

August 27, 1976

Docket Nos. 50-280  
and 50-281

Virginia Electric & Power Company  
ATTN: Mr. W. L. Proffitt  
Senior Vice President - Power  
P. O. Box 26666  
Richmond, Virginia 23261

Gentlemen:

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Enclosed is a signed original of an Order for Modification of License, dated August 27, 1976, issued by the Commission for the Surry Power Station Units 1 and 2. This Order amends Facility Operating Licenses DPR-32 and DPR-37 modifying the Technical Specification limit for the total nuclear peaking factor (F<sub>0</sub>) to 1.80 for Surry Unit 1 and 1.82 for Surry Unit 2. 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

*French  
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DATE	8/27/76	8/27/76	8/27/76	8/27/76	8/27/76	8/27/76

Virginia Electric & Power Company

cc w/enclosure(s):  
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Williamsburg, Virginia 23185

Mr. Sherlock Holmes, Chairman  
Board of Supervisors of Surry County  
Surry County Courthouse  
Surry, Virginia 23683

Commonwealth of Virginia  
Council on the Environment  
903 9th Street Office Building  
Richmond, Virginia 23219

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of  
VIRGINIA ELECTRIC AND POWER COMPANY  
Surry Power Station, Units 1 and 2

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Dockets Nos. 50-280  
and 50-281

ORDER FOR MODIFICATION OF LICENSE

I.

Virginia Electric and Power Company (the Licensee), is the holder of Facility Operating Licenses Nos. DPR-32 and DPR-37 which authorizes the operation of two nuclear power reactors known as Surry Power Station, Units 1 and 2 (the facility) at steady state reactor power levels not in excess of 2441 thermal megawatts (rated power). The reactors are pressurized water reactors (PWR) located at the Licensee's site in Surry County, Virginia.

II.

In conformance with evaluations of the performance of the Emergency Core Cooling System (ECCS) of the facility submitted by the Licensee on April 15, 1975, as supplemented May 1, May 20, June 6, June 9 and June 11, 1975, the Technical Specifications issued June 16, 1975 for the facility limit the reactor total nuclear peaking factor ( $F_Q$ ) to 2.10 for each unit. 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 nuclear steam supply system, 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.

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 water 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 13, 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 Surry reactors 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 250°F for Surry Unit 1 and 235°F for Surry Unit 2.

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 0.25 for Surry Unit 1 and 0.23 for Unit 2 the calculated peak clad temperature for the Surry reactors 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 0.25 to 1.85 for Surry Unit 1 and 0.23 to 1.87 for Surry Unit 2. 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 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 24 and 25, 1976, the licensee amended his previous submission to account for this additional increase in peak clad temperature, by reducing  $F_Q$  to 1.80 for Surry Unit 1 and 1.82 for Surry Unit 2. 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 Swem Library, College of William and Mary, Williamsburg, Virginia, (1) Licensee's Appendix K Analyses submitted April 15, 1975, as supplemented May 1, May 20, June 6, June 9 and June 11, 1975, (2) ECCS Approval by License Amendment No. 7 dated June 16, 1975, (3) Letter from Licensee dated August 18, 1976, (4) Letter from Licensee dated August 26, 1976, and (5) This Order for Modification of License, In the Matter of Virginia Electric and Power Company, Surry Power Station Units 1 and 2, Dockets Nos. 50-280 and 50-281.

### 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 Licenses Nos. DPR-32 and DPR-37 are 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 ( $F_Q$ ) shall be reduced to 1.80 for Surry Unit 1 and 1.82 for Surry Unit 2.

FOR THE NUCLEAR REGULATORY COMMISSION

  
Ben C. Rusche, Director  
Office of Nuclear Reactor Regulation

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