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TO: Mr. Benard C. Rusche

FROM: Carolina Power & Light Company, Raleigh, North Carolina, E. E. Utley

DATE OF DOCUMENT: 8/18/76

DATE RECEIVED: 8/19/76

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DESCRIPTION

Ltr. re 8/5/76 contact between CP&L and Westinghouse Electric Corp. and 8/9/76 meeting..concerning Fuel Rod Bow & Upper Vessel Head Temperature Considerations.

(2-P)

PLANT NAME:

H. B. Robinson #2

ENCLOSURE

ACKNOWLEDGED

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CP&L

Carolina Power & Light Company

August 18, 1976

FILE: NG-3514(R) SERIAL: NG-76-1129

Mr. Benard C. Rusche, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT
DOCKET NO. 50-261
OPERATING LICENSE NO. DPR-23
FUEL ROD BOW & UPPER VESSEL HEAD TEMPERATURE CONSIDERATIONS

Dear Mr. Rusche:

On Thursday, August 5, Carolina Power & Light Company (CP&L) was informed by the H. B. Robinson Unit No. 2 reactor vendor, Westinghouse Electric Corporation, of several items that should be considered as unreviewed safety items. One of these items arose from recent investigations by Westinghouse of certain plant parameters which revealed that the present ECCS analysis was nonconservative. This was caused by the discovery that the fluid temperature underneath the upper vessel head was more characteristic of the reactor vessel hot leg temperature rather than the cold leg temperature. The other item concerned recent thermal-hydraulic tests that they had performed which revealed the need for an additional penalty on DNB parameters due to the effects of fuel rod bowing in irradiated fuel assemblies.

Based on their evaluations at the time we were informed of these items, Westinghouse recommended that the peaking factor, F_q, be reduced from a value of 2.30 to a value of 2.17 for 2300 MWt operation. Since H. B. Robinson is limited to operation at 2200 MWt, the appropriate peaking factor at that power level was calculated to be a value of 2.27. They also recommended several ways to accommodate the penalty factor of 8% on DNBR due to rod bowing, of which CP&L chose to reduce the value of $F^N_{\Delta H}$ by 4%.

On Monday, August 9, the staff met with representatives of Westinghouse and many of the Westinghouse operating plant utilities to discuss the data on which the above evaluations were based. As a result of these discussions, the Commission issued a notification to comply with certain approved methods of evaluation of the LOCA and DNB penalties that should be assessed for an interim period pending complete analysis and evaluation of the problem. In that order, issued on August 12, it was requested that the Company present the operating limit changes for H. B. Robinson Unit No. 2 resulting from compliance with the order. These changes in F_q and $F^N_{\Delta H}$ limits are set forth below.

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In regard to the change in the F_q limit due to the elevated upper head temperature, we have concluded that the peak clad temperature (PCT) change for the worst break is +260°F, based on an upper head temperature equal to the hot leg temperature. This change is higher than the one discussed in the August 9 meeting as being applicable to H. B. Robinson, due to the assumption by Westinghouse of a water volume in the accumulators which cannot be presently assured in the H. B. Robinson accumulators with the present instrumentation. As a result, subsequent analysis on another plant of similar design was employed to establish the 260°F change, which is judged to be conservative for H. B. Robinson. In addition to the upper head temperature effect, there is an additional penalty due to plugged steam generator tubes of +30°F in PCT, resulting in a total penalty of 290°F in PCT, or a 0.29 change in peaking factor using the correlation contained in the order. The presently approved ECCS analysis for H. B. Robinson with Westinghouse fuel was performed at 2300 MWt and resulted in a PCT of 2200°F with a peaking factor, F_q, of 2.30. Assessing the above penalty factor of 0.29 results in an F_q of 2.01 for a PCT of 2200°F. This penalty accommodates the Exxon fuel since the Exxon analysis for Robinson resulted in a PCT of 2066°F at 2300 MWt and an F_q of 2.30.

Since H. B. Robinson is licensed to operate at 2200 MWt, the magnitude of the penalty may be reduced to account for the difference between licensed power level and analytical power level. The resulting value of F_q which we propose, therefore, is 2.10 for continued operation of the Robinson Plant at 2200 MWt. We will employ the Axial Power Distribution Monitoring System (APDMS) to monitor plant operation to assure conformance with this peaking factor at all power levels in excess of 90% full power.

With respect to the second part of the order concerning rod bow penalty factors, advantage may again be taken of the reduced licensed power as opposed to the power level of 2300 MWt at which the DNB analyses have been performed. Applying this power reduction to the penalty factors in the order, we calculate that no penalty would be applied to $F^N_{\Delta H}$ for fuel with no burnup prior to this operating cycle (Cycle 1 fuel in the NRC formula), a 1.45% reduction in $F^N_{\Delta H}$ would be applied for fuel with one cycle of operation prior to this operating cycle (Cycle 2 fuel in the NRC formula), and a 2.45% reduction in $F^N_{\Delta H}$ would be applied for fuel with two cycles of operation prior to this operating cycle (Cycle 3 fuel in the NRC formula). During the present operating cycle, the core is composed of 52 Exxon assemblies which are defined as Cycle 1 fuel, 104 Westinghouse assemblies which are defined as Cycle 2 fuel, and 1 assembly which is defined as Cycle 3 fuel.

Sufficient margin exists between the measured values of $F^N_{\Delta H}$ and the limiting values such that a reduction in power will not be necessary as a result of rod bowing penalties. The reduced value of F_q may or may not necessitate a power reduction, depending on the characteristics of the as-measured core with respect to the new limits. As required by your order, the H. B. Robinson Plant is operating within the above limits.

Yours very truly,

E. E. Utley
Vice President
Bulk Power Supply

MFP/dkm

cc: Mr. Norman C. Moseley