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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

June 7, 1996

MEMORANDUM TO: Ellis W. Merschoff, Director
Division of Reactor Projects
Region II

FROM: Frederick J. Hebdon, Director
Project Directorate II-3
Office of Nuclear Reactor Regulation

SUBJECT: **TIA 96-001**, REQUEST FOR REVIEW ASSISTANCE OF SEQUOYAH
JCO FOR POTENTIAL DEGRADATION OF ECCS THROTTLE VALVES
DURING A LOCA (TAC NOS. M94780 AND M94781)

Attached is our response to the assistance requested in your February 12, 1996, memorandum to me. The action was to provide review assistance of a justification for continued operation for the Sequoyah plants associated with potential degradation of the throttle valves associated with the ECCS following a loss of coolant accident. The purpose of the review is to disposition a notice of violation (see Inspection Report 50-327, 328/95-18).

The Reactor Systems Branch has completed their review of the questions raised in your memo and has provided the answers in the attached memo dated May 30, 1996. I consider that this action closes out TIA 96-001. Please contact me or the NRR Project Manager, Ron Hernan, at (301) 415-2010 if you have any questions.

Docket Nos: 50-327 and 50-328

Attachment: As stated

cc w/atts: R. Cooper, RI
W. Axelson, RIII
J. Dyer, RIV

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WASHINGTON, D.C. 20555-0001

May 30, 1996

MEMORANDUM TO: Frederick J. Hebdon, Director
Project Directorate II-3
Division of Reactor Projects - I & II

FROM: Robert C. Jones, Chief *Eric W. Stein*
Reactor Systems Branch
Division of Systems Safety and Analysis

SUBJECT: SEQUOYAH - TIA 96-001 CONCERNING POTENTIAL DEGRADATION OF
ECCS DUE TO THROTTLE VALVES EROSION FOLLOWING A LOCA
(TAC NOS. M94780 AND M94781)

This memo provides the Reactor Systems Branch (SRXB) responses to the questions raised in a letter from E. Merschoff of Region II, dated February 12, 1996.

(1) Q: From an EOP perspective, is there an accident scenario that could require the use of the Safety Injection or charging Pump flow paths longer than two days? If so, could the use of these flow paths cause degradation of the ECCS throttle valves to the point that pump damage could occur?

A: Transients and accidents that lead to rapid depressurization of the reactor coolant system (RCS) or loss of RCS inventory would require the use of safety injection or charging pump flow paths for a period of time to provide makeup water to RCS. Among these event scenarios, a postulated Loss of Coolant Accident (LOCA) requires the use of safety injection or charging pump flow paths for more than two days during long term cooling of the reactor core.

In the letters from Westinghouse to TVA dated September 7, 1995, and its Nuclear Safety Advisory Letter NSAL-96-001, it is indicated that during the long term cooling mode following a LOCA, the potential erosion of the throttle valves could cause pump run out and lead to pump damage. The staff has no reason to disagree with the Westinghouse assessment.

(2) Q: Is there a requirement for ECCS components to be available for a specified period of time following a LOCA to satisfy the requirements of 10 CFR 50.46?

A: The ECCS is designed to perform its safety function described in section 6.3 of FSAR including long term cooling. A specific time period is not specified in 10 CFR 50.46. However, Section (b)(4) of 10 CFR 50.46 states that after any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptable low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.

(3) Q: Is the Westinghouse NASL-94-016 (Reference 3 in the JCO) methodology an acceptable method to accomplish the intended objective of hot leg recirculation?

A: The methodology referred to in NASL-94-016 regarding hot leg injection has not been submitted for NRC staff review. However, a similar approach has been used in Babcock & Wilcox (B&W) designed reactors for which the recirculation through reactor internal gaps are credited to backup the required hot leg injection function. Since Westinghouse has evaluated and concluded that long term boron precipitation control could be satisfied by the gap recirculation in Westinghouse reactors, it is likely that the methodology referenced in the licensee's JCO could serve to backup the existing hot leg injection system. We do not see the urgency to perform a detailed review of this methodology at this time.

(4) Q: If a LOCA occurs (large cold leg break with failure of the RHR hot leg MOV) then this RHR flow path is not available for hot leg injection. Based on this condition and the ECCS throttle valve potential degradation issue, is it necessary for the licensee to provide operators additional procedural guidance to assure that design basis events are adequately addressed?

A: As discussed in NRC Information Notice 93-66, an added procedural step to realign the RHR/LPSI pumps to the cold legs under the above stated plant condition will minimize the interruption of core cooling. Also, an operating procedure to prevent premature closing of hot leg injection discharge valve due to potential erosion will improve the availability of hot leg injection. However, we believe that procedural changes will not be sufficient to resolve the issue of boron precipitation for design basis events.

(5) Q: Is the flow path from the safety injection pumps, operating in piggy back mode, to the hot legs considered the redundant method to perform hot leg recirculation? Would the inability to perform hot leg recirculation dictate that the ECCS be considered inoperable?

A: The flow path from the safety injection pumps, operating in piggy back mode to the hot legs could serve as the redundant method to perform hot leg recirculation if this flow path is available for long term operation. However, it is our understanding that this flow path is also equipped with throttle valves of similar design to the valves in question at Sequoyah. Therefore, this flow path may not be available for hot leg injection during long term core cooling.

The design of the ECCS as described in Section 6.3 of FSAR uses hot leg injection to prevent excessive boron precipitation and ensure long term core cooling following a LOCA. However, as we stated in our answer to question No. 3 above, it is likely that the gap recirculation referenced in the licensee's JCO could serve to backup

the existing hot leg injection system. The staff could not ascertain that the potential failure of hot leg injection flow path would cause boron precipitation to the extent that it would affect long term core cooling. Therefore, we consider the ECCS at Sequoyah operable but degraded.

(6) Q: Is the potential degradation of the ECCS throttle valve as discussed in the JCO a condition adverse to quality as defined by 10 CFR 50, Appendix B, Criterion XVI?

A: Based on the current design basis documented in the FSAR, the degradation of ECCS throttle valves as described in the JCO is a condition adverse to quality as defined by 10 CFR 50, Appendix B, Criterion XVI. The licensee has identified the potential problem and justified its continued plant operation with a technical evaluation supported by Westinghouse regarding the need for hot leg recirculation in long term cooling. The Westinghouse Owner's Group (WOG) is planning to submit this methodology in a WCAP for NRC staff review. Section 4.5.1 of the "Resolution of Degraded and NonConforming Conditions," of NRC Generic Letter (GL) 91-18 states that "if a system, structure, or component (SSC) is degraded or nonconforming but operable, the licensee provides authorization to operate and the licensee does not need further justification. The licensee must, however, promptly identify and correct the condition adverse to safety or quality in accordance with 10 CFR 50, Appendix B, Criterion XVI." To satisfy this regulation, the licensee should commit to corrective actions to assure long term operability of the ECCS flow paths using high head ECCS pumps as designed and promptly implement these corrective actions. We are proposing that an NRC Information Notice be issued on this concern.

cc: G. Holahan
A. Chaffee
D. LaBarge

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