

September 5, 1997

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

SUBJECT: ISSUANCE OF AMENDMENT NO. 187 TO FACILITY OPERATING LICENSE NO. DPR-71 AND AMENDMENT NO. 218 TO FACILITY OPERATING LICENSE NO. DPR-62 REGARDING A CHANGE IN THE METHODOLOGY FOR DETECTING A REACTIVITY ANOMALY - BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 (TAC NOS. M97688 AND M97689)

Dear Mr. Hinnant:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 187 to Facility Operating License No. DPR-71 and Amendment No. 218 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant, Units 1 and 2. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated December 4, 1996.

The amendments revise the approach in TS 3/4.1.2 for determining a reactivity anomaly by changing from control rod density comparison to direct comparison of reactivity status.

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

Sincerely,

Original signed by:

David C. Trimble, Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-325
and 50-324

Enclosures:

1. Amendment No. 187 to License No. DPR-71
2. Amendment No. 218 to License No. DPR-62
3. Safety Evaluation

cc w/enclosures: See next page
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DTrimble <i>DT</i>	EDunnington <i>ETD</i>	<i>M2/mmg</i>	GEdison <i>9/14/97</i>	
8/14/97	8/13/97	8/25/97	8/14/97	
Yes/No	Yes/No	Yes/No	Yes/No	

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Mr. C. S. Hinnant
Carolina Power & Light Company

Brunswick Steam Electric Plant
Units 1 and 2

cc:

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AMENDMENT NO. 187 TO FACILITY OPERATING LICENSE NO. DPR-71 - BRUNSWICK, UNIT 1
AMENDMENT NO. 218 TO FACILITY OPERATING LICENSE NO. DPR-62 - BRUNSWICK, UNIT 2

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cc: Brunswick Service List



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 187
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 December 4, 1996, 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:

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(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 187, 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 within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Gordon Edison, Acting Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 5, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 187

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Remove Pages

3/4 1-2

B3/4 1-1

Insert Pages

3/4 1-2

B3/4 1-1

REACTIVITY CONTROL SYSTEMS

3/4.1.2 REACTIVITY ANOMALIES

LIMITING CONDITION FOR OPERATION

3.1.2 The reactivity difference between the actual core k_{eff} and the predicted core k_{eff} shall not exceed 1% $\Delta k/k$.

APPLICABILITY: CONDITIONS 1 and 2.

ACTION:

With the reactivity different by more than 1% $\Delta k/k$:

- a. Perform an analysis to determine and explain the cause of the reactivity difference; operation may continue if the difference is explained and corrected, or
- b. Be in HOT SHUTDOWN within 12 hours. Submit a Special Test Program to the Commission describing the methods to be used to determine the cause and magnitude of the reactivity difference.

SURVEILLANCE REQUIREMENTS

4.1.2 The core k_{eff} shall be predicted and compared to the actual core k_{eff} for selected operating conditions:

- a. During the first start-up following CORE ALTERATIONS, and
- b. At least once per effective full power month during POWER OPERATION.

3/4.1 REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.1 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

Since core reactivity values will vary through core life as a function of fuel depletion and poison burnup, the demonstration of SHUTDOWN MARGIN will be performed in the cold xenon-free condition and shall show the core to be subcritical by at least $R + 0.38\% \Delta k/k$. The value of R in units of $\% \Delta k/k$ is the difference between the calculated value of maximum core reactivity during the operating cycle and the calculated beginning-of-life core reactivity. The value of R must be positive or zero and must be determined for each fuel loading cycle. Satisfaction of this limitation can be best demonstrated at the time of fuel loading, but the margin must be determined anytime a control rod is incapable of insertion.

During the SPIRAL RELOAD deviations from the scheduled core loading are permitted in order to achieve the required 3 cps needed to gain SRM operability provided the cold reactivities (zero voids) of the fuel bundles temporarily loaded around the SRMs are individually less than that of the respective bundles scheduled for those locations. The cold shutdown margin calculation performed for the scheduled core loading bounds the partially loaded core during the SPIRAL RELOAD process.

This reactivity characteristic has been a basic assumption in the analysis of plant performance and can best be demonstrated at the time of fuel loading, but the margin must also be determined anytime a control rod is incapable of insertion.

3/4.1.2 REACTIVITY ANOMALIES

Accurate prediction of core reactivity is either an explicit or implicit assumption in the accident analysis evaluations. Comparing predicted versus measured core reactivity validates the nuclear methods used in the safety analysis and supports the SHUTDOWN MARGIN demonstrations in assuring the reactor can be brought safely to cold, subcritical conditions. A 1% change is larger than is expected for normal operation so a change of this magnitude should be thoroughly evaluated.

"During the first startup following CORE ALTERATIONS" implies that the specified surveillance should be performed upon the initial attainment of a high equilibrium power level, preferably of at least 90% of RATED THERMAL POWER, during the unit startup.

3/4.1.3 CONTROL RODS

The specifications of this section ensure that 1) the minimum SHUTDOWN MARGIN is maintained, 2) the control rod insertion times are consistent with those used in the accident analysis, and 3) the



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 218
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 December 4, 1996, 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. 218, 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 within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Gordon Edison, Acting Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 5, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 218

FACILITY OPERATING LICENSE NO. DPR-62

DOCKET NO. 50-324

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Remove Pages

3/4 1-2

B3/4 1-1

Insert Pages

3/4 1-2

B3/4 1-1

REACTIVITY CONTROL SYSTEMS

3/4.1.2 REACTIVITY ANOMALIES

LIMITING CONDITION FOR OPERATION

3.1.2 The reactivity difference between the actual core k_{eff} and the predicted core k_{eff} shall not exceed 1% $\Delta k/k$.

APPLICABILITY: CONDITIONS 1 and 2.

ACTION:

With the reactivity different by more than 1% $\Delta k/k$:

- a. Perform an analysis to determine and explain the cause of the reactivity difference; operation may continue if the difference is explained and corrected, or
- b. Be in HOT SHUTDOWN within 12 hours. Submit a Special Test Program to the Commission describing the methods to be used to determine the cause and magnitude of the reactivity difference.

SURVEILLANCE REQUIREMENTS

4.1.2 The core k_{eff} shall be predicted and compared to the actual core k_{eff} for selected operating conditions:

- a. During the first start-up following CORE ALTERATIONS, and
- b. At least once per effective full power month during POWER OPERATION.

3/4.1 REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.1 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

Since core reactivity values will vary through core life as a function of fuel depletion and poison burnup, the demonstration of SHUTDOWN MARGIN will be performed in the cold xenon-free condition and shall show the core to be subcritical by at least $R + 0.38\% \text{ delta k/k}$. The value of R in units of $\% \text{ delta k/k}$ is the difference between the calculated value of maximum core reactivity during the operating cycle and the calculated beginning-of-life core reactivity. The value of R must be positive or zero and must be determined for each fuel loading cycle. Satisfaction of this limitation can be best demonstrated at the time of fuel loading, but the margin must be determined anytime a control rod is incapable of insertion.

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This reactivity characteristic has been a basic assumption in the analysis of plant performance and can best be demonstrated at the time of fuel loading, but the margin must also be determined anytime a control rod is incapable of insertion.

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Accurate prediction of core reactivity is either an explicit or implicit assumption in the accident analysis evaluations. Comparing predicted versus measured core reactivity validates the nuclear methods used in the safety analysis and supports the SHUTDOWN MARGIN demonstrations in assuring the reactor can be brought safely to cold, subcritical conditions. A 1% change is larger than is expected for normal operation so a change of this magnitude should be thoroughly evaluated.

"During the first startup following CORE ALTERATIONS" implies that the specified surveillance should be performed upon the initial attainment of a high equilibrium power level, preferably of at least 90% of RATED THERMAL POWER, during the unit startup.

3/4.1.3 CONTROL RODS

The specifications of this section ensure that 1) the minimum SHUTDOWN MARGIN is maintained, 2) the control rod insertion times are consistent with those used in the accident analysis, and 3) the



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 187 TO FACILITY OPERATING LICENSE NO. DPR-71
AND AMENDMENT NO. 218 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 December 4, 1996 (Ref. 1) Carolina Power & Light Company (CP&L) proposed a change, for the Brunswick Steam Electric Plant, Units 1 and 2 (BSEP 1 & 2), to the approach to be used for calculating the reactivity anomaly specified in Technical Specification (TS) 3/4.1.2, "Reactivity Anomalies." This anomaly, if it exists, is currently indicated as being the difference between the predicted and measured control rod density in the reactor under the existing conditions, e.g. time in cycle, power level and control rod pattern. This is then translated into a reactivity difference between the two values to compare with the specification limit of 1 percent delta K_{eff} . If the limit is exceeded the cause must be explained or the reactor placed in hot shutdown within 12 hours. This comparison must be made during the first startup following core alterations and at least once per full power month during power operation. The proposed change to the TS would eliminate the translations of reactivity into control rod densities. It would instead use comparison of existing and predicted K_{eff} directly. The only change to TS 3/4.1.2 would be to the words "Rod Density," which would be replaced, wherever they appeared in the TS, by "Core K_{eff} ."

2.0 DISCUSSION AND EVALUATION

The change in approach takes advantage of the new plant process computer and reactor calculation software program, which can gather reactor status data directly and calculate the reactivity status. This provides a more direct and accurate method for comparing "predicted" (calculated) K_{eff} and the existing K_{eff} (which equals 1.00 for steady state operation). The current method requires prior calculations and approximations for the control rod density predictions. These can produce error in the comparison methodology. This will not occur in the revised approach, in which the calculations are done with correct information for the control rod configuration, as well as improved information for other significant parameters such as power distribution and burnup. The basic concept of the TS has not been changed in this change. There is still a comparison of a calculated and an observed reactor reactivity state. A better calculation has replaced one providing a relatively crude analysis of the control rod reactivity status. This is an acceptable change. The Bases for TS 3/4.1.2 have been modified to provide a

clearer statement of the reason for the comparison addressed in the TS. The change is acceptable.

In summary, the NRC staff has reviewed the request by CP&L to revise the BSEP 1 & 2 TS and Bases 3/4.1.2. Based on the review, the staff concludes that these revisions are acceptable and will provide an improved approach for the determination of reactivity anomalies required by this TS.

3.0 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.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change a surveillance requirement. 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 (62 FR 11484). 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.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

6.0 REFERENCES

1. W.R. Campbell, Carolina Power & Light Co., letter to U.S. Nuclear Regulatory Commission, December 4, 1996.

Principal Contributor: H. Richings

Date: September 5, 1997