

# REGULATORY DOCKET FILE COPY

NOVEMBER 25 1979

Docket No. 50-261

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

Dear Mr. Jones:

The Commission has issued the enclosed Amendment No. to Facility Operating License No. DPR-23 for the H. B. Robinson Steam Electric Plant, Unit No. 2. The amendment is in response to your application dated April 18, 1979, as supplemented August 8, 1979.

This amendment changes the Technical Specifications to allow operation with a small positive moderator temperature coefficient at power levels below full power at beginning of cycle. Administrative changes are also made which delete references to early cycle requirements, correct figures and clarify wording.

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

Sincerely,

Original Signed By

A. Schwencer, Chief  
 Operating Reactors Branch #1  
 Division of Operating Reactors

Enclosures:

1. Amendment No. to DPR-23
2. Safety Evaluation
3. Notice of Issuance

cc w/enclosures:  
 See next page

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SURNAME	DNeighbors:sh	PKreutzer	SH Lew	ASchwencer	WGammitt
DATE	10/22/79	10/22/79	10/24/79	10/26/79	10/22/79



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

October 26, 1979

Docket No. 50-261

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

Dear Mr. Jones:

The Commission has issued the enclosed Amendment No. 43 to Facility Operating License No. DPR-23 for the H. B. Robinson Steam Electric Plant, Unit No. 2. The amendment is in response to your application dated April 18, 1979, as supplemented August 8, 1979.

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Sincerely,

A handwritten signature in cursive script, appearing to read "A. Schwencer".

A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors

Enclosures:

1. Amendment No. 43 to DPR-23
2. Safety Evaluation
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cc w/enclosures:  
See next page

Mr. J. A. Jones  
Carolina Power and Light Company

- 2 -

October 26, 1979

cc: G. F. Trowbridge, Esquire  
Shaw, Pittman, Potts and Trowbridge  
1800 M Street, N.W.  
Washington, D. C. 20036

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

Hartsville Memorial Library  
Home and Fifth Avenues  
Hartsville, South Carolina 29550

Mr. McCuen Morrell, Chairman  
Darlington County Board of Supervisors  
County Courthouse  
Darlington, South Carolina 29535

State Clearinghouse  
Division of Policy Development  
116 West Jones Street  
Raleigh, North Carolina 27603

Attorney General  
Department of Justice  
Justice Building  
Raleigh, North Carolina 27602

Michael C. Farrar, Chairman  
Atomic Safety and Licensing  
Appeal Board Panel  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Richard S. Salzman  
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Appeal Board Panel  
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Dr. W. Reed Johnson  
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Appeal Board Panel  
U. S. Nuclear Regulatory Commission  
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Director, Technical Assessment Division  
Office of Radiation Programs (AW-459)  
U. S. Environmental Protection Agency  
Crystal Mall #2  
Arlington, Virginia 20460



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

CAROLINA POWER AND LIGHT COMPANY

DOCKET NO. 50-261

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 43  
License No. DPR-23

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Carolina Power and Light Company (the licensee) dated April 18, 1979, as supplemented August 8, 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.

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2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B. of Facility Operating License No. DPR-23 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 43, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: October 26, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 43

FACILITY OPERATING LICENSE NO. DPR-23

DOCKET NO. 50-261

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove

2.1-5  
2.1-6  
3.1-11  
3.1-12  
3.10-2  
3.10-20  
3.10-21  
5.3-1  
6.9-8

Replace

2.1-5  
2.1-6  
3.1-11  
3.1-12  
3.10-2  
3.10-20  
3.10-21  
5.3-1  
6.9-8

The safety limit curves given in Figures 2.1-1 and 2.1-2 are for constant flow conditions. These curves would not be applicable in the case of a loss of flow transient. The evaluation of such an event would be based upon the analysis presented in Section 14.1 of the PSAR.

The Reactor Control and Protection System is designed to prevent any anticipated combination of transient conditions for Reactor Coolant System temperature, pressure, and thermal power level that would result in a DNB ratio of less than 1.30<sup>(3)</sup> based on steady state nominal operating power levels less than or equal to 100%, steady state nominal operating Reactor Coolant System average temperatures less than or equal to 575.4°F, and a steady state nominal operating pressure of 2235 psig. Allowances are made in initial conditions assumed for transient analyses for steady state errors of +2% in power, +4°F in Reactor Coolant System average temperature, and +30 psi in pressure. The combined steady state errors result in the DNB ratio at the start of a transient being 10 percent less than the value at nominal full power operating conditions. The steady state nominal operating parameters and allowances for steady state errors given above are also applicable for two loop operation except that the steady state nominal operating power level is less than or equal to 45%.

Deleted

Deleted

References

- (1) FSAR Section 3.2.2
- (2) FSAR Section 14.1.3
- (3) FSAR Section 7.2.1
- (4) WCAP-8243, "H. B. Robinson Unit 2 - Justification for Operation at 2300 MWt, December, 1973.



### 3.1.3 Minimum Conditions for Criticality

3.1.3.1 Except during low power physics tests, the reactor shall not be made critical at any temperature, above which the moderator temperature coefficient is greater than:

- a) +2.0 pcm/°F at less than 50% of rated power, or
- b) +2.0 pcm/°F at 50% of rated power and linearly decreasing to 0 pcm/°F at rated power.

3.1.3.2 In no case shall the reactor be made critical above and to the left of the criticality limit shown on Figure 3.1-1.

3.1.3.3 When the reactor coolant temperature is in a range where the moderator temperature coefficient is greater than as specified in 3.1.3.1 above, the reactor shall be subcritical by an amount equal to or greater than the potential reactivity insertion due to depressurization.

3.1.3.4 The reactor shall be maintained subcritical by at least 1% until normal water level is established in the pressurizer.

#### Basis

During the early part of fuel cycle, the moderator temperature coefficient may be slightly positive at low power levels. The moderator coefficient at low temperatures or powers will be most positive at the beginning of the fuel cycle, when the boron concentration in the coolant is the greatest. At all times, the moderator coefficient is calculated to be negative in the high power operating range, and after a very brief period of power operation, the coefficient will be negative in all circumstances due to the reduced boron concentration as Xenon and fission products build into the core. The requirement that the reactor is not to be made critical when the moderator coefficient is more positive than as specified in 3.1.3.1 above has been imposed to prevent any unexpected power excursion during normal operations as a result of either an increase of moderator temperature or decrease of coolant pressure. This requirement is waived during low power physics tests to permit measurement of reactor moderator coefficient and other physics design parameters of interest. During physics tests, special operating precautions will be taken. In addition, the strong negative Doppler coefficient<sup>(2)</sup> and the small integrated  $\Delta k/k$  would limit the magnitude of a power excursion resulting from a reduction of moderator density.

The heatup curve of Figure 3.1-1 includes criticality limits which are required by 10 CFR Part 50, Appendix G, Paragraph IV.A.2.c. Whenever the core is critical, additional safety margins above those specified by the ASME Code Appendix G methods, are imposed. The core may be critical at temperatures equal to or above the minimum temperature for the inservice hydrostatic pressure tests as calculated by ASME Code Appendix G methods, and an additional safety margin of 40°F must be maintained above the applicable heatup curve at all times.

If the specified shutdown margin is maintained (Section 3.10), there is no possibility of an accidental criticality as a result of an increase of moderator temperature or a decrease of coolant pressure.<sup>(1)</sup>

The requirement for bubble formation in the pressurizer when the reactor has passed the threshold of one percent subcriticality will assure that the Reactor Coolant System will not be solid when criticality is achieved.

#### References

- (1) FSAR Table 3.2.1-1
- (2) FSAR Figure 3.2.1-10

3.10.1.5 Except for physics tests, if a full-length control rod is more than 15 inches out of alignment with its bank, then within two hours:

- a. Correct the situation, or
- b. Determine by measurement the hot channel factors and apply Specification 3.10.2.1, or
- c. Limit power to 70 percent of rated power for three-loop operation.

3.10.1.6 Insertion limits do not apply during physics tests or during periodic exercise of individual rods. However, the shutdown margin indicated in Figure 3.10-2 must be maintained except for the low power physics test to measure control rod worth and shutdown margin. For this test the reactor may be critical with all but one full length control rod inserted.

### 3.10.2 Power Distribution Limits

3.10.2.1 At all times except during low power physics tests, the hot channel factors defined in the basis must meet the following limits:

$$F_Q(Z) \leq (2.20/P) \times K(Z) \text{ for } P > .5$$
$$F_Q(Z) < (4.40) \times K(Z) \text{ for } P \leq .5$$
$$F_{\Delta H}^N < 1.55 (1 + 0.2(1-P))$$

where P is the fraction of licensed power at which the core is operating, K(Z) is based on the function given in Figure 3.10-3, and Z is the core height location of  $F_Q$ .

- c. Deleted
- d. Inservice Inspection 4.2 After five years of operation
- e. Containment Sample Tendon Surveillance 4.4 Upon completion of the inspection at 5 and 25 years of operation
- f. Post-operational Containment Structural Test 4.4 Upon completion of the test at 3 and 20 years of operation
- g. Fire Protection System 3.14 As specified by limiting condition for operation.
- h. Overpressure Protection System Operation 3.1.2.1e Within 30 days of operation.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO.43 TO FACILITY OPERATING LICENSE NO. DPR-23  
CAROLINA POWER AND LIGHT COMPANY  
H. R. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2  
DOCKET NO. 50-261

Introduction

By letter dated April 18, 1979, supplemented by letter dated August 8, 1979, Carolina Power and Light Company (the licensee) requested a change to the Technical Specifications for H. B. Robinson Unit 2. The proposed change would allow a small positive moderator temperature coefficient (MTC) at power levels below full power.

Discussion

At the beginning of the fuel cycle, with no xenon and low power level, a positive MTC can exist. To compensate for this, control rods must be inserted during power escalation. This can complicate, or even prevent, an expeditious power ascension within the rod insertion limits.

After a short period of power operation, the MTC becomes negative due to reduced boron concentration. The proposed Technical Specification allows critical operation with an MTC no greater than +2.0 pcm/°F below 50% power, linearly decreasing to 0.0 pcm/°F at 100% power.

Evaluation

The model used for plant transient analysis for H. B. Robinson 2 is described in Exxon Report XN-75-14. This model was reviewed and accepted by the staff when Robinson 2 was fueled by Exxon in 1975. For that analysis, the steady state DNBR was forced to a value of 1.86 to match results from a previous fuel vendor analysis so as to provide a basis for comparison. This agreement was forced by increasing the axial peaking factor assumed in the analysis above its actual value until the DNBR matched the target value.

For the analysis supporting operation with a positive MTC, as presented in the licensee submittal of April 18, an appropriately conservative peaking factor was used, and the steady-state DNBR was determined to be 2.29. The same assumptions (including axial peaking factor) were used in the transient analysis.

The MDNBR for the transients are therefore higher than those for the comparable events in XN-75-14, despite the fact that a positive MTC was used. The staff considers that this approach is acceptable since the peaking factors used are conservative relative to operating limits.

The transients that were reanalyzed in the submittal were those which were previously shown to become more limiting with a less negative MTC. These include events such as loss of forced coolant flow and the locked rotor event. The positive MTC results in a small reduction (.07) in MDNBR, with the most limiting case being the locked rotor event, with a MDNBR of 1.58. This is well above the limit of 1.30. This analysis was performed at 102% power, with an MTC of +2.0 pcm/°F to bound the allowable conditions of +2.0 pcm/°F at 50%, decreasing to +0.0 pcm/°F at 100% power.

Other transients which might be adversely affected by a positive MTC, such as loss of load and rod withdrawal, were also reviewed. These transients were previously shown to be less limiting than the locked rotor event. For these events, sufficient thermal lag exists so that the rod heat flux is not increased before the scram even though neutron power does increase. Thus, the MDNBR for these transients is not reduced by operation with a positive MTC.

All other plant analyses are considered to be applicable to operating with the proposed Technical Specifications since either the performance is improved, or it is not affected by the small positive MTC allowed at less than full power.

Other changes have been proposed by the licensee to the Technical Specifications which are administrative in nature and require no technical review (i.e., delete references to deleted early cycle requirements, correct figures and clarify wording). We find these administrative changes acceptable.

Based on our review, we conclude that analysis of plant transients has shown that operation with a small positive moderator temperature coefficient at less than full power does not lead to violation of any safety limits. Therefore, the proposed Technical Specification change is considered acceptable.

#### Environmental Considerations

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 §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 this amendment.

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 amendment 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.

Date: October 26, 1979

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKET NO. 50-261CAROLINA POWER AND LIGHT COMPANYNOTICE OF ISSUANCE OF AMENDMENT TO FACILITY  
OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 43 to Facility Operating License No. DPR-23, to the Carolina Power and Light Company (the licensee), which revised Technical Specifications for operation of the H. B. Robinson Steam Electric Plant Unit No. 2 (the facility) located in Darlington County, Hartsville, South Carolina. The amendment is effective as of the date of its issuance.

This amendment changes the Technical Specifications to allow operation with a small positive moderator temperature coefficient at power levels below full power at beginning of cycle. Administrative changes are also made which delete references to early cycle requirements, correct figures and clarify wording.

The application for the 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 this amendment was not required since the amendment does not involve a significant hazards consideration.



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

For further details with respect to this action, see (1) the application for amendment dated April 18, 1979, as supplemented August 8, 1979, (2) Amendment No. 43 to License No. DPR-23, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the Hartsville Memorial Library, Home and Fifth Avenues, Hartsville, South Carolina. 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 26th day of October, 1979.

FOR THE NUCLEAR REGULATORY COMMISSION



A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors