

OPPD

**Omaha Public Power District**  
1623 Harney Omaha, Nebraska 68102  
402/536-4000

March 25, 1985  
LIC-85-122

Mr. James R. Miller, Chief  
Office of Nuclear Reactor Regulation  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

- References: (1) Docket No. 50-285
- (2) Letter from OPPD (W. C. Jones) to NRC (Robert A. Clark),  
dated December 29, 1982, LIC-82-410.

Dear Mr. Miller:

**Error in LOCA-ECCS Analysis for Fort Calhoun Station**

On March 15, 1985, Omaha Public Power District received a preliminary notification from our fuel vendor, Exxon Nuclear Co. (ENC), that a coding error had been discovered in the Fort Calhoun Station Unit No. 1 LOCA-ECCS analysis. This error could potentially result in a 55°F non-conservatism in the Peak Clad Temperature (PCT). ENC also notified the District that formal notification would be provided by March 19, 1985. Based upon the preliminary report, the District immediately assessed the implications of the error and determined that the 10 CFR 50.46 PCT limit of 2200°F was not exceeded by a preliminary revised value of 2107°F (55°F + 2052°F from the Cycle 8 analysis), the Reactor Protective System (RPS) setpoints remained valid, all Technical Specifications remained valid and no unreviewed safety question existed pursuant to 10 CFR 50.59. The District also assessed the situation against the criteria of 10 CFR 50.72 and 50.73 and determined it was not reportable. The NRC Resident Inspector, Mr. L. A. Yandell, was notified of the potential problem and our conclusions regarding the safety significance and reportability.

On March 19, 1985, the District received formal notification from ENC of the coding error discovered in the LOCA-ECCS analysis for the Fort Calhoun Station Unit No. 1. The error was contained in the EXEM/PWR model used to perform the Cycle 8 Large Break LOCA Analysis as described in Reference 2. The EXEM/PWR model has been approved by the staff for use on Fort Calhoun Station. Based upon our March 20, 1985, review of the Cycle 8 EXEM/PWR LOCA-ECCS analysis results and our discussions with ENC, we have concluded that the LOCA models were correctly used in the Cycle 8 LOCA-ECCS analysis and that no credit was taken for heat transfer augmentation (HTAF = 1.0). The coding error discovered by ENC was contained in the TOODEE2 model used for reflood/heatup, specifically in the heat transfer augmentation option section. The effect of the error was to

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enhance the heat transfer coefficient during reflood, thus underpredicting the Peak Clad Temperature (PCT). The correct coding is of the form:

$$HTAF = 1.0 + a (FLOCAL - 1.0)$$

where: HTAF = heat transfer augmentation factor

a = a constant for augmenting the heat transfer

FLOCAL = the local heat transfer factor. This variable would have been set equal to 1.0 for Fort Calhoun Station to turn off the augmentation option, i.e., to result in a multiplier of 1.0.

The incorrect coding used was of the form:

$$HTAF = b * FLOCAL$$

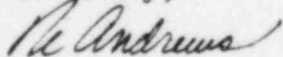
where: b = a constant for augmenting heat transfer

In the notification, ENC informed the District that a coding correction to the form of the first equation was performed and the limiting case reanalyzed. We have reviewed the results of the re-analysis which showed an increase in the PCT of 52°F, from 2052° to 2104°, and found them to be acceptable. The increase in PCT was assessed against the conclusions of the Fort Calhoun Station Updated Safety Analysis Report. The USAR shows that the Cycle 8 analysis (PCT = 2052°F) is bounded by the results of the Cycle 6 analysis (PCT = 2195°F). Since the increase to 2104°F is still bounded by the Cycle 6 results, the conclusions of the USAR remain valid.

It is our understanding that ENC initially had reported the error pursuant to 10 CFR 50 Appendix K in that it resulted in calculated fuel cladding temperatures greater than 20°F in excess of those previously reported. Subsequently, ENC has reported the error to the NRC pursuant to 10 CFR Part 21. Since receipt of the formal results from ENC, our conclusions remain the same; i.e., no unreviewed safety question (10 CFR 50.59) exists; the defect or non-compliance does not constitute a substantial safety hazard and is not reportable under 10 CFR Part 21; nor does this discrepancy meet criteria of 10 CFR 50.72, or 10 CFR 50.73 requiring reporting to the Commission.

Based upon the reanalysis, the District finds that the PCT remains below the 2200°F limit and Fort Calhoun Station is still in compliance with 10 CFR 50.46.

Sincerely,



R. L. Andrews  
Division Manager  
Nuclear Production

RLA/rh

cc: LeBoeuf, Lamb, Leiby & MacRae  
1333 New Hampshire Avenue, N.W.  
Washington, DC 20036

Mr. E. G. Tourigny, NRC Project Manager  
Mr. L. A. Yandell, NRC Senior Resident Inspector