



Tennessee Valley Authority, 615 Market Street, Nashville, Tennessee 37203

September 20, 1993

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of)	Docket Nos. 50-327
Tennessee Valley Authority)	50-328
		50-390
		50-391

**SEQUOYAH NUCLEAR PLANT (SQN) AND WATTS BAR NUCLEAR PLANT (WBN) -
TRANSMITTAL OF RESPONSE TO GENERIC LETTER (GL) 93-04 ROD CONTROL SYSTEM
FAILURE AND WITHDRAWAL OF ROD CLUSTER ASSEMBLIES**

Pursuant to the requirements of 10 CFR 50.54(f), NRC issued GL 93-04, "Rod Control System Failure and Withdrawal of Rod Control Cluster Assemblies," on June 21, 1993, addressed to all licensees with the Westinghouse Rod Control System (except Haddam Neck) for action and to all other licensees for information.

The GL requires that, within 45 days from the date of the GL, each addressee provide an assessment of whether or not the licensing basis for each facility is still satisfied with regard to the requirements for system response to a single failure in the rod control system (General Design Criteria [GDC] 25 or equivalent). If the assessment (Required Response 1.(a)) indicates that the licensing basis is not satisfied, then the licensee must describe compensatory short-term actions consistent with the guidelines contained in the GL, and within 90 days, provide a plan and schedule for long-term resolution (Required Response 1.(b) and 2). Subsequent correspondence between the Westinghouse Owners Group (WOG) and NRC resulted in schedular relief for Required Response 1.(a) (NRC letter to Roger Newton dated July 26, 1993).

TVA's letter to NRC dated August 5, 1993, provided TVA's 45-day response to the GL as it applies to SQN and WBN. The response summarized the compensatory actions taken by TVA in response to the Salem Nuclear Plant rod control system failure event (the second part of Required Response 1.(b)). It also provided a summary of the results of the generic safety analysis program conducted by the WOG and its applicability to SQN and WBN.

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TVA hereby submits its 90-day response to the GL as it applies to SQM and WBN. Enclosure 1 concludes that the licensing basis is satisfied for GDC 25 (or equivalent) (Required Response 1.(a)) and also provide additional information for long-term clarification of this issue. The safety assessment that was provided in the 45-day response confirmed that there is no safety significance for any asymmetric rod cluster control assembly withdrawal by using three-dimensional safety analysis.

Enclosure 2 contains a list of commitments made in this submittal.

If you have any questions, please telephone me at (615) 751-2687.

Sincerely,



Bruce S. Schofield
Manager
Nuclear Licensing and Regulatory Affairs

Sworn to and subscribed before me
this 20th day of September 1993


Notary Public

My Commission Expires 10-6-93

Enclosures

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ENCLOSURE 1

SEQUOYAH NUCLEAR PLANT (SQN) AND WATTS BAR NUCLEAR PLANT (WBN) - TRANSMITTAL OF RESPONSE TO GENERIC LETTER 93-04 ROD CONTROL SYSTEM FAILURE AND WITHDRAWAL OF ROD CLUSTER ASSEMBLIES

Assessment of Licensing Basis Compliance

The purpose of this response is to provide an assessment of whether or not the licensing basis for Sequoyah (SQN) and Watts Bar Nuclear Plant (WBN) is satisfied with regard to the requirements for system response to a single failure in the rod control system and to provide supporting discussion for this assessment in light of the information generated as a result of the Salem Nuclear Plant event (Required Response 1.(a)).

The Westinghouse Owners Group (WOG) has undertaken the following initiatives to support the response to NRC Generic Letter (GL) 93-04: conducted rod control system testing in the Salem training center, examined the existing Rod Control System Failures Modes and Effects Analysis (FMEA), analyzed the worst-case asymmetric rod cluster control assembly (RCCA) withdrawal combinations with three-dimensional analytical methods, and performed an equipment survey of Westinghouse plants to determine the frequency and significance of control system circuit card failure.

After this extensive investigation, the WOG has concluded that General Design Criteria (GDC) 25 continues to be met, but recognizes that there are questions as to the interpretation of not only the intent of GDC 25, but also the appropriate definition of the specified acceptable fuel design limit as well.

Based on previous communications, NRC has interpreted the GDC 25 fuel design limit to be the departure from nucleate boiling (DNB) design basis. The WOG believes that this is a conservative definition if applied to all events. The equipment survey conducted by the WOG demonstrated that the failure rate of rod control system cards that could result in the movement of less than a whole group is on the order of 4×10^{-8} /critical reactor hour. This would indicate that the likelihood of a Salem-type event is extremely remote. Therefore, the WOG would propose that a Condition III (or IV) specified acceptable fuel design limit would be applicable.

Based on the WOG's understanding of GDC 25, the purpose of this criterion is to ensure that the appropriate limits (commensurate with the probability of occurrence) are not violated for a "worst-case" single failure. The test program conducted at the Salem training center demonstrated that all the rods within a given group would receive the same signals. The corrupted current orders generated by the logic cabinet failures at Salem were transmitted identically to all eight RCCA's in Shutdown Bank A. The fact that only one RCCA withdrew in the plant was due to a second unrelated effect. Had all the rods in shutdown Bank A responded, as predicted in the existing FMEA, all the rods would have withdrawn uniformly and would have been enveloped by the existing Final Safety Analysis Report accident analysis. In addition, existing rod

motion surveillance requirements would detect the type of rod motion failure observed at Salem. Thus, the requirement that one single failure not result in a specified acceptable fuel design limit being exceeded, in this case DNB design basis, would remain satisfied.

Assessment of the Safety Significance of Potential Asymmetric Rod Motion in the Rod Control System

Westinghouse has also performed a safety analysis using three-dimensional safety analysis techniques to assist the WOG in its determination of the safety significance of an uncontrolled asymmetric rod withdrawal. Westinghouse Commercial Atomic Power (WCAP) 13803, Revision 1 documented the safety analysis program and concluded that the generic analysis and their plant-specific application demonstrate that DNB does not occur for a worst-case asymmetric rod withdrawal for all affected Westinghouse plants. As such, the analysis program concluded that there is no safety significance for affected Westinghouse plants for a Salem-type rod withdrawal.

Long-Term Enhancements

While the assessment indicates that the licensing basis is currently satisfied, the WOG believes that there are measures that can be taken by utilities to enhance compliance with GDC 25. Those recommended modifications include a combination of rod control system logic cabinet changes (current order timing adjustments) and an additional rod control system test.

At SQN and WBN, TVA will implement a new current order test (current order traces from each group following each refueling outage) to ensure detectability of abnormalities and modify the rod control system current order timing to prevent any uncontrolled asymmetric rod withdrawal in the event of the failure identified at Salem. This will provide a high degree of confidence that none of the rods will move if corrupted current orders are present.

The schedule for implementation of the proposed long-term actions at SQN and WBN is: (1) SQN will perform new current order testing during the present Unit 1, Cycle 6 Refueling Outage and the Unit 2, Cycle 6 Refueling Outage that is presently scheduled to begin April 1994. This additional testing will be routinely performed during each refueling outage. The proposed modification is scheduled to be implemented during each unit's Cycle 7 Refueling Outage. (2) WBN will perform additional testing before initial criticality and during each refueling outage. The proposed modifications will be scheduled for implementation before initial criticality for each unit provided an acceptable design is finalized by Westinghouse at least six months before fuel load to allow adequate time for installation and testing.

The proposed schedule for SQN and WBN is based on the successful demonstration of the timing adjustments at an operating plant and receipt of the official technical bulletin from Westinghouse. This schedule is justified in that the existing rod motion surveillance tests provide assurance that the failure that would result in an uncontrolled asymmetric rod withdrawal will be detected, and the analysis program performed and documented in WCAP-13803, Revision 1, concluded that there was no safety significance for affected Westinghouse plants for a Salem-type rod withdrawal. Additionally, SQN Rod Control System performance history has been good.

ENCLOSURE 2

SEQUOYAH NUCLEAR PLANT (SQN) AND WATTS BAR NUCLEAR PLANT (WBN) -
TRANSMITTAL OF RESPONSE TO GENERIC LETTER 93-04 ROD CONTROL
SYSTEM FAILURE AND WITHDRAWAL OF ROD CLUSTER ASSEMBLIES

LIST OF COMMITMENTS

1. Rod control system logic cabinet modifications (current order timing adjustments) will be performed during each unit's Cycle 7 refueling outage at SQN.
2. Rod control system logic cabinet modifications (current order timing adjustments) will be performed prior to initial criticality at WBN.
3. SQN will implement a new current order test to be performed during each refueling outage beginning with each unit's cycle 6 refueling outage.
4. WBN will implement a new current order test to be performed prior to initial criticality and during each refueling outage.