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Westinghouse Owners Group

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OG-93-39

June 25, 1993

To: Westinghouse Owners Group Primary Representatives

Subject: Westinghouse Owners Group
REGULATORY RESPONSE GROUP
WOG Effort Related to Salem Rod Control System
Event (GL 93-04) Update

Westinghouse and the Westinghouse Owners Group (WOG) Regulatory Response Group (RRG) met on Thursday, June 24, to develop a generic action plan to assist all Westinghouse licensees in responding to NRC Generic Letter 93-04. The following is a status of the WOG initiatives with respect to the generic assessment of the Rod Control System failure event at Salem Unit 2.

Generic Letter 93-04 Summary

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

The generic letter requires that within 45 days from the date of the generic letter, 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 (GDC 25 for most plants). If the assessment indicates that the licensing basis is not satisfied, describe compensatory short-term actions consistent with the guidelines contained in the generic letter, and within 90 days, provide a plan and schedule for long-term resolution.

The WOG members will be requested to endorse the programs outlined in this letter which are aimed at developing a generic response for the licensees to utilize as part of their plant-specific response to the generic letter.

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Update to NSAL 93-007

Westinghouse issued Nuclear Safety Advisory Letter 93-07 on June 11, 1993. During the last two weeks, additional thought has gone into the appropriate licensing interpretation of the current understanding of the Salem failure event. Given that the failure will result in identical current orders to all the rods in the selected bank, other effects have been postulated to address why the entire bank did not behave in a similar manner. As a result, the Westinghouse position on GDC-25, as stated in Westinghouse Nuclear Safety Advisory Letter 93-007, has been revised. Specifically, the determination in the Assessment of Failure Scenarios (pg 8) that GDC 25 is not met is not the current interpretation of the position of Westinghouse and the WOG. As stated in the June 14 NRC meeting, the Salem event is still considered to be an infrequent fault (Condition III), based on probability and thus, satisfying the DNB design limit is not the appropriate licensing criteria. The WOG, and Westinghouse, believe that the intent of GDC 25 continues to be met. The position of the NRC as indicated in the Generic Letter (93-004) is that the specified acceptable fuel design limits (SAFDL) referred to in GDC-25 is the minimum DNBR limit. Westinghouse and the WOG RRG believe that the design philosophy behind the classification of events, based on probability of occurrence and severity of consequences, indicates that it is appropriate to consider a small amount of fuel damage vs the DNBR limit as the acceptance criteria for a low probability event.

To address the potential consequences of an asymmetric rod withdrawal, Westinghouse is confident that, using current methods, all plants would be able to show that the ANS Condition III acceptance criteria would continue to be met (i.e., no more than a small fraction of fuel will experience DNB - less than 5%). Westinghouse also believes that it is important to pursue the possibility of the acceptability of a small fraction of fuel failure for these events while investigating the likelihood of occurrence of a single or multiple asymmetric rod withdrawal. The programs outlined below will provide the technical and analytical bases to support this position and provide interim assurance that the DNBR will be greater than the design limit while long-term solutions are pursued.

In addition, in the Review of Failure History at U.S. Westinghouse Plants section of NSAL 93-007, the number and types of failures is incorrect. The failure breakdown in the second paragraph should be "Of the 34 reported failures, 24 caused the rods to remain as positioned, 5 failures resulted in dropped rod(s), 2 failures were step counter failures, and 3 (including the Salem event) failures resulted in misalignment of the rods." The fifth paragraph in that same section should be changed to the following, "This event is thus considered no worse than an infrequent fault using ANSI standard S1.1 to correlate the calculated probability of occurrence to the FSAR accident category definitions. For an event to become an 'incident of moderate frequency,' the frequency would have to be in the range of 1E-01 events per year. Thus, additional misalignments would have had to occur to reach the upper bound of a Condition III event (i.e., to move to a Condition II event)."

General Discussion

At the June 14, 1993 WOG Regulatory Response Group presentation to the NRC on the generic assessment of the Salem event, it was stated that the expected response to the single failure is a RCCA group or bank movement. This would include the failure that occurred at Salem. The explanation for why only one RCCA moved at Salem will be provided as part of the generic assessment. Also discussed with the NRC was the consideration that this event has very low probability and should be classified as a Condition III event with associated acceptance criteria. Actual operating and failure experience will help substantiate this statement of event frequency.

Generic Letter 93-04 included the following sentence just before the paragraph on the Westinghouse Nuclear Safety Advisory Letter, "The analysis discussed by the Westinghouse Owners Group indicated that fuel failures could result from single failures identified as a result of the Salem event." This is a NRC conclusion apparently developed by combining two parts of the presentation material. The safety analysis discussed with the NRC was not attributed to the rod control system single failure, but was an analysis intended to bound the safety significance of single or multiple rod withdrawals from power or from subcritical initial reactor conditions.

Another consideration presented by the WOG RRG was that the rod control system failures were detectable when rod motion occurs. The operator would detect abnormal rod motion as a result of normal plant operation at power, during periodic technical specification surveillance tests on control rod movement, or during other manual operation of the rod control system. It was concluded that from a generic standpoint, the rod control system is considered operable if the control rods move as required and technical specification requirements are met. An operability determination on the Rod Control System is not typically required because it is not a safety system, but rather the operability determination is made on the ability of the control rods to perform their safety function, i.e., fall into the reactor upon demand. Given that the postulated failure is detectable, Westinghouse believes that the Rod Control System failure does not have to be considered coincident with any other Chapter 15(14) accident. Note that it still must be addressed as an initiating event.

A meeting will be scheduled with the NRC on July 8/9 to provide the NRC with a status of WOG activities, the intended direction of those activities, and to request a 15 day extension to the 45 day reporting requirement in order to permit utilities time to incorporate the results of the WOG programs. Attendance at this meeting is tentatively limited to members of the RRG and additional requests should be discussed with Mr. Roger Newton, RRG Chairman.

WOG Plans and Schedule

This section identifies the activities that the WOG RRG intends to sponsor during the next 6 weeks. Each is described in some detail and a single comprehensive schedule is attached. The schedules for both Westinghouse and the licensees are extremely aggressive and will require dedicated cooperation from each licensee. It is the intent of the WOG RRG to request an additional 15 days for the licensee response at the July 8/9 NRC meeting. The necessity for the extension is based on the ability of Westinghouse and the Licensees to perform all the various actions within the allotted time.

The programs discussed below will be documented in two WOG Project Authorizations yet to be issued. These will be issued by June 30, 1993 with the voting to be completed by July 7, 1993.

1. SURVEY

In the next several weeks, the WOG, through Westinghouse, will be conducting a survey. This survey is in response to the WOG commitment made to the NRC to evaluate the equipment performance history of the Rod Control System and to support the initial determination of the probability of occurrence for the postulated failures. This survey will involve the collection and analysis of component failure data in the Rod Control System logic cabinets during startup, rod surveillance testing, and power operation. The components that will be analyzed include logic cabinet components such as printed circuit boards, DC power supplies, and loose wiring and connectors within the logic cabinet. The events of particular interest are those where the control rods did not move consistently when demanded, including movement from the bottom of the core and misalignment. The data collection is to span the time from initial plant startup through May 1993.

Failures of rods to move properly and failures of components (i.e., not out-of-tolerance conditions but failures in which the component would not be able to perform its function) will be analyzed. In this instance, failures are defined as replaced components or repairs with at least one component replaced (such as a chip on a printed circuit board).

The survey will be mailed from the Westinghouse WOG Project Office on Friday, June 25. Licensees need to respond with as much information as possible by July 15. The most critical items (supervisory and slave cycler cards) are identified in the survey. A preliminary report will be issued by July 23. The final report will be issued by July 30.

2. TESTING

The purpose of the Rod Control System test program is to determine the type of motion that can occur when Control Rod Drive Mechanisms (CRDMs) are subjected to corrupted current orders under varying conditions. A test team will be assembled from WOG, PSE&G, and Westinghouse, including design expertise in the Rod Control System and CRDMs. Tests will be performed on a Rod Control System (Logic Cabinet, Power Cabinet and one or more CRDMs) installed in a test facility. Tests to be conducted include baseline cycle tests, latching tests, rod displacement tests, load tests, and current order timing tests. The test program, as currently designed, is anticipated to be completed over an 80 day time frame. Once the Project Authorization is completed and approved and the testing site is confirmed, the schedule will be integrated into the master schedule. It is recognized that portions of the program will not be completed prior to the 45/60 day reporting requirement.

A generic failure assessment will be performed to determine whether other single point failures can occur in the Rod Control System that corrupt the CRDM coil current orders. Of concern are only those corrupted current orders that could possibly produce motion of less than a group of control rods. The analysis would revise or supplement the existing Failure Modes and Effects Analysis (WCAP-8976). The schedule for completion of the generic failure assessment will be included with the overall test program.

3. ACCIDENT ANALYSIS

As part of the WOG initiative, the Analysis Subcommittee will be sponsoring a generic approach to demonstrate that all Westinghouse plants satisfy GDC 25 (or its equivalent). The purpose of this program is to analyze a series of asymmetric rod withdrawal cases from both subcritical and power conditions to demonstrate that the Condition II DNB design basis will remain met. Current codes and NRC-approved methodologies are not sufficient to make that determination. As a result, the approach will use a three-dimensional spatial kinetics/systems transient code (LOFT5/SPNOVA) to show that, in 3-D, the localized power peaking is not as severe as current codes would predict. This code/methodology is not yet approved by the US NRC, but is approved for use in the United Kingdom (UK) by their regulatory agency. The analytical work will be conducted by the National Nuclear Corporation (NNC) - the UK Westinghouse licensee. Given that the UK regulator is similar to the US NRC in philosophy and level of review detail, this approach should provide additional assurance that all Westinghouse plants continue to satisfy GDC 25.

To address those plants that either do not use Westinghouse fuel or do their own safety analyses, Westinghouse will be providing a brief survey form to gather the required neutronics parameters to ensure that the "generic" sensitivity studies are representative of all Westinghouse plants.

The schedule for this program is the following: the draft project authorization is due out on Friday, June 25. The final is due out by June 30 through the Westinghouse WOG Project Office. A phone vote will then be conducted. The draft analysis report will be issued for comment by July 23 with the final report being issued by July 30.

4. WESTINGHOUSE TECHNICAL BULLETIN

Westinghouse is currently working on the draft Technical Bulletin that will describe the Rod Control System failure event in detail. The Technical Bulletin will also provide guidance in determining the functionality of the rod deviation alarm, a recommended action in NSAL 93-007.

5. GENERIC RESPONSE TO THE SALEM COMPENSATORY ACTIONS

The WOG will also be sponsoring a generic assessment of the plant-specific compensatory actions committed to by Salem as a precondition for plant startup. Each compensatory action will be identified, reviewed, and a conclusion made as to whether or not the action should be implemented by the remainder of Westinghouse plants. The preliminary determination is that a sufficient technical basis exists such that none of the Salem compensatory actions needs to be implemented. Pending release by Public Service Electric & Gas, a copy of the Salem Justification of Continued Operation will also be attached. A copy of typical normal and corrupted Rod Control System current traces will also be provided. This action will be completed by Friday, July 2.

6. GENERIC RESPONSE TO GL 93-04

The WOG will be issuing a comprehensive report summarizing all the various activities that can be referenced in each licensee's response. The WOG report will provide a technical basis for the determination that every Westinghouse plant continues to meet the requirements for system response to a single failure in the Rod Control System (GDC 25 for most plants) and provide some level of guidance as to the content and format of the individual licensee response. The defense will focus on 1) the root cause of the Salem event, 2) the probability or likelihood that the fault in the Rod Control System could result in all rods in a bank not behaving in a similar manner, 3) the expected symptomatic response if it does occur, and 4) a best-estimate analytical argument that, even if the fault were to occur, every plant would continue to satisfy the DNB design basis.

The draft of this report will be issued to utilities by July 23 with the final report issued by July 30.

WOG Deliverables

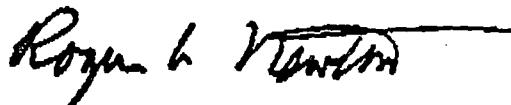
A comprehensive schedule has been developed and is contained in Attachment 1. All milestones and deliverables are highlighted.

Strategy

The WOG, with support from Westinghouse, will assess the Salem event to show that no single failure (without other effects) can result in single or asymmetric rod movement. The approach will include discussions on Rod Control System failure rates/types and probability of occurrence through the equipment survey, expected/predicted movement under failure conditions from the testing program, and the ability to detect such a failure. Ultimately, it is expected that all Westinghouse plants will continue to satisfy GDC 25 (or its equivalent). As additional support, best estimate analyses will be performed to demonstrate that all plants can continue to satisfy their DNB design basis.

The primary technical contact at Westinghouse is Mr. Mark Proviano (412) 374-5651. The WOG Project Office Interface is Mr. J. David Campbell (412) 374- 6206. Additional information will be provided as it becomes available.

Very truly yours,



Roger A. Newton, Chairman
Regulatory Response Group
Westinghouse Owners Group

cc: WOG Steering Committee
 Regulatory Response Group
 C.K. McCoy, Georgia Power
 J.P. O'Hanion, Virginia Power
 S.R. Tritch, W
 N.J. Liparulo, W
 K.J. Voytell, W

Attachment 1

- June 25: WOG RRG update letter
WOG/Westinghouse RCS survey issued
Draft project authorization faxed for review
- June 30: Final project authorization issued for WOG vote
Neutronics analysis survey issued to non-Westinghouse scope plants
- July 2: Generic response to Salem compensatory actions
- July 7: WOG project authorizations telephone votes completed
Start of Testing Program (Day 1)
Westinghouse Technical Bulletin issued
- July 8: NRC meeting in Rockville, Maryland
- July 9: NRC meeting in Rockville, Maryland (alternate date)
Neutronics analysis survey returned to Westinghouse
- July 15: RCS survey response due to Westinghouse
- July 23: Draft RCS failure survey report issued
Draft generic response to Generic Letter 93-004 issued
Draft accident analysis report issued
- July 27: Start of actual testing (Day 21)
- July 30: Final RCS failure survey report issued
Final accident analysis report issued
Final generic response to Generic Letter 93-004 issued

August 5: Original due date to NRC

August 20: Proposed extended NRC due date (pending NRC approval)

August 25: Completion of testing (Day 50)

September 9: Draft test report issued (Day 65)

September 24: Final test report issued (Day 80)