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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards response to Franklin Research Ctr 820115 request for addl info re IE Bulletin 80-04, "Main Steam Line Break w/Continued Feedwater Addition." Response also contains revisions per 820302 & 03 telcons.

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April 26, 1982
AEP:NRC:0291B

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
ADDITIONAL INFORMATION RELATIVE TO IE BULLETIN NO. 80-04

APR 28 1982
US NUCLEAR REGULATORY COMMISSION
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Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Denton:

The attachment to this letter contains our response to a Franklin Research Center (FRC) Request for Information concerning IE Bulletin No. 80-04, "Main Steam Line Break with Continuing Feedwater Addition", transmitted to us via Mr. S. A. Varga's letter of January 15, 1982. We were informed during telephone discussions with members of your staff held on March 2 and 3, 1982 of revisions made to the FRC Request. Accordingly, our response reflects the revised version of the Request. As was discussed with members of your staff on March 3 and March 18, 1982 this submittal has been delayed pending verification of specified analytical results by the NSSS Vendor.

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. S. Hunter
Vice President

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/md

cc: John E. Dolan - Columbus
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8204300426

Attachment to AEP:NRC:0291B
Additional Information on IE Bulletin 80-04

Evaluation of Steam Line Break Events for Donald C. Cook Nuclear Plant

Our response to IE Bulletin No. 80-04, AEP:NRC:00291A dated April 8, 1980, summarized the review of the containment and reactor coolant system responses to postulated main steam line breaks (MSLBs) for the Donald C. Cook Nuclear Plant. On the basis of our review, we concluded that the MSLB containment and reactor coolant system analyses reported in the Final Safety Analysis Report (FSAR) adequately address the concerns of IE Bulletin No. 80-04. We have not altered our conclusions subsequent to review of the revised Franklin Research Center (FRC) Request for Additional Information.

Background Information

Numerous MSLB analyses have been performed to determine the most severe conditions for containment pressure and temperature response. These analyses considered potential failures such as main steam isolation valve (MSIV) failure, main feedwater (MFW) isolation valve failure, failure of a MFW pump to trip, or failure of the auxiliary feedwater (AFW) runout control system. The results of those analyses are presented in the FSAR, in particular in our response to NRC Question 022.9 contained in Appendix Q to the FSAR. Additional analyses of the containment response to small MSLBs are summarized in our AEP:NRC:00131 submittal dated 01 April 1980. It should be noted that the analyses performed in conjunction with Question 022.9 and AEP:NRC:00131 were performed with the specific intent of determining which MSLB, with a corresponding worst case single failure, resulted in the most severe containment temperature and pressure conditions.

It should be noted that the text of our response to Question 022.9 incorrectly states that the 1.4 ft^2 break at 102% power with a MSIV failure was the "worst case" large MSLB. Review of table 022.9-3 clearly shows that the highest peak containment temperature following a large MSLB corresponds to a 4.6 ft^2 break at 102% power with a failed MSIV. This editorial inconsistency and the inclusion of the temperature time history (figure 022.9-1) for the 1.4 ft^2 break instead of the 4.6 ft^2 break, do not impact the conclusions of our response to Question 022.9, AEP:NRC:00131, or this submittal. The necessary modifications to our response to Question 022.9 will be incorporated into our FSAR update program.

FRANKLIN RESEARCH CENTER (FRC) REQUESTS

Item 1: Justify the assumed ten minute time for operator action to terminate auxiliary feedwater flow to the faulted steam generator.

RESPONSE

A safety injection signal, generated a few seconds after the break, would result in MFW isolation. Thus, the only source of water available to the faulted steam generator is the AFW system. Following the break, pressure in the steamline from the faulted steam generator will decrease rapidly while pressure in the intact secondary loops will stabilize. Indication of the differential pressure between steamlines would be available to the operator within a few seconds after steamline isolation. (Note: The MSIVs close within 5 seconds of receipt of a "Steamline Isolation" signal.) This will provide the information necessary for the operator to identify the faulted steam generator and to isolate AFW flow to that generator. The means for detecting the faulted steam generator and terminating AFW requires only the use of safety grade equipment. All of the controls required to perform the above actions are located in the main control room.

The existing MSLB analyses assume that the operator terminates AFW flow to the faulted steam generator ten minutes after initiation of the event. This assumption is consistent with the design basis of the Cook Plant and is justifiable based on the indications available to the operator to identify the faulted steam generator and the time frame in which the indications would become available.

Item 2: Provide evidence that margin exists beyond ten minutes to account for delayed termination of auxiliary feedwater to the faulted steam generator.

Response:

Review of the existing MSLB analyses indicates that the total integrated energy released to the containment during the first ten minutes of the worst case large MSLB, the 4.6 ft^2 break at 102% power with a failed MSIV, is not sufficient to cause ice bed meltout. We have been informed by Westinghouse Electric Corporation that in excess of one million pounds of ice, approximately 50% of the initial inventory required by the Plant Technical Specifications, are not melted ten minutes after the worst case break. The presence of this ice, which represents a substantial heat sink, provides significant margin beyond the assumed ten minute operator action time for termination of AFW flow to the faulted steam generator. Clearly, the combined effects of the remaining ice inventory, containment spray flow, heat transfer to passive heat sinks, and the decreasing decay heat load indicate that extended operation of AFW flow aligned to the faulted steam generator, although unlikely, would not pose a threat to the containment.

Conclusions

For reasons cited above, we have concluded that:

(1) the assumed ten minute time period for operator action is justified, and

(2) extended operation of AFW aligned to the faulted steam generator, although unlikely, would not pose a threat to the containment.

(3) No modifications, procedural or of equipment, are necessary at the Donald C. Cook Nuclear Plant.

(4) Quantification of the time (beyond ten minutes) required to melt the remaining ice, assuming continued AFW flow to the faulted steam generator, would require detailed analyses considering such factors as passive heat sinks, spray heat removal, decay heat load, and the sensible heat available for boiling-off of AFW in the faulted generator. The fact that greater than one million pounds of ice, approximately 50% of the initial inventory required by the Plant Technical Specifications, remains after ten minutes, clearly shows that substantial margin exists beyond ten minutes and that further analysis is not warranted.