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Gray File
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Xtra Cy File (4)
BHarless

February 11, 1977

Docket No.: 50-261

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

Gentlemen:

The Commission has issued the enclosed Amendment No. 26 to Facility Operating License No. DPR-23 for the H. B. Robinson Steam Electric Plant Unit No. 2. The amendment consists of changes to the Technical Specifications in partial response to your application dated January 4, 1977.

This amendment specifies more restrictive limits on the reactor coolant system pressure and temperature during system heatup and cooldown and when the reactor is critical.

Copies of the Safety Evaluation and the Federal Register Notice are also enclosed.

Sincerely,

Original Signed By

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:
1. Amendment No. 26
2. Safety Evaluation
3. Federal Register Notice

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DATE ➤	2/2/77	2/2/77	2/7/77	2/3/77	2/4/77	

Carolina Power & Light Company

cc w/enclosure(s):
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Washington, D. C. 20036

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

Mr. McCuen Morrell, Chairman
Darlington County Board of Supervisors
County Courthouse
Darlington, South Carolina 29532

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Chief, Energy Systems
Analyses Branch (AW-459)
Office of Radiation Programs
U. S. Environmental Protection Agency
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Washington, D.C. 20460

U. S. Environmental Protection Agency
Region IV Office
ATTN: EIS COORDINATOR
245 Courtland Street, NE
Atlanta, Georgia 30308

cc w/enclosures and incoming
dtd.: 1/4/77
Office of Intergovernmental Relations
116 West Jones Street
Raleigh, North Carolina 27603

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

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-261

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

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 26
License No. DPR-23

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

   A. The application for amendment by Carolina Power & Light Company (the licensee) dated January 4, 1977, 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 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. 26 , 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

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: February 11, 1977

ATTACHMENT TO LICENSE AMENDMENT NO. 26

FACILITY OPERATING LICENSE NO. DPR-23

DOCKET NO. 50-261

Revise Appendix A Technical Specifications as follows:

Remove Pages	Insert Pages
3.1-7 - 3.1-10	3.1-7 - 3.1-10
3.1-19 & 3.1-20	3.1-19 & 3.1-20

The changed areas on the revised pages are shown by marginal lines.

surveillance capsule is periodically removed from the operating nuclear reactor and the encapsulated specimens tested. The increase in the Charpy V-notch 50 ft-lb temperature (ΔRT_{NDT}) due to irradiation is added to the original RT_{NDT} to adjust the RT_{NDT} for radiation embrittlement. This adjusted RT_{NDT} (RT_{NDT} initial + RT_{NDT}) is utilized to index the material to the K_{IR} curve and in turn to set operating limits for the nuclear power plant which take into account the effects of irradiation on the reactor vessel materials. Allowable pressure-temperature relationships for various heatup and cooldown rates are calculated using methods[2] derived from Appendix G to Section III of the ASME Boiler and Pressure Vessel Code. The approach specifies that the allowable total stress intensity factor (K_I) at any time during heatup or cooldown cannot be greater than that shown on the K_{IR} curve in Appendix G for the metal temperature at that time. Furthermore, the approach applies an explicit safety factor of 2.0 on the stress intensity factor induced by pressure gradients.

Following the generation of pressure-temperature curves for both the steady state and finite heatup rate situations, the final limit curves are produced in the following fashion. First, a composite curve is constructed based on a point-by-point comparison of the steady state and finite heatup rate data. At any given temperature, the allowable pressure is taken to be the lesser of the two values taken from the curves under consideration. The composite curve is then adjusted to allow for possible errors in the pressure and temperature sensing instruments.

The use of the composite curve is mandatory in setting heatup limitations because it is possible for conditions to exist such that over the course of the heatup ramp the controlling analysis switches from the O.D. to the I.D. location; and the pressure limit must, at all times, be based on the most conservative case. The cooldown analysis proceeds in the same fashion as that for heatup, with the exception that the controlling location is always at the I.D. position. The thermal gradients induced during cooldown tend to produce tensile stresses at the I.D. location and compressive stresses at the O.D. position. Thus, the I.D. flaw is clearly the worst case.

As in the case of heatup, allowable pressure temperature relations are generated for both steady state and finite cooldown rate situations. Composite limit curves are then constructed for each cooldown rate of interest. Again adjustments are made to account for pressure and temperature instrumentation error.

References:

1. S. E. Yanichko, "Carolina Power & Light Company, H. B. Robinson Unit No. 2 Reactor Vessel Radiation Surveillance Program," Westinghouse Nuclear Energy Systems - WCAP-7373 (January, 1970).

2. E. B. Norris, "Reactor Vessel Material Surveillance Program for H. B. Robinson Unit No. 2, Analysis of Capsule V," Southwest Research Institute - Final Report SWRI Project No. 02-4397.

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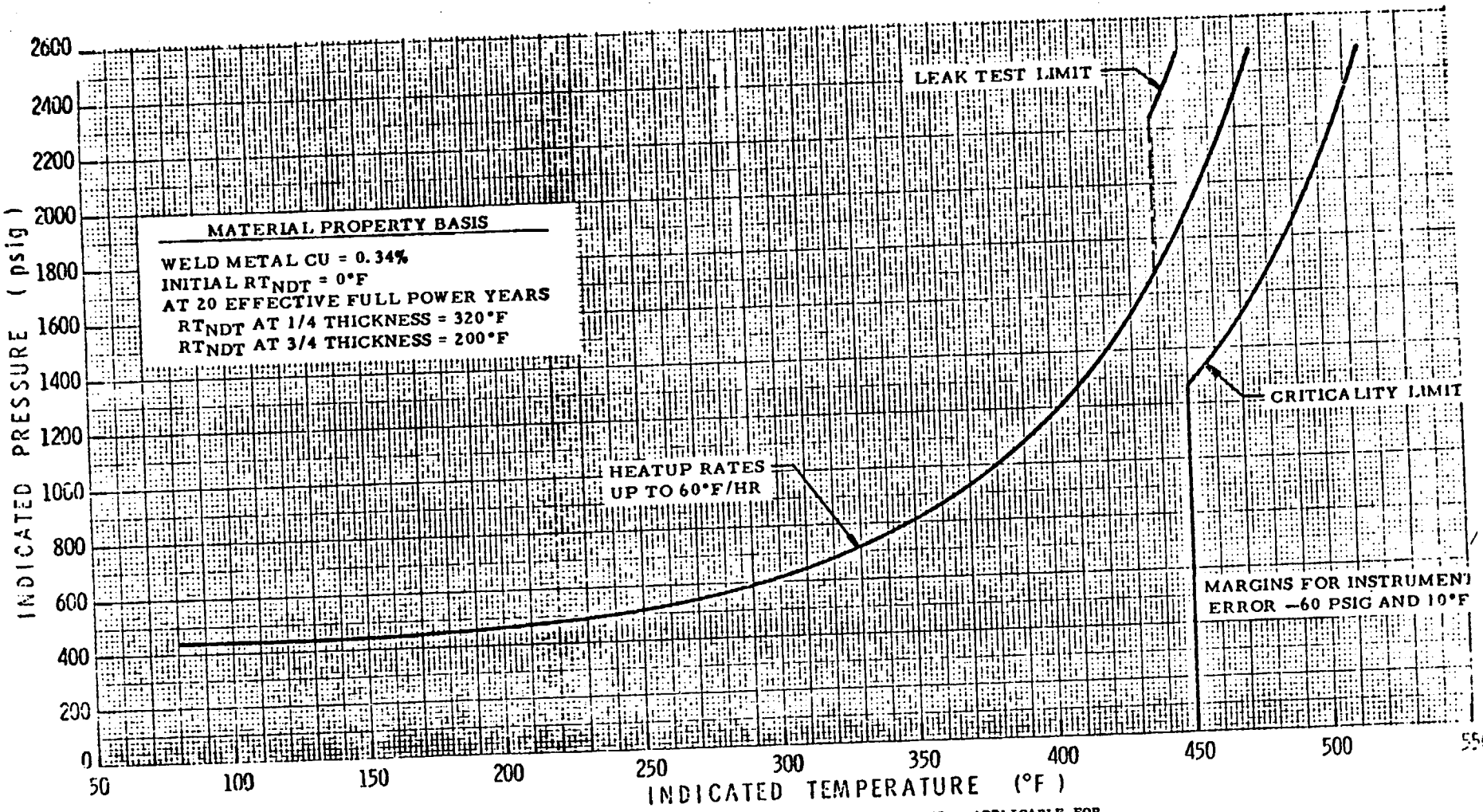

Figure 3.1-1 REACTOR COOLANT SYSTEM HEATUP LIMITATIONS - APPLICABLE FOR PERIODS UP TO 20 EFFECTIVE FULL POWER YEARS

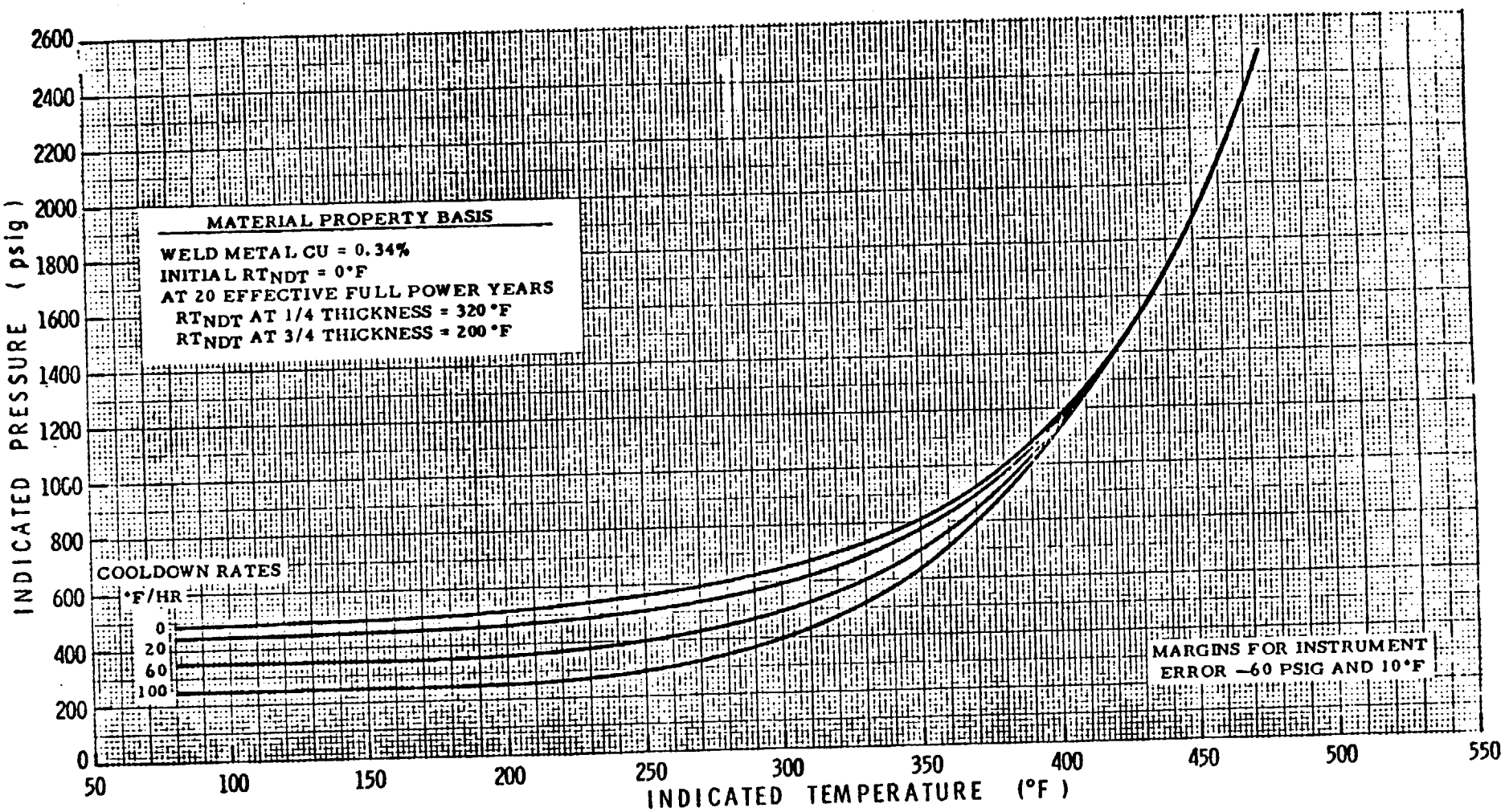

Figure 3.1-2 REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS - APPLICABLE FOR PERIODS UP TO 20 EFFECTIVE FULL POWER YEARS

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 26 TO LICENSE NO. DPR-23

CAROLINA POWER AND LIGHT COMPANY

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

DOCKET NO. 50-261

Introduction

By letter dated January 4, 1977, Carolina Power & Light Company (the licensee) requested amendment of the Technical Specifications appended to License No. DPR-23 for the H. B. Robinson Steam Electric Plant Unit No. 2 (Robinson-2). The requested revisions would:

1. Specify more restrictive limits on the reactor coolant system pressure and temperature during system heatup and cooldown and when the reactor is critical as specified in Appendix A Technical Specifications 3.1.2.1 and 3.1.3.2, and

2. Delete the requirement for pressure testing of steam generator tubes as specified in Appendix A Technical Specification 4.7.2.

This Safety Evaluation addresses only item 1, above, of the request. Item 2 will be addressed at a later date.

Item 1 of the licensee's request was made in conformance with the provisions of Appendix A Technical Specification 3.1.2.4 which requires that Figures 3.1-1 and 3.1-2 (which define the pressure-temperature limits for heatup, cooldown, and criticality) be updated before the calculated fast neutron exposure of the reactor vessel exceeds the exposure for which the figures apply.

Discussion

Robinson-2 is currently operating with heatup, cooldown, and criticality limits developed in accordance with the requirements of 10 CFR 50, Appendix G which are valid for the first 4.25 effective full power years (EFPY) of operation. It is estimated, however, that Robinson-2 will achieve 4.25 EFPY of operation on about February 11, 1977, at which time the present limits will no longer be valid. It was in anticipation of the expiration of the validity of the current limits, that the licensee submitted the present request for license amendment which specifies proposed limits for operation up to 20 EFPY.

Related to the licensee's request are the results of the examination of the specimens contained in capsule V of the Robinson-2 Reactor Vessel Radiation Surveillance Program. This capsule was removed from the Robinson-2 vessel during the 1975 refueling after having received a neutron fluence equivalent to 3.33 EFPY of operation at licensed power (2200 MWt). The results of the examination of these specimens were submitted by the licensee by letter dated December 7, 1976.

Evaluation

The proposed pressure-temperature operating limits for Robinson-2 have been calculated for operation through 20 EFPY. Based on information submitted by the licensee, the limiting material with respect to RT_{NDT} shift is weld material in the reactor vessel beltline having 0.34% copper. Its initial RT_{NDT} shift due to irradiation at 20 EFPY (fluence of 1.9×10^{19} n/cm^2) is 320°F at 1/4T location. This shift in RT_{NDT} was obtained by extrapolating the data on weld material in capsule V that was subjected to a fluence of 4.51×10^{18} n/cm^2. The extrapolation followed the upper limit curve in Regulatory Guide 1.99, Revision 1 (in publication).

The limiting material with respect to reduction of the Charpy upper shelf energy is the vessel plate material, W10201-5. While the irradiation data from both capsule V and previously removed capsule S indicate that this material is less sensitive to radiation-induced loss of Charpy upper shelf energy than that predicted for 0.1% copper base plate by Regulatory Guide 1.99, Revision 1, application of the 0.1% copper curve in Regulatory Guide 1.99 indicates that the W10201-5 would reach 50 foot-lbs shelf energy after about 24 EFPY of operation. Since even this conservative estimate of attainment of a 50 foot-lb shelf energy is beyond the operating period covered by the proposed new limits, it is concluded that the proposed service period for the revised limits is acceptable.

We have reviewed the pressure-temperature operating limits proposed for H. B. Robinson, Unit No. 2 and conclude that they conform to Appendix G, 10 CFR Part 50 and that they are acceptable for operation through 20 EFPY. The use of Appendix G in establishing safe operating limitations will ensure adequate safety margins during operation, testing, maintenance and postulated accident conditions and constitute an acceptable basis for satisfying the requirements of NRC General Design Criterion 31, Appendix A, 10 CFR Part 50.

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 §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.

Dated: February 11, 1977

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-261

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. 26 to Facility Operating License No. DPR-23, issued to Carolina Power & 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 its date of issuance.

This amendment specifies more restrictive limits on the reactor coolant system pressure and temperature during system heatup and cooldown and when the reactor is critical.

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.

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that 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 January 4, 1977, (2) Amendment No. 26 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 & 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 11th day of February 1977.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors