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U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Gentlemen:

SUBJECT: Cycle 11 Setpoint Errors

The purpose of this letter is to summarize the discussion on June 30, 1988 between members of the NRC's NRR and Region IV Staff and the Omaha Public Power District (OPPD) regarding non-conservative errors discovered in the Cycle 11 setpoint analysis and corrective actions taken.

During performance of the Cycle 12 Reload Analysis at OPPD, discrepancies in the Cycle 11 Setpoint Analysis were discovered. A meeting was held on June 28, 1988 to discuss these discrepancies. Based on the results of this meeting, it was confirmed that errors existed in the current Cycle 11 Setpoint Analysis. The impact of these errors was not quantified, but the errors were known to affect Technical Specification Figure 1-3 for the Thermal Margin Trip Setpoint and Technical Specification Figure 2-6 for the Excore Monitoring Linear Heat Rate (LHR) Limiting Condition for Operation (LCO).

Following the meeting on June 28, 1988, the Reactor Engineer initiated several interim corrective actions to ensure conservative plant operation during the period in which the discrepancies were being quantified.

The Reactor Engineer contacted the Shift Supervisor and discussed with him the conservative actions to be taken until the errors could be quantified. The Shift Supervisor placed in his log instructions that if any situation arose that necessitated the use of the excore linear heat rate LCO, the unit would be brought to 80% power and not the 90% power level identified in Technical Specification Figure 2-6. In addition, instructions were provided that the unit was to be held at 90% power and the core inlet temperature maintained at 541°F until the situation was resolved.

After this discussion, the Reactor Engineer called the Manager-Fort Calhoun Station and apprised him of the above described events. They discussed the applicability of entering an LCO. This was not done because the error in the TM/LP trip had not been quantified. Based on the Manager - Fort Calhoun

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Station's recommendation, the Reactor Engineer also called the Manager-Administrative & Training Services to discuss the situation. The Manager-Administrative & Training Services communicated with other management personnel. The Reactor Engineer called the night Shift Supervisor to fully brief him on the circumstances related to the information contained in the Shift Supervisor's Log.

On June 29, 1988, the Reactor Engineer was notified that the Thermal Margin Pvar equation used in the RPS trip units was nonconservative by approximately 80 psi based on preliminary calculations which remained to be independently reviewed. It would take several hours to perform the analysis verification and confirm the exact value needed to place the TM/LP trip units back in a conservative condition. The Plant Manager and his staff were immediately brought up to date on this latest development.

At 0920, although the exact degree of nonconservatism had not been identified, the station was placed in a 12 hour LCO per Technical Specification 2.15(3). The TM/LP trip units were declared inoperable and recalibration was initiated. The Plant Manager also stipulated that, at four hours into the LCO, if significant progress had not been made on recalibration of the trip units, a shutdown would be initiated. A conservative value was chosen such that it would bound the analytical result determined by the engineering staff. Per 10 CFR 50.72, at 1230, a four hour report was made to the NRC. By 1730 the recalibration and the operability surveillance tests were completed and the four trip units had again been declared operable.

The root cause of the errors was determined to result from procedural omissions in training by Combustion Engineering and a misunderstanding between CE and the OPPD Staff during the training. This training was provided to permit conversion from hand calculation methods of setpoint generation to a less time consuming computer aided technique, which also reduces the probability of analysis error. During the training, the CE Instructor assumed the OPPD Staff would incorporate a temperature dependent radial peaking factor penalty into the analysis, while the OPPD Staff assumed that all inputs were explicitly identified by the code and procedure. As a result, the penalty factor was not incorporated into the Cycle 11 Setpoint Analysis, which affected Technical Specification Figure 1-3. A second error occurred for the same reasons with respect to use of transient analysis and LOCA required overpower margins (ROPM's) for Technical Specification Figure 2-6. Failure to identify the error during verification of the analysis resulted from turnover of experienced staff and the necessity to use a qualified but less experienced independent reviewer.

After the June 28, 1988 meeting, the CE setpoint expert was instructed to completely and independently reanalyze the required Cycle 11 setpoints and determine the degree of nonconservatism in any part of the analysis performed by OPPD. No other nonconservatism, other than those already identified, were found to exist. A verification of the CE Setpoint expert's analysis was performed. Results of the reanalysis were reported to the Manager-Fort Calhoun Station and the Reactor Engineer after completion of the reanalysis on June 30, 1988. The reanalysis showed nonconservatism of 79 psia in the Pvar equation

of Technical Specification Figure 1-3 and 4% power in Technical Specification Figure 2-6 at the maximum permissible power. In addition, verification of the previous cycles (i.e., Cycle 10) setpoints were verified to be correct by CE.

To prevent this error from occurring in the future, Combustion Engineering is revising the analysis procedure for use of the computer aided setpoint generation code. At the time the analysis error occurred, both the analyst and the analysis reviewer had recently been trained by CE to perform the computer aided analysis and thus had the same misconceptions regarding the analysis methods. Since Cycle 11 additional personnel have been trained and qualified in setpoint analysis. OPPD Staff qualified to perform setpoint analyses have now been informed of the appropriate analysis methods and it is unlikely that even without the analysis procedure correction that the same error could again occur. In addition, OPPD has committed to having CE perform independent reviews of any portion of a reload analysis when sufficiently experienced OPPD personnel are not available.

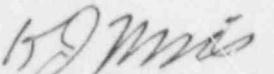
To ensure continued safe operation for the remainder of Cycle 11, which is expected to end on approximately September 2, 1988, the following corrective measures have been or are being taken:

1. As discussed above, the RPS Thermal Margin Calculator Setpoints have been adjusted by 100 psia to conservatively account for the 79 psia nonconservatism identified in the reanalysis. This 79 psia corresponds to a 2.63% nonconservatism in the total integrated radial peaking factor (F_{RT}) which resulted from a failure to apply the penalty factor.
2. It has been determined that Cycle 11 operations have not resulted in a full power total integrated radial peaking factor in excess of 1.70 (e.g. actual maximum has been 1.68). The Technical Specification limit for this parameter is 1.80 yielding an additional Cycle 11 operating margin of 5.56% (for $F_{RT} = 1.70$) or approximately a 180 psia conservatism to the Thermal Margin Pvar equation.
3. It has been concluded that prior to revising the Thermal Margin trip setpoints in (1) above that at no time during Cycle 11 operation had the setpoint margin requirements been exceeded.
4. Should loss of the incore monitoring ability combined with lack of a valid power distribution result in use of the excore monitoring LHR LCO (e.g., Technical Specification Figure 2-6) versus the normally used incore monitoring DNB LCO (Technical Specification Figure 2-7), power shall be immediately reduced to 80% of rated power. Revisions to the Technical Data Book Figures III.16.b, III.16.b.1, III.16.b.2, and III.16.c have been prepared and implemented into the Operating Manual, Volume I. It should be noted that use of the excore monitoring LHR LCO has not been required within at least the previous twelve years of operation and that use of this LCO is not expected to be required during the remainder of Cycle 11 operation.

5. It has been concluded that should use of the excore monitoring LHR LCO have been necessary during Cycle 11 operation, sufficient margin would have existed due to margin between the actual total planar radial peaking factor (F_{XY}^T) and the Technical Specification limit of 1.85 to have prevented exceeding any of the required LHR margins. The maximum F_{XY}^T occurring during Cycle 11 to date has been 1.72 which yields a margin of 7.0%.
6. An Operations memo has been issued notifying Operations to utilize the Technical Data Book figures in lieu of Technical Specification Figures 1-3 and 2-6.

In conclusion, OPPD discovered two errors in the Cycle 11 setpoint analysis and has taken appropriate and timely corrective actions to ensure continued safe operation through changes of RPS Thermal Margin trip setpoints, administrative restrictions on core inlet temperature, and revision of Technical Data Book Figures related to the excore monitoring LHR LCO, as well as corrections to CPPD setpoint analysis methods.

Sincerely,


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