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Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
Subject: IE Bulletin 80-04: Analysis of a PWR Main Steam Break with Continued Feedwater Addition

Mr. James G. Keppler, Director
U.S. Nuclear Regulatory Commission, Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Dear Mr. Keppler:

This letter responds to IE Bulletin No. 80-04 received on February 13, 1980. The Bulletin addressed possible non-conservative assumptions in the calculation of reactor system and containment responses to steam line break events. The attachment to this letter summarizes the review which was performed for the Donald C. Cook Nuclear Plant. On the basis of the review, we have concluded that our present steam line break containment and reactor system analyses as reported in the Cook Plant FSAR adequately address the concerns of the bulletin.

Very truly yours,

John E. Dolan

John E. Dolan
Vice President

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EVALUATION OF STEAM LINE BREAK EVENTS FOR DONALD C. COOK PLANT FOR IE BULLETIN 80-04

The containment and Reactor Coolant System (RCS) responses to postulated Steam Line Break (SLB) Events have been analyzed in considerable detail for the Donald C. Cook Nuclear Plant. Results of these analysis are reported in FSAR sections 14.2.5 (both Units 1 and 2) and Appendix Q (questions 22.9, 212.7, 212.23, 212.24, 212.25, 212.34, 212.35 and 212.39). Further information has been supplied in our transmittal No. AEP:NRC:00131 dated April 1, 1980.

A review of the containment response analysis (in particular Q22.9) reveals that the potential impact of various flow control failures have been addressed for the Cook Plant. A series of break sizes and initial reactor power levels were analyzed in conjunction with potential failures such as main steam isolation valve (MSIV) failure, feedwater isolation valve failure, failure of main feedwater pump to trip, or failure of the auxiliary feedwater runout control system, in order to determine the most severe break conditions for the containment pressure and temperature response. The analysis indicated that the worst large SLB is a 1.4 ft^2 break occuring at 102% power in conjunction with a MSIV failure. The worst split break (small break) is a 0.942 ft^2 severance occuring at 30% power in conjunction with the failure of the auxiliary feedwater runout control system. In all cases analyzed, the combined mitigating actions of the ice condenser, containment spray system and the passive structural heat sinks controlled the transient such that a containment overpressure condition was never calculated to occur.

Item 2 of the Bulletin addresses the core power transients associated with SLB events. Westinghouse has reviewed the assumptions made for main and auxiliary feedwater flow during the event. The following input assumptions made in the Cook Plant analysis are relevant to the current concerns.

1. The reactor is assumed to be initially in a hot shutdown condition at the minimum allowable shutdown margin. Further, reactivity response parameters were chosen as to both minimize the moderator temperature coefficient and underpredict beneficial feedback effects such as Doppler and void coefficients. Minimum boron injection capability concurrent with the most restrictive single failure in the safety injection system was assumed.

2. In the analysis of a double ended SLB, all main feedwater flow is assumed from the beginning of the transient at a very conservative cold temperature thereby maximizing the RCS cooldown.

3. All auxiliary feedwater pumps are initially assumed to be operating in addition to the main feedwater pumps. The initial flow is equivalent to the rated flow of all pumps at the steam generator design pressure.

4. Feedwater is assumed to continue at its initial flow rate until feedwater isolation is complete approximately ten seconds after the break occurs, while auxiliary feedwater is assumed to continue at its initial flow rate. Isolation of main feedwater is redundant in the Cook Plant design in that in addition to the normal control actions, a safety injection signal will rapidly close all feedwater control valves, backup feedwater isolation valves, trip the main feedwater pumps and close the main feedwater pump discharge valves.

5. Main feedwater is completely terminated following feedwater isolation.

The analyses performed for the Cook Plant show the core transient results to be insensitive to auxiliary feedwater flow assumptions. The first minute of the transient is dominated entirely by the steam flow contribution to primary-secondary heat transfer which is the forcing function for both the reactivity and thermal hydraulic transients. The effect of the auxiliary feedwater runout control system is minimal. Greater feedwater flows accelerate automatic safeguards actuation (i.e., steamline and feedwater isolation, safety injection, etc.). Therefore, the assumptions listed above are both appropriate and conservative for the short term aspect of the SLB transient.

The auxiliary feedwater flow becomes a dominant factor in determining the duration and magnitude of the steam flow transient during the later stages of the event. However, the limiting core conditions occur during the first minute of the transient due to the higher steam flows inherently present early in the event and the introduction of boron into the core. In the worst scenario analyzed for the Donald C. Cook Plant, which was a complete severance of the steam line at the steam generator outlet with offsite power available, the peak core power never exceeded 25% of full power and DNB was not calculated to occur.

In conclusion, review of the relevant analyses already performed and reported for the Cook Plant for the steam line break provide adequate assurance that the licensing basis remains valid in light of the concerns of IE Bulletin 80-04.