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SUBJECT: Application for amend to Licenses DPR-58 & DPR-74 consisting of changes to ECCS analysis & power distribution limits Tech Specs.

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April 7, 1982
AEP:NRC:0665

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
ECCS ANALYSIS AND POWER DISTRIBUTION LIMITS TECHNICAL SPECIFICATIONS

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Denton:

On December 15 and 17, 1981, Westinghouse informed the NRC of a potential problem regarding large break ECCS analyses for Westinghouse Plants. The potential problem is that single failure of the emergency safeguards equipment assumed in the large break ECCS analysis may not represent the most limiting assumption. In fact, for both Units of the D. C. Cook Nuclear Plant, it is more conservative to assume no failure in the emergency safeguards equipment.

Attachment 1 to this letter presents the information provided to us by Exxon Nuclear Company (ENC), the manufacturer of Unit 1's fuel. This information is responsive to the requests made in Themis P. Speis' (NRC) letter to Gerald F. Owsley (ENC), dated January 26, 1982. As a result of the ENC analyses; changes to D. C. Cook Unit 1 Technical Specifications are deemed necessary and are enclosed in Attachment 2 to this letter. The proposed F_q limit of 2.04 will assure compliance with the 10 CFR 50.46 limits with maximum LHSI (RHR) flow. Attachment 2 also includes a revised K(Z) curve (Figure 3.2.2) which accounts both for the new F_q limit of 2.04 and for a necessary correction to the linear heat generation rate (kw/ft) limit at the top one-foot of the core. Since this figure had not been changed in our transmittal letter No. AEP:NRC:0363 dated May 5, 1980, we are now forwarding a correct version of this figure to you. This error was reported to NRC-Region III via LER No. 81-056/99T-0, on December 21, 1981. In W. G. Smith's letter to J. G. Keppler dated March 11, 1982, AEPSC had committed to submit the revised K(Z) curve by March 31, 1982. However, Mr. D. W. Hayes of your office granted us an extension until April 10, 1982 in which to respond.

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Attachment 3 summarizes the information provided by Westinghouse, the manufacturer of the Unit 2's fuel, on the impact on Unit 2 of assuming no single ECCS failure. The results clearly show

that no corrective actions are required and, therefore, no Technical Specification changes are submitted for Unit 2. Furthermore, both fuel vendors state their belief that more realistic analyses would show that the single failure of one train of RHR pumps would still be the most limiting case.

The topic of this letter has been reviewed by the AEPSC Nuclear Safety and Design Review Committee (NSDRC). The proposed Technical Specification changes were reviewed in a generic form. They will be reviewed in a specific form at the next meeting of the NSDRC. This letter and its attachments have also been reviewed and approved by the Plant Nuclear Safety and Review Committee (PNSRC).

AEPSC interprets the Technical Specification changes contained in Attachment 2 to constitute a Class II Amendment as defined in 10.CFR.170.22. Enclosed, therefore, is a check in the amount of $1,200 for the processing of the aforementioned request.

This document has been prepared following Corporate Procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

R. F. Hering
Vice President

cc: John E. Dolan - Columbus
R. W. Jurgensen
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Charnoff
Joe Williams, Jr.
NRC Resident Inspector at Cook Plant - Bridgman
R. S. Hunter

Attachment 1 to AEP:NRC:0665

Donald C. Cook Nuclear Plant

Unit 1

Responses to NRC requests for D. C. Cook Unit 1

1. NRC Request: Determine if maximum LHSI could be the worst assumption for any plant using your large break PWR evaluation model. Include any considerations of this assumption you may have made in the past.

Response: The ECCS analysis for D. C. Cook Unit 1 was reexamined by assuming a conservatively high LHSI (RHR) flow. The results were compared to the existing analysis which is for a single RHR pump operation. The single RHR pump analysis results for D. C. Cook Unit 1 show the downcomer to fill very rapidly during the reflood period due to the high accumulator flow. Once the downcomer is full, the RHR flow in excess of that required to sustain the reflood rate spills to the containment. Thus, the increased coolant flow from operation of two RHR pumps is insignificant in increasing the calculated reflood rate; in fact, due to the conservatism of the evaluation model, the extra water introduced into the system would be calculated to degrade the reflood rate because of increased steam binding, which acts to restrict ECCS flow into the core. This is partly because the evaluation model assumes the water flowing out the break is fully effective in condensing the steam in the containment, thus further lowering the containment pressure.

Equilibrium assumptions are conservatively employed in both the reflood and containment pressure calculations. In both cases, this assumption enhances the calculated detrimental effects of increased LHSI flow.

ENC did not analyze maximum LHSI cases in the past since they concluded that a realistic analysis would confirm that the loss of LHSI pump is the worst single failure. Further, the worst single failure required for LOCA-ECCS analysis is a characteristic of a particular NSSS and the associated ECCS design, and is independent of fuel design.

2. NRC Request: If maximum LHSI could be the worst assumption, determine the impact on licensing analyses relative to the 50.46 ECCS limits. If these limits could be exceeded, determine the impact on operating technical specifications and arrange with the licensees or customers to make appropriate modifications.

Response: ENC has made a conservative estimate of the effect of maximum RHR flow in the D. C. Cook Unit 1 plant. These conservative analyses resulted in an increase in PCT of 42°F. Based on sensitivity studies previously performed for D. C. Cook Unit 1 which showed a relationship of PCT vs F_Q of 15°F per 0.01 in F_Q, it is concluded that the maximum peaking factor reduction from the current Technical Specification Limit (2.07-2.10) to 2.04 would assure that 10 CFR 50.46 ECCS limits would not be exceeded with maximum RHR flow with the evaluation model which has been used for previous D. C. Cook Unit 1 analyses.

3. NRC Request: Discuss what you believe the effect of this assumption would be using more realistic analyses.

Response: The increased LHSI flow assumption which, based on conservative EM calculations, could be calculated to increase PCT would, in fact, mitigate the consequences of the accident:

a. The EM assumes that the increased ECCS flow spilling out the break during reflood would condense more steam, thus lowering the containment backpressure; while in fact, the increased flow should not significantly affect the condensation rate because of lack of dispersion and thus, as a minimum, would not affect the containment backpressure.

b. The EM assumes full carryover of core effluent during reflood to be in the form of steam flowing through steam generators and hence resisting the reflood flows; while a realistic calculation would show de-entrainment (separation of liquid phase) occurring in the reactor vessel upper plenum. Such de-entrainment will result in an increased reflood rate. The higher LHSI flow will be available to sustain this increased rate, thus leading to lower PCT.

Attachment 2 to AEP:NRC:0665

Donald C. Cook Nuclear Plant

Unit 1

Technical Specifications Changes