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PLANT NAME: D C Cook #1

ENCLOSURES:

Addl info concerning switchover from injection to recirculation & procedures permitting diversion of flow from the low head pumps to the containment spray systems.....

FOR ACTION/INFORMATION 1-5-76 ehf

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BOWLING GREEN STATION
NEW YORK, N. Y. 10004

December 23, 1975

Donald C. Cook Nuclear Plant, Unit 1
Docket No. 50-315
DPR No. 58

Mr. Benard Rusche, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Rusche:

This letter, including attachments, responds to your letter of December 3, 1975 requesting additional information regarding the switchover from injection to recirculation and procedures permitting diversion of flow from the low head pumps to the containment spray system.

Specific responses attached demonstrate that adequate time is available to perform the switchover from injection to recirculation. This time is based upon a simulated performance of a switchover to determine operator response time, equipment response times determined during preoperational testing, and the steps required for a switchover as described in Attachment A.

Regarding your second question on flow diversion, conservative analyses have been performed to determine the time that diversion to containment sprays is required. The time is based upon assumptions in Appendix N, Questions 0.3.1, Case A to the Donald C. Cook Nuclear Plant Final Safety Analysis Report.

In conjunction with the above responses, several changes to the operating procedures and setpoints have been made, as discussed in Attachment B.

Very truly yours,

John Tillinghast
Vice President

JT:mam
Attachment

cc: R. S. Hunter
R. W. Jurgensen - Bridgman
R. C. Callen
G. Charnoff
P. W. Steketee
R. Walsh
R. J. Vollen

14392

Attachment A

Response to NRC Questions from

December 3, 1975 Letter

NRC Question 1

Demonstrate that adequate time is available to perform the switchover from injection to recirculation.

a) Provide the time required to realign the valves and pumps, including personnel response time, valve actuation times, and the effects of any valve/pump interlocks.

b) Provide a time history of the water inventory in the RWST while the switchover is being performed under the most adverse conditions relative to time available to perform the necessary switchover.

c) If all pumps are shut down during switchover, provide the time available before the core is uncovered.

Response to Question 1

Following an accident the shortest time when the operator must take action to perform the necessary switchover is when both trains of ECCS and spray pumps are in operation at full runout conditions. This is because the RWST is emptying at the fastest possible rate, thus requiring the most rapid operator action to perform the switchover from injection to recirculation.

The limiting times required to switchover the first train of pumps are shown on Figure 1 and the associated RWST level above the low-low level alarm setpoint (613') is shown on Figure 2. Once a single train is switched over and operating, an adequate water supply is assured to both the reactor core and the containment sprays. The switchover of the second train supplies redundant capability. The switchover procedure requires stopping only the RHR pumps, the other pumps run continuously while the RHR pumps are shutdown. At no time in the switchover procedure are all pumps shutdown. Therefore, core uncovery is not expected to occur.

NRC Question 2

The emergency operating procedures permit diversion of flow from the low head pumps to the containment spray system.

a) Specify the minimum time after an accident that an operator would be permitted to divert flow from the ECCS system to the containment spray system. Describe the means by which there will be assurance that diversion will not occur prior to this minimum time.

b) Demonstrate that the amount of coolant entering the core, after diversion to containment spray, provides abundant cooling even with minimum safeguards equipment available.

c) Confirm that the containment pressure analyses previously presented are consistent with the responses to the above questions.

Response to Question 2

In accordance with the conservative assumptions in Appendix N, Question 0.3.1, Case A, the time where RHR spray diversion is required is approximately 5000 seconds following the accident when containment pressure exceeds 8 psig.

The operating procedure permits diversion of flow from the low head RHR pumps to the residual spray header any time after switchover to recirculation when the containment pressure exceeds 8 psig.

Question 2b

For minimum safeguards, one high head safety injection pump and one charging pump would supply the coolant to the core after realignment of a portion of the RHR pump discharge to the containment sprays. The amount of water which would be supplied to the core at an RCS pressure of 10 psig (which is approximately the peak containment pressure) is approximately 110 lbm/sec. The decay heat mass boiloff at 2755 seconds*, which is the minimum time that the RHR pumps can be diverted to RHR spray, is 62.8 lbm/sec based on the following assumptions:

*2755 seconds is the time switchover from injection to recirculation is required with minimum safeguards.

1. 102% of Engineered Safeguard Design Rating of 3391 MWt,

2. ANS Infinite Decay Heat with 20% Margin (10 CFR 50.46 Appendix K),

3. Coolant entering the core is subcooled by 60 BTU/lbm, Therefore, the coolant entering the Reactor Coolant System piping is about 200% of that required by the decay heat mass boiloff, calculated with conservative assumptions.

Question 2c

The assumptions given in response to Question 2b above are the emergency core cooling parameters per Appendix K of 10CFR50.

The containment pressure analysis as shown in Appendix N Question 0.3.1, Case A is based upon the assumption that the RHR flow is diverted to the sprays at 2755 seconds after the accident. Initiation of RHR spray flow at a time when containment pressure exceeds 8 psig should provide adequate margin to suppress the containment pressure at or below the peak pressure presented in Appendix N, Question 0.3.1 Case A.

Therefore, the assumptions presented in the response to 2b above are conservative with respect to the emergency operating procedures related to diversion of RHR spray flow.

Attachment B

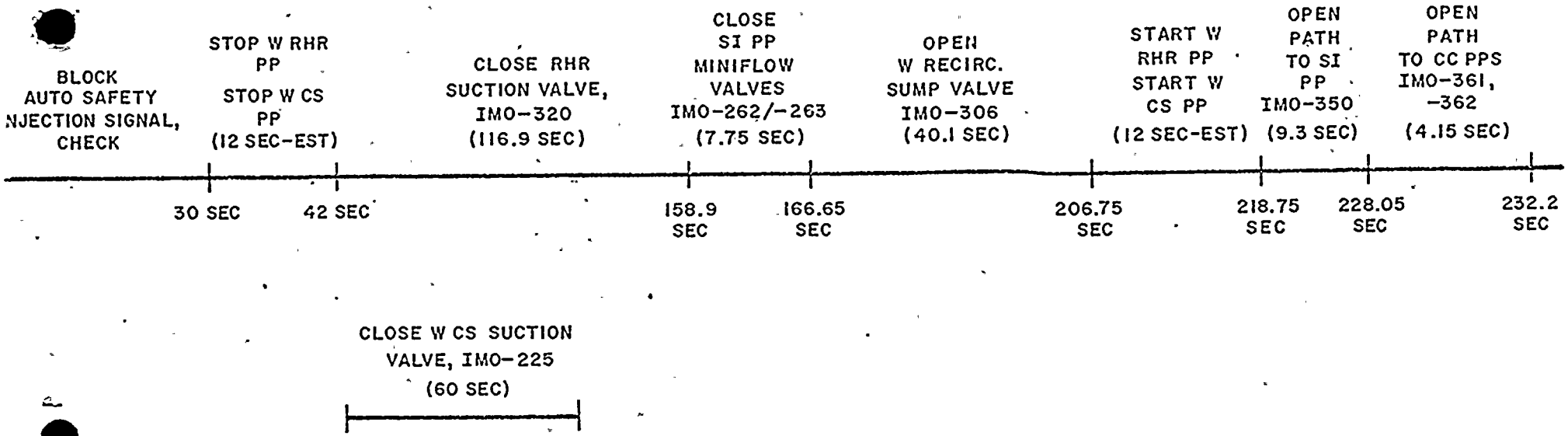
Revisions

The Abnormal Operating Procedure for switchover from injection to recirculation currently states that the first step is to check that a sufficient level exists in the sump to assure adequate NPSH exists for the emergency core cooling and containment spray pumps. The procedure states that switchover must begin at the RWST Low Level Alarm Point. If switchover was performed at the time of adequate NPSH in the containment sump, more than adequate time would have been available to perform the switchover since these conditions occur prior to reaching Low Level Alarm Point. However, to assure, under all circumstances, that the operator has sufficient time to perform the switchover, the Low Level Alarm Point on the Refueling Water Storage Tank has been raised. This point was revised from 614 ft. (50,754 gallons of useable volume) to 620 ft. (131,961 gallons of useable volume). Conservative calculations show that sufficient NPSH exists when this RWST Low Level Alarm Point is reached. Our reviews also reveal the necessity to clarify the conditions at which the operator would be allowed to perform the switchover and the steps to be taken. The procedures are presently being revised to reflect the RWST level change, steps and parameters for diversion of Attachment A.

D.C. COOK NUCLEAR STATION

SWITCHOVER TIME FOR WEST PUMP INJECTION TO RECIRCULATION

FIGURE 1



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REFUELING WATER STORAGE TANK-SWITCHOVER FROM INJECTION TO RECIRCULATION PHASE

ELEVATION, USEABLE VOLUME VS. TIME

FIGURE 2