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July 30, 1996

SERIAL: BSEP 96-0271 10 CFR 50.90 TSC 95TSB32

U. S. Nuclear Regulatory Commission ATTN: Document Control Desk Washington, DC 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1 DOCKET NO. 50-325/LICENSE NO. DPR-71 SUPPLEMENT TO REQUEST FOR LICENSE AMENDMENT FUEL CYCLE 11 RELOAD LICENSING (NRC TAC NO. M95263)

Gentlemen:

By letter dated April 8, 1996 (Serial: BSEP 96-0061), Carolina Power & Light Company (CP&L) submitted a license amendment request for revisions to the Technical Specifications for the Brunswick Steam Electric Plant (BSEP), Unit No. 1. The original proposed amendment would revise the Technical Specifications as follows:

Proposed Change 1

Revise the Minimum Critical Power Ratio (MCPR) Safety Limit specified in Technical Specification 2.1.2 from 1.07 to 1.09 for Unit 1 Cycle 11 operation. Also, Technical Specification 5.3.1 to reflect the new fuel type (GE13) that will be inserted during Unit 1 Refueling Outage 10.

Proposed Change 2

Revise the acceptable range of sodium pentaborate concentration for the standby liquid control system shown in Technical Specification Figure 3.1.5-1 to reflect changes to poison material concentration needed to achieve reactor shutdown based on the new GE13 fuel type.

As noted in CP&L's April 8, 1996 license amendment application, General Electric has identified an issue relating to their methodology for calculating generic fuel type safety limit minimum critical power ratios (MCPRs). In the course of calculating a cycle-specific safety limit MCPR for another facility, General Electric determined that the GESTAR II generic calculated safety limit MCPR may be non-conservative when applied to some actual core and fuel designs.

General Electric has conducted a plant-by-plant cycle-specific review of the adequacy of the safety limit minimum critical power ratio for each current operating core. As a result of this review for the Brunswick Plant, General Electric has determined that the cycle-specific safety limit MCPR value for Unit 1 Cycle 11 operation is 0.01 higher than the generic safety limit

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MCPR value for GE13 fuel. Carolina Power & Light Company is submitting this supplement to the Company's April 8, 1996 license amendment application to address the necessary change to the safety limit MCPR for the GE13 fuel type resulting from this General Electric review.

Enclosure 1 provides a revised description of the Proposed Change 1 and the basis for the revised change.

Enclosure 2 details the revised basis for the Company's determination that the revised proposed changes do not involve a significant hazards consideration. For completeness, the enclosed significant hazards evaluation includes discussion of the previously submitted Proposed Change 2 (Proposed Change 2 was described in CP&L's license amendment application dated April 8, 1996 and is unaffected by the General Electric safety limit MCPR revision).

Enclosure 3 provides an environmental evaluation which demonstrates that the revised proposed amendment meets the eligibility for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental assessment needs to be prepared in connection with the issuance of the amendment. No change to this environmental evaluation is required due to the proposed safety limit minimum critical power ratio value changing from 1.09 to 1.10.

Enclosure 4 provides a replacement marked-up Technical Specification page for Unit 1.

Enclosure 5 provides a replacement typed Technical Specification page for Unit 1.

Carolina Power & Light Company is providing, in accordance with 10 CFR 50.91(b), Mr. Dayne H. Brown of the State of North Carolina with a copy of this supplement to the proposed license amendment.

Please refer any questions regarding this submittal to Mr. Mark Turkal at (910) 457-3066.

Sincerely.

William R Carpbell

William R. Campbell

WRM/wrm

Enclosures:

- 1. Revised Basis for Change Request
- 2. Revised 10 CFR 50.92 Evaluation
- 3. Environmental Considerations
- 4. Revised Marked-up Technical Specification Page Unit 1
- 5. Revised Typed Technical Specification Page Unit 1

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William R. Campbell, 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.

R. Midgette Votary (Saal)

My commission expires: Que yest 12, 1996

pc: Mr. Charles A. Patterson Brunswick NRC Senior Resident Inspector

> U. S. Nuclear Regulatory Commission ATTN.: Mr. Stewart D. Ebneter, Regional Administrator, Region II 101 Marietta Street, N.W., Suite 2900 Atlanta, GA 30323-0199

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The Honorable H. Weils Chairman - North Carolina Utilities Commission P.O. Box 29510 Raleigh, NC 27626-0510

ENCLOSURE 1

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1 NRC DOCKET NO. 50-325 OPERATING LICENSE NO. DPR-71 SUPPLEMENT TO REQUEST FOR LICENSE AMENDMENT FUEL CYCLE 11 RELOAD LICENSING (NRC TAC NO. M95263)

REVISED BASIS FOR CHANGES

INTRODUCTION

As discussed in CP&L's April 8, 1996 license amendment application (Reference 1), General Electric has identified an issue relating to their methodology for calculating generic fuel type safety limit minimum critical power ratios (MCPRs). Carolina Power & Light Company is submitting this supplement to the Company's April 8, 1996 license amendment application to address the necessary change to the safety limit MCPR for the GE13 fuel type resulting from further General Electric review of this issue.

The Proposed Change 2 described in CP&L's license amendment application dated April 8, 1996 is unaffected by the General Electric safety limit MCPR revision. Proposed Change 2 revises the acceptable range of the sodium pentaborate concentration for the standby liquid control system shown in Technical Specification Figure 3.1.5-1. Since the basis for Proposed Change 2 does not require revision due to the change to the Unit 1 Cycle 11 safety limit minimum critical power ratio, a repetition of the previously submitted discussion of Proposed Change 2 is not needed and has been omitted from this letter.

PROPOSED CHANGE 1:

Current Requirement

Technical Specification 5.3.1 states:

The reactor core shall contain 560 fuel assemblies limited to the following fuel types: BP8x8R, GE8x8EB, and GE8x8NB-3.

Technical Specification 2.1.2 states:

The MINIMUM CRITICAL POWER RATIO (MCPR) shall not be less than 1.07 with the reactor vessel steam dome pressure greater than 800 psia and core flow greater than 10% of rated flow.

Proposed Change (Revised)

Incorporate the GE13 fuel type into Technical Specification 5.3.1 and, as a result, revise the safety limit minimum critical power ratio (MCPR) specified in Technical Specification 2.1.2 from 1.07 to 1.10.

Basis For Proposed Change (Revised)

The fuel types that have been reviewed and approved by the Nuclear Regulatory Commission (NRC) staff for use in Brunswick Unit 1 reactor cores are listed in Technical Specification 5.3.1. At present, the BP8x8R, GE8x8EB, and GE8x8NB-3 fuel types have been approved by the NRC. For Unit 1 Cycle 11 operation, Carolina Power & Light Company (CP&L) plans to use the GE13 fuel type as reload fuel; therefore, revisions to Technical Specifications 5.3.1 and 2.1.2 are being proposed to reflect the planned use of this new fuel design.

The GE13 design is similar to the GE11 fuel design, which has been previously reviewed and accepted by the NRC and is in use at numerous U.S. reactors. The major difference between the GE11 and GE13 designs is the GE13 fuel assembly has eight spacers with the part length rods terminating above the sixth spacer, whereas the GE11 fuel assembly has seven spacers with the part length rods terminating just above the fifth spacer. As a result, the part length rods in the GE13 fuel assembly are slightly longer than the part length rods in the GE11 assembly. Adding an extra spacer in the upper region of the fuel assembly results in an increased critical power capability for identical thermal-hydraulic conditions. Based on the similarity of the GE11 and GE13 fuel designs, by letter from J. F. Klapproth (GE) to the NRC Document Control Desk dated December 30, 1993 (Reference 2), General Electric has informed the NRC that the GE13 fuel type is considered equivalent to a formally NRC licensed design.

General Electric has determined that the GE13 fuel bundles provide a significantly flatter power distribution than the similarly designed limiting GE11 bundle with a corresponding impact on the satety limit minimum critical power ratio value. Because of this uniformity in critical power capability, when the most limiting fuel rod in a bundle experiences boiling transition, the margin to boiling transition of the remaining rods is reduced.

As stated above, the planned use of the GE13 fuel design beginning with the next Unit 1 operating cycle (Cycle 11) requires the revision of the safety limit minimum critical power ratio (MCPR). The safety limit minimum critical power ratio is established to protect the integrity of the fuel cladding during normal operation and anticipated transients, as required by Criterion 10 of 10 CFR Part 50, Appendix A. As such, the safety limit minimum critical power ratio bounds the acceptable consequences of anticipated operational transients (i.e., the safety limit minimum critical power ratio is defined to assure that 99.9 percent of the fuel rods avoid boiling transition during normal operation and anticipated operational transients, when all uncertainties are considered).

General Electric Nuclear Energy (GE) document NEDE-24011-P-A, "General Electric Standard Application For Reactor Fuel (GESTAR-II)," through the latest NRC-approved amendment, provides the latest acceptance criteria for new GE fuel designs (Reference 2). By letter dated May 24, 1996 (Reference 3), General Electric notified the NRC of a reportable condition in accordance with 10 CFR Part 21. In the course of calculating a cycle-specific safety limit MCPR for another facility, General Electric determined that the GESTAR-II generic calculated safety limit MCPR may be non-conservative when applied to some actual core and fuel designs. Following discussions between General Electric and the NRC staff, General Electric prepared and submitted Revision 12 to NEDE-24011 to describe methods to be used in calculating cyclespecific safety limit MCPR values (Reference 4).

General Electric has performed a cycle-specific calculation of the safety limit MCPR for Unit 1 Cycle 11 operation based on the methodology provided in Revision 12 of NEDE-24011. Based on this calculation, CP&L proposes to revise the safety limit minimum critical power ratio value to 1.10 for Brunswick Unit 1 Cycle 11 instead of the originally proposed safety limit MCPR value of 1.09.

The proposed safety limit MCPR value of 1.10 will assure that 99.9 percent of the fuel rods avoid boiling transition during a transient event when all uncertainties are considered. Thus, the new safety limit minimum critical power ratio value of 1.10 maintains the same degree of conservatism as that for the previous safety limit minimum critical power ratio. For the currently approved fuel types that will be carried over to the upcoming Unit 1 Cycle 11 reactor core, the proposed revision of the safety limit minimum critical power ratio is conservative.

While in the reactor core, fuel bundles interact with the control blades. Spacers on the channeled bundles maintain an acceptable spacing between bundles to allow control blade movement. Buttons or rollers on the blades are guided by the channels. The new GE13 fuel bundles (channeled) have the same outer dimensions as the current GE10 fuel bundles (e.g., GE8x8NB-3), and provide an equivalent response with regard to control blade movement and interaction.

The radiological consequences of a fuel handling accident involving the new GE13 fuel type were evaluated. The GE13 fuel type will be operated to a higher burn-up than the current fuel types. Aithorach the Technical Specifications do not contain a limit for maximum fuel burn-up, the Nuclear Regulatory Commission has established a 60,000 MWD/MT burn-up limit on the peak rod (Reference 6). This extended burn-up evaluation was performed for the original 7x7 fuel type, which bounds the later 8x8 fuel types. General Electric has demonstrated the radiological consequences of a fuel handling accident with the new GE13 fuel type (a 9x9 fuel type) will be less than a similar accident involving the original 7x7 fuel type (Reference 7). Thus, the consequences of extended burn-up of the GE13 fuel type are bounded by current analyses.

References:

- Letter from William Levis (CP&L) to NRC Document Control Desk dated April 8, 1996, "Request for License Amendment Fuel Cycle 11 Reload Licensing."
- General Electric Nuclear Energy Document NEDE-24011-P-A-11, "General Electric Standard Application for Reactor Fuel (GESTAR-II)," November 1995.
- Letter from M. A. Smith (General Electric) to the U.S. Nuclear Regulatory Commission Document Control Desk dated May 24, 1996, "10CFR Part 21, Reportable Condition, Safety Limit MCPR Evaluations."
- Letter from R. J. Reda (General Electric) to the U.S. Nuclear Regulatory Commission Document Control Desk dated May 24, 1996, "Revision 12 to GESTAR and It's United States Supplement."
- Letter from J. Klapproth (General Electric) to the U.S. Nuclear Regulatory Commission dated December 30, 1993, "Completion of GE13 Licensing Qualification."
- U.S. Nuclear Regulatory Commission letter dated February 6, 1988, Issuance of Amendment No. 124 to Facility Operating License No. DPR-62, Brunswick Steam Electric Plant, Unit 2 Regarding Fuel Cycle No. 8 - Reload Extended Burnup Fuel (TAC No. 69200).

7. General Electric Nuclear Energy Document NEDE-32198P, "GE13 Compliance With Amendment 22 of NEDE-24011-P-A (GESTAR II)," December 1993.

ENCLOSURE 2

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1 NRC DOCKET NO. 50-325 OPERATING LICENSE NO. DPR-71 SUPPLEMENT TO REQUEST FOR LICENSE AMENDMENT FUEL CYCLE 11 RELOAD LICENSING (NRC TAC NO. M95263)

10 CFR 50.92 EVALUATION (REVISED)

The Commission has provided standards in 10 CFR 50.92 for determining whether a significant hazards consideration exists. A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. Carolina Power & Light Company has reviewed this proposed license amendment request and believes that its adoption would not involve a significant hazards consideration. The basis for this determination follows.

1. The proposed license amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

Proposed Change 1:

The proposed license amendment will allow the loading and use of GE13 fuel assemblies in the Brunswick Unit 1 reactor core. The use of GE13 fuel assemblies requires that the safety limit minimum critical power ratio value also be revised. The safety limit minimum critical power ratio is established to maintain fuel cladding integrity during operational transients. The GE13 fuel assembly design has been analyzed using methods that have been previously approved by the Nuclear Regulatory Commission and documented in General Electric Nuclear Energy's reload licensing methodology Topical Report NEDE-24011, "General Electric Standard Application for Reactor Fuel (GESTAR II)." Based on a cycle-specific calculation performed by General Electric, a safety limit minimum critical power ratio value of 1.10 has been established for the GE13 fuel type for Brunswick Unit 1 Cycle 11 operation. The cycle-specific calculation has been performed in accordance with the methodology in Revision 12 of NEDE-24011. This cyclespecific calculation has demonstrated that a safety limit minimum critical power ratio value of 1.10 will ensure that 99.9 percent of the fuel rods avoid boiling transition during a transient event when all uncertainties are considered. The safety limit minimum critical power ratio value of 1.10 assures that fuel cladding protection equivalent to that provided with the existing safet, limit minimum critical power ratio value is maintained. This ensures that the consequences of previously evaluated accidents are not significantly increased.

The proposed revision of the safety limit minimum critical power ratio does not alter any plant safety-related equipment, safety function, or plant operations that could change the probability of an accident. The change does not affect the design, materials, or construction standards applicable to the fuel bundles in a manner that could change the probability of an accident.

Proposed Change 2:

The standby liquid control system provides a means of reactivity control that is independent of the normal reactivity control system. The standby liquid control system must be capable of assuring that the reactor core can be placed in a subcritical condition at any time during reactor core life. Technical Specification Figure 3.1.5-1 specifies the acceptable range of concentrations and volumes for sodium pentaborate solution used as a neutron absorber (i.e., for reactivity control). The portion of the sodium pentaborate concentration range shown in Technical Specification Figure 3.1.5-1 applicable to the lower range of tank volumes is being revised to increase the required concentration of sodium pentaborate solution. This change is needed to account for the additional shutdown reactivity needed based on the planned use of GE13 fuel assemblies as reload fuel for the Unit 1 reactor core. Since the standby liquid control system is independent from the normal means of controlling reactor core reactivity and not used to control core reactivity during normal plant operations, the proposed revision to the sodium pentaborate concentration curve for the standby liquid control system does not alter any plant safety-related equipment, safety function, or plant operations that could change the probability of an accident.

The current volume-concentration range of sodium pentaborate used in the standby liquid control system will achieve a sufficient concentration of boron in the reactor vessel to ensure reactor shutdown. Based on the increased reactivity of the new GE13 reload fuel assemblies, the required sodium pentaborate volume-concentration range is being revised to ensure sufficient neutron absorbing solution is available to achieve reactor shutdown; therefore, the consequences of an accident previously evaluated are not significantly increased.

 The proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.

Proposed Change 1:

The GE13 fuel assembly has been designed and complies with the acceptance criteria contained in General Electric Nuclear Energy's standard application for reactor fuel (GESTAR-II), which provides the latest acceptance criteria for new General Electric fuel designs. The similarity of the GE13 fuel design to the previously accepted GE11 fuel design, in conjunction with the increased critical power capability of the GE13 fuel design, ensure that no new mode or condition of plant operation is being authorized by the loading and use of the GE13 fuel type. The proposed revision of the safety limit minimum critical power ratio from 1.07 to 1.10 does not modify any plant controls or equipment that will change the plant's responses to any accident or transient as given in any current analysis. Therefore, the proposed change to allow the loading and use of the GE13 fuel type and the revision of the safety limit minimum critical power ratio value from 1.07 to 1.10 will not create the possibility for a new or different kind of accident from any accident previously evaluated.

Proposed Change 2:

As discussed above, the standby liquid control system provides a means of reactivity control that is independent of the normal reactivity control system and is capable of

assuring that the reactor core can be placed in a subcritical condition at any time during reactor core life. The proposed revision to the sodium pentaborate concentration range does not modify the standby liquid control system or its controls, does not modify other plant systems and equipment, and does not permit a new or different mode of plant operation. As such, the proposed revision to the minimum pentaborate concentration value does not create the possibility of a new or different xind of accident from any accident previously evaluated.

 The proposed license amendment does not involve a significant reduction in a margin of safety.

Proposed Change 1:

As previously discussed, the GE13 fuel assembly design has been analyzed using methods that have been previously approved by the Nuclear Regulatory Commission and documented in General Electric Nuclear Energy's reload licensing methodology Topical Report NEDE-24011, "General Electric Standard Application for Reactor Fuel (GESTAR II)." The safety limit minimum critical power ratio value is selected to maintain the fuel cladding integrity safety limit (i.e., that 99.9 percent of all fuel rods in the core are expected to avoid boiling transition during operational transients). Appropriate operating limit minimum critical power ratio values are established, based on the safety limit minimum critical power ratio value, to ensure that the fuel cladding integrity safety limit. The operating limit minimum critical power ratio values are equired by Technical Specification 6.9.3.1.

Based on the cycle-specific calculation performed by General Electric, a safety limit minimum critical power ratio value of 1.10 has been established for the GE13 fuel type for Unit 1 Cycle 11 operation. This cycle-specific calculation has been performed based on the methodology contained in Revision 12 of NEDE-24011-P-A. The new GE13 safety limit minimum critical power ratio value of 1.10 for Unit 1 Cycle 11 operation is based on the same fuel cladding integrity safety limit criteria as that for the GE11 safety limit minimum critical power ratio (i.e., that 99.9 percent of all fuel rods in the core are expected to avoid boiling transition during operational transients); therefore, the proposed change does not result in a significant reduction in the margin of safety.

Propi sed Change 2:

As previously stated, the purpose of the standby liquid control is to inject a neutron absorbing solution into the reactor in the event that a sufficient number of control rods cannot be inserted to maintain subcriticality. Sufficient solution is to be injected such that the reactor will be brought from maximum rated power conditions to subcritical over the entire reactor temperature range from maximum operating to cold shutdown conditions. General Electric methodology establishes a fuel type dependent standby liquid control system shutdown margin to account for calculational uncertainties. General Electric calculations show that an in-vessel concentration of 660 ppm will provide a standby liquid control system minimum shutdown margin in excess of the 3.2% Ak value required for the GE13 fuel. To achieve an in-vessel concentration of 660 ppm, the acceptable range of standby liquid control system tank concentrations is being revised for the lower range of tank volumes. Thus, the proposed revision of the standby liquid control system sodium pentaborate volume-concentration range ensures that there will not be a significant

reduction in the amount of available shutdown margin and, therefore, not a significant reduction in the margin of safety.

ENCLOSURE 3

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1 NRC DOCKET NO. 50-325 OPERATING LICENSE NO. DPR-71 SUPPLEMENT TO REQUEST FOR LICENSE AMENDMENT FUEL CYCLE 11 RELOAD LICENSING (NRC TAC NO. M95263)

ENVIRONMENTAL CONSIDERATIONS

10 CFR 51.22(c)(9) provides criterion for and identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (3) result in an increase in individual or cumulative occupational radiation exposure. Carolina Power & Light Company has reviewed this request and believes that the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement of environmental assessment needs to be prepared in connection with the issuance of the amendment. The basis for this determination follows.

- This amendment does not involve a significant hazards consideration, as shown in Enclosure 2.
- 2. The proposed license amendment does not result in a significant change in the types or a significant increase in the amounts of any effluent that may be released offsite. The proposed license amendment does not introduce any new equipment nor does it require any existing equipment or systems to perform a different type of function than they are presently designed to perform. The proposed license amendment does not alter the function of existing equipment and will ensure that the consequences of any previously evaluated accident do not increase. Therefore, CP&L has concluded that there will not be a significant increase in the types or amounts of any effluent that may be released offsite and, as such, does not involve irreversible environmental consequences beyond those already associated with normal operation.
- This amendment does not result in an increase in individual or cumulative occupational radiation exposure.