

August 27, 1976

Docket No. 50-261

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

Gentlemen:

Enclosed is a signed original of an Order for Modification of License, dated August 27, 1976, issued by the Commission for the H. B. Robinson Steam Electric Plant Unit No. 2. This Order amends Facility Operating License DPR-23 by modifying the Technical Specification limit for the total nuclear peaking factor (F<sub>0</sub>) to 2.05. This Order also requires submittal of a corrected ECCS analysis as soon as possible.

A copy of the Order is being filed with the Office of the Federal Register for publication.

Sincerely,

Original Signed by

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

Enclosure:  
Order for Modification  
of License

cc w/enclosure:  
See next page

*From Renewal  
for Fletcher  
Point  
OK WRS*

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| DOR:ORB-2 | DOR:ORB-4         | OELD    | DOR:AD/OT |
| MFletcher | RIngram <i>sm</i> | OELD    | DEisenhut |
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| OFFICE >  | DOR:ORB-4    | DOR:ORB-4 | DOR:AD/ORS | DOR:DIR | NRR:O/DIR | NRR:DIR  |
| SURNAME > | GZwetzig:esp | RWReid    | KRGoller   | VStello | EGCase    | BCRusche |
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- DEisenhut

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- BJones (8) 4
- CMiles, OPA
- JMcGough
- Dross*

Carolina Power & Light Company

cc w/enclosure(s):  
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Hartsville Memorial Library  
Home and Fifth Avenue  
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Mr. McCuen Morrell, Chairman  
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cc w/enclosures & incoming  
dated:  
Office of Intergovernmental Relations  
116 West Jones Street  
Raleigh, North Carolina 27603

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of )  
 )  
CAROLINA POWER AND LIGHT COMPANY ) Docket No. 50-261  
 )  
(H. B. Robinson Steam Electric )  
Plant Unit No. 2) )  
 )

ORDER FOR MODIFICATION OF LICENSE

I.

Carolina Power and Light Company (the Licensee), is the holder of Facility Operating License No. DPR-23 which authorizes the operation of a nuclear power reactor known as H. B. Robinson Steam Electric Plant Unit No. 2 (the facility) at steady state reactor power levels not in excess of 2200 thermal megawatts (rated power). The facility is a pressurized water reactor (PWR) located at the Licensee's site near Hartsville, South Carolina.

II.

In conformance with evaluations of the performance of the Emergency Core Cooling System (ECCS) of the facility submitted by the Licensee on October 14, 1975, as supplemented by correspondence dated August 3 and 22, October 17, November 13, 18, and 24, 1975, the Technical Specifications issued December 3, 1975, for the facility limit the reactor total nuclear peaking factor ( $F_Q$ ) to 2.30. The ECCS performance evaluation submitted by the Licensee was based upon a previously approved ECCS evaluation model

developed by the Westinghouse Electric Corporation (Westinghouse), the designer of the facility and supplier of part of the nuclear fuel, to conform with the requirements of the Commission's ECCS Acceptance Criteria, 10 CFR Part 50, 50.46 and Appendix K. The evaluation indicated that with a total nuclear peaking factor limited as set forth above, and with the other limits set forth in the facility's Technical Specifications, the ECCS cooling performance for the facility would conform with the criteria contained in 10 CFR §50.46(b) which govern calculated peak clad temperature, maximum cladding oxidation, maximum hydrogen generation, coolable geometry and long term cooling. The total nuclear peaking factor limits established above for the Westinghouse fuel are also conservative for the nuclear fuel supplied by the Exxon Nuclear Corporation.

Due to the configuration of the Westinghouse reactor vessel design, a small portion of reactor inlet water which is cooler than outlet water is directed through several nozzles located on the periphery of the vessel to cool the upper portion of the vessel head. Accordingly, upper head temperatures used in evaluating ECCS performance were assumed to be equal to the reactor inlet water temperature. However, recent operating data gathered at the Connecticut Yankee facility has indicated that, contrary to this expectation, the temperature of the water in the upper head is higher than the reactor inlet water temperature, by about 60% of the difference between reactor inlet and reactor outlet temperature. This higher upper head water temperature would have the effect of increasing the calculated peak clad temperature in the event of a loss of coolant accident.

In a meeting with the staff on August 9, 1976, Westinghouse presented generic evaluations of the effect on calculated peak clad temperature for the worst break identified in previous calculations for each type of Westinghouse reactor and fuel design using an upper head water temperature exceeding reactor inlet water temperature by an amount equal to 75% of the reactor inlet - reactor outlet differential. On August 12, 1976, the staff instructed the licensee to submit an analysis similar to the Westinghouse evaluation with the clearly conservative assumption of upper head water temperature equal to reactor outlet temperature (100% of the reactor outlet - reactor inlet differential) and to operate the facility in accordance with the results of this analysis. The results of the evaluation submitted for the H. B. Robinson, Unit No. 2 reactor indicated that with this modification of the upper head water temperature the calculated peak clad temperature for the worst case break would exceed the Commission's ECCS performance criteria by about 200°F.

Extensive sensitivity studies, submitted with previous calculations in connection with assessment of Westinghouse evaluation models, have established a relationship between the reactor total nuclear peaking factor ( $F_Q$ ) and calculated peak clad temperature such that if  $F_Q$  is reduced by .20 the calculated peak clad temperature for the H. B. Robinson, Unit No. 2 reactor would not exceed 2200°F. As directed by

the NRC staff, the Licensee agreed to operate the facility with the total nuclear peaking factor reduced by 0.20 to 2.10. However, subsequent to the licensee's submittal, further review of data presented by Westinghouse has led the staff to conclude that an additional reduction in  $F_Q$  over that presented by the licensee is warranted. This is based on the fact that the Westinghouse generic evaluation for plants with three reactor coolant loops, used the results from two different, but approved, ECCS models (the March 1975 and the October 1975 models). When consistent ECCS models are used the calculated peak clad temperature could increase by an additional 50°F.

After discussions with the NRC staff, on August 25, 1976, the Licensee amended his previous submission to account for this additional increase in peak clad temperature, by reducing  $F_Q$  to 2.05. The NRC staff believes that the licensee's actions, under the circumstances, are appropriate and should be confirmed by NRC Order.

The staff expects that, when revised calculations for the facility are submitted using an approved evaluation model with correct input for upper head water temperature, or assuming that the upper head water temperature equals reactor vessel outlet water temperature, such calculations will demonstrate that operation with this total nuclear peaking factor would

conform with the criteria of 10 CFR §50.46(b). Such revised calculations fully conforming to the requirements of 10 CFR §50.46 are to be provided for the facility as soon as possible. The additional limitations set forth in this Order will provide reasonable assurance that the public health and safety will not be endangered.

Copies of the following documents are available for public inspection in the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C., 20555 and at the Hartsville Memorial Library, Home and Fifth Avenue, Hartsville, South Carolina 29550, (1) Licensee's letters of August 3 and 22, October 14 and 17, and November 13, 18, and 24, 1975, (2) Amendment No. 15 to Facility License No. DPR-23, (3) Licensee's letters of August 18 and 25, 1976, and (4) This Order for Modification of License, In the Matter of Carolina Power and Light Company, H. B. Robinson Steam Electric Plant Unit No. 2, Docket No. 50-261.

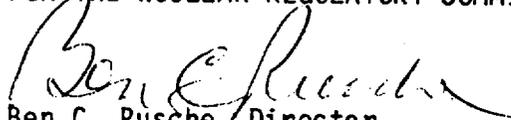
### III.

Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's Rules and Regulations in 10 CFR Parts 2 and 50, IT IS ORDERED THAT Facility Operating License No. DPR-23 is hereby amended by adding the following new provisions:

1. As soon as possible, the Licensee shall submit a reevaluation of ECCS cooling performance calculated in accordance with an approved Westinghouse Evaluation Model, with appropriate correction for upper head water temperature.

2. Until further authorization by the Commission, the Technical Specification limit for total nuclear peaking factor (F<sub>Q</sub>) shall be reduced to 2.05.

FOR THE NUCLEAR REGULATORY COMMISSION

  
Ben C. Rusche, Director  
Office of Nuclear Reactor Regulation

Dated in Bethesda, Maryland  
this 27th day of August 1976.