February 26, 1996

VENDOR: Westinghouse Owners Group (WOG)

SUBJECT: SUMMARY OF TELEPHONE CONFERENCES WITH WOG TO DISCUSS SOUTH TEXAS AND WOLF CREEK STUCK CONTROL ROD EVENTS AND APPLICABILITY TO OTHER WESTINGHOUSE PLANTS

The subject telephone conferences were held between representatives from the Nuclear Regulatory Commission (NRC), WOG and Westinghouse on February 6 and 7, 1996. The purpose of the telephone conferences were to discuss the stuck control rod events that occurred at South Texas on December 18, 1995, and at Wolf Creek on January 30, 1996, and to discuss the applicability of the events to other Westinghouse plants.

As a result of NRC staff concerns, a telephone conference was held on the morning of February 6, 1996, in which Mr. Brian Grimes, Deputy Director, Division of Reactor Program Management requested that the WOG activate its Regulatory Response Group in response to the two recent stuck control rod events at Westinghouse plants. The staff expressed concerns regarding the susceptibility of other Westinghouse plants to stuck control rods. In attendance on the call were Mr. Gary Holahan, Director, Division of Systems Safety and Analysis and many staff members from the Office of Nuclear Reactor Regulation, the Office of Analysis and Evaluation of Operational Data, and the Office of Nuclear Regulatory Research. Nine staff questions were faxed to Westinghouse to assist in the evaluation of the applicability of the events to other Westinghouse plants. During the afternoon of February 6, 1996, the WOG informed the NRC that it would evaluate the events and respond to staff questions through a Regulatory Issues Group, rather than the Regulatory Response Group. In a telephone conference held on February 7, 1996, a schedule was set for future interactions with the staff. Draft responses to many of the questions were scheduled to be sent on February 15, 1996. Exceptions to the schedule were Question 1, which was to be answered by February 19, and Questions 4 and 7, which will be answered by February 26, 1996. A meeting to discuss the responses was scheduled for February 20, 1996, in Rockville, Maryland. On February 7, 1996, the WOG reconsidered their decision and activated its Regulatory Response Group to address the issue. On February 9, 1996, the staff faxed an additional five questions regarding the evaluation of stuck control rods. Westinghouse was to provide draft responses to the second set of questions by February 15, 1996, or provide a schedule for response. The two sets of staff questions are given as an attachment.

original signed by:

Diane T. Jackson, Project Manager
Standardization Project Directorate
Division of Reactor Program Management
Office Of Nuclear Reactor Regulation

Project No. 694

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Attachment: As stated

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Project 694

NRC QUESTIONS CONCERNING RECENT CONTROL ROD PROBLEMS

1. What is the safety significance of the recent South Texas and Wolf Creek (and several foreign reactors) control rod events where rods have not bottomed following a trip?

2. What is the justification for continued operation while the root cause(s) of the events are studied?

3. In light of the Wolf Creek and South Texas events, discuss why current technical specification surveillance and rod drop testing are sufficient to ensure that the control rods remain operable. What, if any, additional testing should be performed, such as

   a. shutting down at the end of cycle (EOC) via trip (possibly from low power) instead of a controlled shutdown or

   b. performing periodic and end of cycle rod drop tests

4. For all plants provide the following data for fuel with control rods, that are in high burnup fuel assemblies or have exhibited anomolous conditions such as sticking, slow drop times, high withdrawal resistance, etc.

Type of fuel	Current burnup	Projected EOC burnup	Burnup at latest scram or scram test		Observations from latest scram tests*

   * Observations should describe nature of the scram (e.g., controlled scram, rod drop tests, etc.), and any anomolous behavior observed (e.g., stuck rods, high withdrawal resistance, slow drop times, absence of recoil, etc.).

5. What are the probable root cause(s) of these control rod events and describe actions being taken to confirm the root cause(s).

6. Describe the results of the lead test assembly program for the rods involved in the South Texas and Wolf Creek events. To what extent were these representative, or not representative, of the operating conditions for these reactors? Why didn't the lead test assembly program provide advanced warning of these events?

7. Describe operator actions in response to "stuck rods." What, if any, procedural enhancements or additional operator training is needed as a result of these events?

8. What are the WOG's short-term and long-term actions as a result of these events?

9. Identify any plants that are currently operating with hafnium control rods. If any, identify how many such control rods per plant are in use.

Attachment

QUESTIONS FOR WOG
ON CONTROL ROD DROP ISSUE

1. Root Cause

   At Ringhals and other European plants, prolonged drop times are believed to be caused by fuel assembly bowing, which is in turn caused by an imbalance between the force from the top springs and the strength and forces on the fuel skeleton. Is any other cause suspected at South Texas and Wolf Creek?

2. Low Tin

   We understand that low-tin alloys were used for fuel and guide tubes at South Texas and Wolf Creek. While the lower tin alloys have improved corrosion resistance, they may have reduced strength and increased creep rates that could enhance bowing. Please provide a comparison of yield strength and creep rate for standard zircaloy tubing and the low-tin tubing.

3. Rod and Assembly Bowing

   Have accurate (rather than approximate) rod bowing and assembly bowing measurements been made on fuel with low-tin alloys? If so, (a) to what burnup have data been recorded, (b) how do the results compare with standard zircaloy fuel, and (c) how do the results compare with Westinghouse model predictions?

4. Experience with Standard Cladding

   Has there been experience out to 45 or 50 GWd/t with standard (high tin) zircaloy cladding? If so, were there any indications of interference with control rod movement in those cases? Have there been enough rod drop tests to tell?

5. Span Length

   South Texas has 14-ft fuel, and Wolf Creek has fuel without intermediate mixing flow grids. Are the unrestrained span lengths or overall lengths in these plants longer than other plants, and would these lengths make these plants more susceptible to bowing?

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