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WGammill
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BGrimes
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SSheppard
JHannon
Atty, OELD
OI&E (5)
BJones (8)
Scharf (10)
DBrinkman
ACRS (16)
OPA (CMiles)
RDiggs
JRBuchanan
TERA

SEPTEMBER 21 1979

Docket Nos. 50-325
and 50-324

Mr. J. A. Jones
Executive Vice President
Carolina Power & Light Company
336 Fayetteville Street
Raleigh, North Carolina 27602

Dear Mr. Jones:

The Commission has issued the enclosed Amendment No. 25 to Facility Operating License No. DPR-71 for the Brunswick Steam Electric Plant, Unit No. 1. This amendment consists of changes to the Technical Specifications in response to your request dated September 11, 1979, as supplemented by letter dated September 18, 1979.

This amendment revises the minimum critical power ratio (MCPR) for fuel bundle LJ0197, which is misoriented by 180°. This revision will ensure conservative operation for Cycle 2 in accordance with the reload analysis.

We are also including a corrected Technical Specification page 3/4 3-65 for BSEP Units 1 and 2 which was inadvertently omitted from our previous transmittal dated August 21, 1979. Please replace the previous pages 3/4 3-65 with the enclosed corrected pages for each unit's Technical Specifications.

Copies of the Safety Evaluation and Notice of Issuance are also enclosed.

Sincerely,

V. Rooney for

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

REGULATORY DOCKET FILE COPY

CP

Enclosures:
1. Amendment No. 25 to DPR-71
2. Safety Evaluation
3. Notice
4. Pages 3/4 3-65

cc w/enclosures: See page 2

ORB ##3
*PKreutzer
9/21/79

*SEE PREVIOUS YELLOW FOR CONCURRENCES

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OFFICE	ORB #3	AD:ORP	OELD	ORB #3
SURNAME	JHannon:mjf	WGammill		TIppolito
DATE	9/ /79	9/ 79	9/ /79	9/ /79

NC FORM 318 (9-76) NRCM 0240 ★ U.S. GOVERNMENT PRINTING OFFICE: 1978 - 265 - 769

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cc:

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P. O. Box 249
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Denny McGuire (Ms)
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Division of Policy Development
116 West Jones Street
Raleigh, North Carolina 27603

Southport - Brunswick County Library
109 W. Moore Street
Southport, North Carolina 28461

Director, Technical Assessment Division
Office of Radiation Programs (AW-459)
US EPA
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Arlington, Virginia 20460

U. S. Environmental Protection Agency
Region IV Office
ATTN: EIS COORDINATOR
345 Courtland Street, N. W.
Atlanta, Georgia 30308

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

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 25
License No. DPR-71

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

   A. The application for amendment by Carolina Power & Light Company (the licensee) dated September 11, 1979, 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 A, as revised through Amendment No. 25, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 21, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 25

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

Replace the following pages of the Technical Specifications contained in Appendix A of the above-indicated license with the attached pages. The changed area of the revised page is reflected by a marginal line.

Remove	Insert
3/4 2-7	3/4 2-7
3/4 2-8*	3/4 2-8*

*Overleaf pages - no change

3/4.2.3 MINIMUM CRITICAL POWER RATIO

LIMITING CONDITION FOR OPERATION

3.2.3 The MINIMUM CRITICAL POWER RATIO (MCPR), as a function of core flow, shall be equal to or greater than MCPR x the K_f shown in Figure 3.2.3-1 where: ***

a. MCPR = 1.22 from BOC2* to (EOC2** - 2000 MWD/t).

b. MCPR = 1.23 from (EOC2 - 2000 MWD/t) to (EOC2 - 1000 MWD/t).

c. MCPR = 1.28 from (EOC2 - 1000 MWD/t) to EOC2.

APPLICABILITY: CONDITION k, when THERMAL POWER $\geq$ 25% RATED THERMAL POWER

ACTION:

With MCPR less than the applicable limit determined from Figure 3.2.3-1, initiate corrective action within 15 minutes and continue corrective action so that MCPR is equal to or greater than the applicable limit within 4 hours or reduce THERMAL POWER TO LESS THAN 25% of RATED THERMAL POWER within the next 4 hours.

SURVEILLANCE REQUIREMENTS

4.2.3 MCPR shall be determined to be equal to or greater than the applicable limit determined from Figure 3.2.3-1:

a. At least once per 24 hours,

b. Whenever THERMAL POWER has been increased by at least 15% of RATED THERMAL POWER and steady state operating conditions have been established, and

c. Initially and at least once per 12 hours when the reactor is Operating with a LIMITING CONTROL ROD PATTERN for MCPR.

*Beginning of Cycle 2.
**End of Cycle 2.
***The operating MCPR for bundle LJ0197 shall be adjusted by subtracting the following correction factors from the calculated values:
a-0.11, b-0.12, c-0.13

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 25 TO FACILITY OPERATING LICENSE NO. DPR-71

CAROLINA POWER AND LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1

DOCKET NO. 50-325

1.0 Introduction and Chronology

In a letter dated September 11, 1979, Carolina Power and Light Company requested a Technical Specification change for MCPR limits at the Brunswick Nuclear Power Plant Unit No. 1. The reason for the change in MCPR limits was because a fuel bundle loading error had been discovered in the cycle 2 core while reviewing the core loading tapes. The chronology of the actions taken following this event are as follows:

On August 28, 1979, Carolina Power and Light Company (CP&L) identified the presence of a misoriented fuel bundle in the core for cycle 2 of the Brunswick Steam Electric Plant, Unit No. 1 (BSEP-1). At that time the plant was operating at 90.5% power (Reference 1). CP&L immediately imposed an administrative 9.7 KW/ft Linear Heat Generation Rate Limit (LHGR) and increased the operating limit MCPR to 1.45 on the misoriented bundle. CP&L contacted General Electric (GE) on the same day. GE recommended observing an LHGR limit to 9.7 KW/ft, and Minimum Critical Power Ratio (MCPR) of 1.38 pending a more detailed evaluation of the problem. CP&L imposed the GE recommended operational limits, which resulted in 88% power, on August 28, 1979.

On August 29, 1979, an NRC I&E inspector contacted NRCs Project Manager of BSEP-1 to verify NRC acceptance of the proposed GE limits (Reference 2). A staff review of the reload analysis for BSEP-1 cycle 2 operation (Reference 3) showed that the proposed GE limits included adequate conservatism to account for a "worst case" misloading. The NRC Project Manager informed the NRC I&E inspector on August 29, 1979 that the proposed GE limits were acceptable and that these limits should be maintained until a more detailed analysis and review was completed.

On August 30, 1979 the NRC staff discussed the BSEP-1 misloading event with the CP&L staff (Reference 4). This discussion revealed that fuel bundle LJ0197 located at core position 29-10 was rotated 180° from its correct orientation. The misoriented fuel assembly was not a fresh fuel bundle and therefore was bounded by the "worst case" misloading analyzed in the reload analysis. CP&L stated that they expected the results of GEs reanalysis in early September.

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On September 12, 1979, CP&L telecopied Reference 5 to the NRC staff. Reference 5 contained the results of GEs reanalysis of the CP&L misloading event, and the proposed Technical Specification change to remedy the effects of the misoriented fuel bundle.

2.0 Discussion

The Fuel Loading Error (FLE) discussed herein addresses only the misoriented bundle observed at BSEP-1. The FLE analyzed in the reload submittal is considered a low probability accident condition. However, in this case a FLE actually occurred. Thus, we have reassessed the effects of this particualr FLE on the steady state operations, the most severe operational transients, and other hypothetical accidents.

The following sections describe our evaluation of the reanalysis submitted by CP&L. In addition to discussing the reanalysis submitted by CP&L, this report references other specific information obtained via telephone conversations with the CP&L staff.

3.0 Evaluation

3.1 Nuclear Characteristics

3.1.1 Shutdown Margin

CP&L stated that control rod (30-11) which is adjacent to the misoriented fuel assembly was not exercised in the startup program tests of the shutdown margin (Reference 1). The closest rod exercised during the shutdown margin was two diagonal fuel bundles removed from the misoriented fuel bundle. The loose neutronic coupling of the core will minimize the effects of this misoriented fuel bundle on the shutdown margin test results. The staff agreed with this determination by GE and CP&L in support of continued operation at the reduced limits. The results of GEs reanalysis confirmed our earlier determination (Reference 6, 9).

3.2 Thermal Hydraulics

3.2.1 Operating Limit MCPR

Although a FLE is an accident condition, it is sufficient for safety to treat it against transient criteria. Thus, it is acceptable that the Minimum Critical Power Ratio (MCPR) resulting from a fuel loading error be no less than the safety limit MCPR, e.g., 1.07. The safety limit MCPR assures that during transients 99.9% of the fuel rods in the core will avoid transition boiling, and that transition boiling will not occur during steady state operations.

GE has determined that the fuel loading error at BSEP-1 involving a 180° rotation of fuel bundle LJ0197, located at core position 29-10, does not significantly affect the core-wide transients. However GE has determined that local ΔCPR adjustments to the calculated CPR of the misoriented fuel bundle will maintain this fuel bundle within acceptable safety limits. GE calculated exposure-dependent ΔCPRs which include the 0.02 ΔCPR allowance required by NRC to allow for the axially varying water gap. The operating MCPR for fuel bundle LJ0197 will be adjusted by subtracting the following ΔCPRs from the calculated MCPRs for that fuel bundle.

Exposure	Adjustment ΔCPR
(BOC-2) to (EOC-2) - 2000 MWd/T	0.11
(EOC-2) - (2000 MWd/T) to (EOC-2) - (1000 MWd/T)	0.12
(EOC-2) - (1000 MWd/T) to (EOC-2)	0.13

The resulting MCPR (after adjustments) for fuel bundle LJ019 shall be equal to, or greater than, the exposure dependent MCPRs shown in section 3.2.3 of the Technical Specifications. The core-wide MCPR limits, exclusive of fuel bundle LJ0197, and exclusive of the above adjustments, will be equal to, or greater than, the exposure dependent MCPRs shown in section 3.2.3 of the Technical Specification (no change).

The staff finds the proposed ΔCPR adjustment to fuel bundle LJ0197 acceptable.

3.2.3 Operating Limit LHGR

The LHGR of fuel bundle LJ0197 should be modified to reflect the increase in local peaking due to the rotation of the fuel assembly. CP&L proposes to increase the calculated LHGR for fuel bundle LJ0197 by 20% until the modified peaking factors have been determined. The adjusted LHGR for fuel bundle LJ0197 will remain limited by the current Technical Specification LHGR limits of 13.4 KW/ft.

Since the 13.4 KW/ft Technical Specification limit on LHGR is below the safety limit LHGR of 17.5 KW/ft (Reference 7), we find the proposed adjustment to the calculated LHGR for fuel bundle LJ0197 acceptable.

3.3 Rod Withdrawal Error

Control rod 30-11, which is adjacent to the misoriented fuel bundle, has a rod worth of less than 60% of the worth of the limiting control rod analyzed in the cycle 2 RWE analysis. Therefore a RWE involving control rod 30-11 would be less severe than the limiting condition approved in Reference 8. We find this acceptable.

3.4 Accident Analysis

3.4.1 ECCS Appendix K Analysis

In Reference 8, it was concluded that the proposed operating limit MCPRs are more limiting than the 1.2 MCPR assumed, and found acceptable, in the Loss-of-Coolant Accident (LOCA) analysis. Likewise the 13.4 KW/ft LHGR is more limiting that the MAPLHGR verses Average Planar Exposure calculated in the cycle 2 LOCA analysis. For the misoriented fuel bundle at position 29-10, GE has proposed that BSEP-1 increase the locally calculated LHGR by 20% and decrease the locally calculated MCPR by the exposure dependent ΔCPRs shown in Section 3.2. These locally peaked values would still be maintained within the more restrictive limits currently required for reasons not connected with the LOCA analysis.

With the above adjustments to the Limiting Conditions of Operations (LCOs), we have concluded that the plant will be in conformance with all requirements of 10 CFR 50.46 and Appendix K to 10 CFR 50.46.

3.4.2 Control Rod Drop Accident

The cold reactivity worth of control rod (30-11) was determined to be 0.95% ΔK compared with 1.21% ΔK for the maximum worth control rod. Even considering local peaking at the misoriented fuel bundle, the peak enthalpy resulting from a CRDA of control rod (30-11)would be less than 208 cal/gm. Since this would be less severe than the CRDA analyzed and approved in the cycle 2 reload analysis, we find this condition acceptable.

4.0 Technical Specification Modifications

The Licensee has proposed adjustments to the calculated MCPR for the misoriented fuel bundle LJ0197 located at core position 29-10. The adjustment involves subtracting the exposure dependent ΔCPRs shown in Section 3.2 from the calculated MCPRs for bundle LJ0197. The lower adjusted MCPRs would then be required to be greater than, or equal to, the exposure dependent MCPRs shown in Section 3.2.3 of the Technical Specifications.

The 13.4 KW/ft LHGR limits which are currently specified in the Technical Specifications remain unchanged. This is acceptable since the 20% adjustment factor is to be applied to the calculated Local LHGR. Therefore the locally peaked LHGR will be maintained within the current 13.4 KW/ft LHGR limit.

We find the above Technical Specification changes acceptable along with the procedures for accommodating the misoriented fuel bundle.

Based on the above considerations, we conclude that the proposed change to Specification 3.2.3 is acceptable as written.

5.0 Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR Section 51.5(d)(4) that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of the amendment.

6.0 Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the change does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: September 21, 1979

References

1. Telephone conversation, J. McQueen (CP&L) to R. Riggs (NRC), dated September 14, 1979.

2. Telephone conversation, K. Julian (I&E/NRC) to J. Hannon (NRC), dated August 29, 1979.

3. "Supplemental Reload Licensing Submittal" for Brunswick Unit 1, Reload 1 NEDO-24166, December 1978.

4. Telephone conversation, Reactor Safety Branch (NRC) to H. Bowles (CP&L), dated August 30, 1979.

5. Telecopy, Serial No. GD-79-2289, transmitting CP&L request for Amendment, General Electric's analysis results, and proposed Technical Specification Changes, dated September 12, 1979.

6. Telephone conversation, H. Bowles (CP&L) to R. Riggs (NRC), dated September 18, 1979.

7. Safety Evaluation of the General Electric Generic Reload Fuel Application (NEDE-24011-P), April 1978.

8. Reactor Safety Branch SER supporting BSEP-1 Cycle 2 Operation, March 28, 1979.

9. CP&L letter dated September 18, 1979, Rotated Fuel Bundle: Technical Documentation for MCPR Limit Revision.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-325

CAROLINA POWER & LIGHT COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 25 to Facility Operating License No. DPR-71 issued to Carolina Power & Light Company (the licensee) for operation of the Brunswick Steam Electric Plant, Unit No. 1 (the facility), located in Brunswick, North Carolina. The amendment is effective as of the date of issuance.

This amendment revises the minimum critical power ratio (MCPR) for fuel bundle LJ0197, which is misoriented by 180°. This revision will ensure conservative operation for Cycle 2 in accordance with the reload analysis.

The application for amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of the amendment was not required since the amendment does not involve a significant hazards consideration.

The Commission has determined that the issuance of the amendment will not result in any significant environmental impact and that pursuant to 10 CFR Section 51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of the amendment.

For further details with respect to this action, see (1) the application for amendment dated September 11, 1979, as supplemented September 18, 1979, (2) Amendment No. 25 to License No. DPR-71, and (3) the Commission's related Safety Evaluation. These items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. 20555, and at the Southport-Brunswick County Library, 109 West Moore Street, Southport, North Carolina 28461. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland this 21st day of September 1979.

FOR THE NUCLEAR REGULATORY COMMISSION

Vernon L. Rooney, Acting Chief
Operating Reactors Branch #3
Division of Operating Reactors

TABLE 4.3.6.1-1

ATWS RECIRCULATION PUMP TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION AND INSTRUMENT NUMBER	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION
1. Reactor Vessel Water Level - Low Low, Level 2 (B21-LIS-N024 A, B; B21-LIS-N025 A, B)	S	M	R
2. Reactor Vessel Pressure - High (B21-PS-N045 A, B, C, D)	NA	M	R

TABLE 4.3.6.1-1

ATWS RECIRCULATION PUMP TRIP SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

TRIP FUNCTION AND INSTRUMENT NUMBER	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION
1. Reactor Vessel Water Level - Low Low, Level 2 (B21-LIS-N024 A, B; B21-LIS-N025 A, B)	S	M	R
2. Reactor Vessel Pressure - High (B21-PS-N045 A, B, C, D)	NA	M	R