phase of EPU, will be completed.	Prior to raising unit thermal power above 2558 MWt on the affected unit.
4. Training and simulator upgrades, necessary to support the second phase of EPU, will be completed.	Prior to increasing power above the thermal power level achieved by the first phase of EPU on the affected unit.