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SUBJECT: Submits required 10CFR50.46(a)(3)(ii) info re estimated effect on error identified in ECCS evaluation model. Each error discovered & impact of each error on PCT, discussed.

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Serial: RNP-RA/98-0144

**JUL 30 1998**

United States Nuclear Regulatory Commission

Attn: Document Control Desk

Washington, DC 20555

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

DOCKET NO. 50-261/LICENSE NO. DPR-23

ESTIMATES OF SIGNIFICANT ERRORS IN THE APPLICATION  
OF THE LARGE BREAK LOSS OF COOLANT ACCIDENT MODEL

Sir or Madam:

This letter submits information to the NRC required in accordance with 10 CFR 50.46(a)(3)(ii) for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, regarding the estimated effect of an error identified in the Emergency Core Cooling System (ECCS) evaluation model. The sum of the absolute values of the estimated effects on calculated Peak Clad Temperature (PCT) of errors reported by this letter and by previous letter to the NRC dated June 1, 1998, are greater than 50°F. Therefore, the estimated effect on PCT of these errors are required to be reported to the NRC within 30 days, in accordance with 10 CFR 50.46(a)(3)(ii). Each error discovered and the impact of each error on PCT is discussed below.

By letter dated June 1, 1998, Carolina Power & Light (CP&L) Company submitted a report to the NRC in accordance with 10 CFR 50.46(a)(3)(ii) of an error in the Siemens Power Corporation (SPC) EXEM PWR Large Break Loss-of-Coolant Accident (LBLOCA) evaluation model<sup>1</sup>. The CP&L letter identified that small changes in the input to the RELAP4 model could result in large changes in the calculated PCT. The RELAP4 computer model is used in calculating the PCT for the LBLOCA. The variability in calculated PCT was considered excessive when compared to the size of the input changes. To estimate the effect of the error associated with the RELAP4 model, SPC developed a revised RELAP4 model for calculating LBLOCA PCT values that eliminated the excessive variability in the calculated PCT. The estimated PCT effect of this error was -90°F.

<sup>1</sup> EXEM PWR LBLOCA Evaluation Model as accepted in NRC Letter, D. M. Crutchfield (NRC) to G. N. Ward, "Safety Evaluation of Exxon Nuclear Corporation's Large Break ECCS Evaluation Model EXEM/PWR and Acceptance for Referencing of Related Licensing Topical Reports," July 8, 1986.

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Subsequent to CP&L's letter to the NRC dated June 1, 1998, SPC identified an error in the revised RELAP4 model used to estimate the PCT effect of the excessive variability error in the approved RELAP4 model. The error in the revised RELAP4 model consisted of converting the units for the fuel elastic deformation value from inches to feet twice instead of once. The revised RELAP4 model was corrected, and the estimated PCT effect of this correction to the revised RELAP4 model is  $-10^{\circ}\text{F}$ .

SPC has identified an error in the re-normalization of the decay heat in RELAP4 at the initiation of the LBLOCA. The re-normalization incorrectly adjusted the fission product decay heat by slightly less than the required 1.2 multiplier on the RELAP4 decay heat equations. The PCT effect of the error was estimated using the revised RELAP4 model which eliminated the excessive variability error, and the estimated PCT effect of this error is  $+37^{\circ}\text{F}$ .

SPC has identified an error in the calculation of the fuel average temperature in RELAP4. The error consists of use of one half of the volume of the first gap node for computing the fuel volume. The PCT effect of the error was estimated using the revised RELAP4 model which eliminated the excessive variability error, and the estimated PCT effect of this error is  $+3^{\circ}\text{F}$ .

SPC has identified an error in the calculation of the gap dimensions in RODEX2<sup>2</sup>. The error consists of use of the gap dimension calculated from the EXEM PWR code which calculates the hot rod heatup, TOODEE2, during zero power hot standby conditions rather than at cold shutdown conditions. The PCT effect of the error was estimated using the revised RELAP4 model which eliminated the excessive variability error, and the estimated PCT effect of this error is  $+2^{\circ}\text{F}$ .

The previously reported LBLOCA calculated PCT values for HBRSEP, Unit No. 2 was  $2114^{\circ}\text{F}$  for the LBLOCA during the ECCS Injection Mode. The total estimated PCT effect of the errors reported in this letter and in CP&L letter dated June 1, 1998, is  $-58^{\circ}\text{F}$ . Since the total effects of these errors result in an estimated PCT that is less than the previously reported value, the currently reported LBLOCA Injection Mode PCT value of  $2114^{\circ}\text{F}$  is not reduced.

The current PCTs associated with Loss-of-Coolant Accidents (LOCAs) are not changed but are listed below.

<u>Event</u>	<u>PCT (<math>^{\circ}\text{F}</math>)</u>
LBLOCA ECCS Injection Mode	2114
LBLOCA Transfer to Recirculation Mode	2102

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<sup>2</sup> XN-NF-81-58(P)(A), "RODEX 2 Fuel Rod Thermal-Mechanical Response Evaluation Model," Supplements 1 and 2, Revision 2, Siemens Power Corporation (NRC Safety Evaluation Report Issued November 16, 1983).

Event

PCT (°F)

Small Break (SB) LOCA ECCS Injection Mode

1978

SB LOCA Transfer to Recirculation Mode

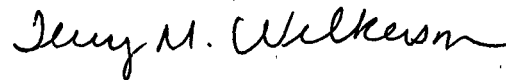
No Heatup

During Switch-over

As stated in CP&L letter dated June 1, 1998, SPC has scheduled submittal to the NRC of a revised LBLOCA evaluation model that eliminates the excessive variability of the calculated PCT by August 31, 1998. A re-analysis of HBRSEP, Unit No. 2, LBLOCA PCT during the ECCS Injection Mode will be performed within nine (9) months of NRC approval of the SPC revision to the LBLOCA evaluation model.

If you have any questions concerning this matter, please contact Mr. H. K. Chernoff of my staff.

Very truly yours,



T. M. Wilkerson

Manager, Regulatory Affairs

ALG/alg

Attachment

c: Mr. L. A. Reyes, USNRC, Region II  
Mr. J. W. Shea, USNRC  
USNRC Resident Inspector, HBRSEP