



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555-0001

March 31, 1994

WESTINGHOUSE OWNERS GROUP

SUBJECT: SUMMARY OF MEETING ON MARCH 9, 1994, REGARDING WESTINGHOUSE OWNERS GROUP (WOG) UPDATE ON ROD CONTROL SYSTEM PROGRAM, IN RESPONSE TO GENERIC LETTER (GL) 93-04

On March 9, 1994, representatives of the WOG met with the NRC to present an update on their Rod Control System Program, in response to GL 93-04, "Rod Control System Failure and Withdrawal of Rod Control Cluster Assemblies." Meeting attendees are listed in Enclosure 1. Slides presented by the WOG are in Enclosure 2.

This meeting was requested by NRC when it was learned that the testing of the current order timing changes to the rod control system at the lead plant (South Texas) didn't proceed as advertised in WCAP-13864, "Rod Control System Evaluation Program." The original timing change goals were to ensure that (1) when Salem-like corrupted current orders (faults) are present, affected control rods will not move, and (2) the current order timing change has no impact on normal rod control system operation. The South Texas modifications resulted in normal rod movement with normal current orders, however, the modifications also resulted in inward rod motion when out-motion was requested with Salem-type faults.

The WOG's solution is to further retard current timing orders (for rod withdrawal) beyond the original modification to ensure inward rod motion with Salem-type faults, and then show by safety analysis that the most limiting asymmetric insertion scenarios would not result in departure from nucleate boiling. The timing change goals are now revised to (1) preclude outward rod motion with Salem-type faults, and (2) have normal rod operation with normal current orders. The WOG identified Ginna as the new lead plant for the revised current order modifications and set a schedule for the week of April 13, 1994. The testing at Ginna will also confirm that with the original timing changes and Salem-type faults, the rods will move in when out-motion is requested.

Once testing at Ginna is complete, a revision to WCAP-13864 and a final technical bulletin will be issued. The WOG's schedule for submittal of both documents is by June 1994, and they will attempt to estimate when licensees will make the current order timing changes, in the cover letter to the revised WCAP-13864. The WOG will also issue instructions on new current order surveillance testing by the end of March.

In addition, the WOG agreed to resubmit WCAP-13803, Revision 1, "Generic Assessment of Asymmetric Rod Cluster Control Assembly Withdrawal," for limited NRC review, within the next few weeks. The NRC will review the document on a limited basis for the interim until the long-term timing changes can be

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implemented. The WOG mentioned they will inform the licensees of the results of this meeting, including the NRC position that a commitment to the timing modifications and the new surveillance testing is expected.

ORIGINAL SIGNED BY:

Thomas W. Alexion, Project Manager
Project Directorate IV-1
Division of Reactor Projects - III, IV, V
Office of Nuclear Reactor Regulation

Enclosures:

1. List of attendees
2. Slides

DISTRIBUTION:

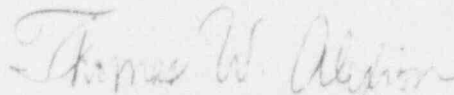
Docket File
NRC & Local PDRs
PD4-1 Reading
W. Russell/F. Miraglia
L. Reyes
J. Roe
E. Adensam
W. Beckner
T. Alexion
P. Noonan
OGC
E. Jordan
NRC Participants
ACRS (10)
V. McCree, EDO
L. Plisco, EDO
G. Grant, EDO
J. Mitchell, EDO
R. Cooper, RI
E. Merscholl, RII
E. Greenman, RIII
A. B. Beach, RIV
K. Perkins, RV
All NRR Project Directors

OFC	LA:PD4-1	PM:PD4-1	BC:HICB	(A)BC:SRXB	(A)DD:DSSA	D:PD4-1
NAME	PNoonan	TAlexion/bc	JWermiel	TCollins	RJones	WBeckner
DATE	3/24/94	3/24/94	3/24/94	3/29/94	3/29/94	3/31/94
COPY	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO

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Project Directorate IV-1
Division of Reactor Projects - III, IV, V
Office of Nuclear Reactor Regulation

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1. List of attendees
2. Slides

March 9, 1994

Meeting with WOG - Update on Rod Control System Program

List of Attendees

<u>Name</u>	<u>Organization</u>	<u>Phone</u>
Margaret Chatterton	NRC/NRR/SRXB	301-504-2889
Tom Alexion	NRC/NRR/PD4-1	301-504-1326
Bryce Shriver	WOG/Virginia Power	804-273-2721
Larry Walsh	NAES Corporation	603-474-9521
Dave Campbell	<u>W</u>	412-374-6206
Mark Proviano	<u>W</u>	412-374-5651
Dick Liparulo	<u>W</u> /WOG	412-374-5169
Jeff Bass	<u>W</u>	412-374-4262
Eric Benner	NRC/NRR/OEAB	301-504-1171
James Raleigh	Southern Technical Serv.	301-652-2500
Hans Renner	NUS	301-258-8693
Hank Sepp	<u>W</u> Nuclear Safety	412-374-5282
David Husgel	<u>W</u> Nuclear Safety	412-374-5424
Steve Fowler	<u>W</u> Reliability Engineering	412-374-6071
Hukam Garg	NRC/NRR/HICB	301-504-2929
Robert Perch	NRC/NRR/SRXB	301-504-3236
Gene Lazarowitz	NRC/RI/DRS	215-337-5392
Robert Jones	NRC/NRR/DSSA	301-504-2884
Jared Wermiel	NRC/NRR/DRCH/HICB	301-504-2821
Roger Newton	WEP Company	414-221-2002

WESTINGHOUSE OWNERS GROUP

UPDATE ON

ROD CONTROL SYSTEM EVENT

March 9, 1994

1:00 - 3:00

ROOM 16B11, White Flint

Rockville, MD

AGENDA FOR MARCH 9, 1994
NRC/WOG MEETING ON WOG RESPONSE
TO NRC GENERIC LETTER 93-04

- INTRODUCTION/MEETING PURPOSE - Robert Jones, NRC
- INTRODUCTION OF WOG RESPONSE - Roger Newton, WOG
- SOUTH TEXAS DEMONSTRATION TEST - Steve Fowler, W
- TEST RESULTS - Steve Fowler, W
- ROOT CAUSE OF THE PROBLEM WITH SOUTH TEXAS TESTS - Steve Fowler, W
- EFFECTS ON SAFETY ANALYSES - Dave Huegel, W
- WOG POSITION ON NEED FOR WCAP-13803 REV. 1 REVIEW - Roger Newton, WOG
- FUTURE ACTIVITIES - Bryce Shriver, WOG
- CLOSING WOG SUMMARY - Roger Newton, WOG
- NRC COMMENTS - Robert Jones, NRC

INTRODUCTION OF WOG RESPONSE

- SUMMARIZE WOG ACTIVITIES AND RESULTS
- REVIEW SAFETY SIGNIFICANCE
- DISCUSS ISSUES AND TESTING AT SOUTH TEXAS
- DISCUSS POTENTIAL IMPACT ON THE SAFETY ANALYSES
- REVIEW WOG POSITION ON NEED FOR WCAP-13803 REV. 1 REVIEW
- SUMMARIZE WOG FUTURE ACTIONS

SUMMARY OF WOG ACTIVITIES

June 14	WOG/NRC Meeting in Bethesda, Md
June 25	WOG RRG Letter issued to all members outlining RRG effort related to Salem Rod Control System Event (OG-93-39)
July 9	WOG/NRC Meeting in Rockville, Md
July 14	WOG Request to NRC for Scheduling Relief on GDC-25 Determination (OG-93-44)
July 26	NRC Letter granting relief
July 30	WOG 45 day generic response transmitted to all members (OG-93-53)
August 5	45 day response submitted to NRC
August 9-11	Rod control testing performed at Salem Training Center
September 3	WOG Status Report sent to NRC (OG-93-75)
September 9	WOG 90 day generic response transmitted to all members (OG-93-77)
September 13	WOG/NRC Meeting in Rockville, Md
September 20	90 day licensee response due to NRC
September 24	WCAP-13864, RCS Evaluation
November	Houston Light & Power volunteered to perform test
January, 1994	Modified timing installed at South Texas
February 13	Rod Control Testing at South Texas
February 23	WOG Rod Control Task Team met in Pittsburgh
March 9	WOG/NRC Meeting in Rockville, Md

WOG/NRC MEETING

SEPTEMBER 13, 1993

- GDC 25 CONTINUES TO BE MET
 - Satisfy appropriate criterion based on frequency of occurrence

- RECOMMENDATION OF ENHANCEMENTS
 - OPTION A - New Current Order Surveillance and Current Order Timing Changes
 - OPTION B - New Current Order Surveillance and New Safety Analyses

WOG/NRC MEETING

SEPTEMBER 13, 1993

- RECOMMENDED TIMING CHANGE GOALS
 - Ensure that, when Salem-like corrupted current orders are present, affected control rods will not move.
 - Ensure that the current order timing change has no impact on normal Rod Control System operation.

- WOG FUTURE ACTIONS
 - Demonstrate that recommended timing changes will preclude rod motion for a Salem-type failure and have no impact on normal operation.
 - Issue draft Westinghouse Technical Bulletin with new timing changes and surveillance testing instructions.

SAFETY SIGNIFICANCE OF POTENTIAL ASYMMETRIC ROD MOTION FOR SALEM-TYPE FAILURE EVENTS

- EXTREMELY LOW PROBABILITY OF OCCURRENCE
- FAILURE IS DETECTABLE THROUGH EXISTING TECHNICAL SPECIFICATION SURVEILLANCE
- ANY OCCURRENCE WOULD BE TERMINATED BY OPERATOR ACTION LONG BEFORE ANY FUEL DESIGN LIMIT IS CHALLENGED. FIVE HUNDRED REACTOR YEARS OF OPERATION HAS DEMONSTRATED THAT GDC 25 IS MET.
- THUS, THE FOCUS IS ON ENHANCING OPERATIONAL SAFETY AND RELIABILITY.

WOG ROD CONTROL ENHANCEMENT PROGRAM

BACKGROUND INFORMATION

PURPOSE:

The revised Failure Modes and Effects Analysis reported in WCAP-13864 determined that the only single failure that could potentially result in asymmetric rod withdrawal was the failure experienced at Salem.

PROGRAM ELEMENTS:

- Develop and test a modification to current order timing to prevent rod motion with Salem-type failures while ensuring reliable CRDM operation
- Develop a current order surveillance to be performed by plants on a refueling basis

TIMING MODIFICATION DETAILS

Timing modification focused on ensuring the following:

- With the Salem-type failure is present, the lift coil raises the moving gripper assembly prior to the moving gripper engaging the lower drive rod groove, thus preventing outward rod motion.
- Without the Salem-type failure present, normal insert and withdraw sequences among between lift, moving, and stationary coil signals are maintained

South Texas timing modification accomplished by:

- For rod insertion, advancing the lift coil energization from count 5 to count 1
- For rod withdrawal, retarding the current orders by 10 counts

SOUTH TEXAS PROJECT DEMONSTRATION TEST

- Recordings of slave cyclor current orders showed modification was correctly implemented.
- Rod withdrawal and insertion were normal during rod position indication and rod drop tests.
- When Salem-type fault was installed with rods on bottom and control bank A outmotion requested, no rods withdrew.
- When Salem-type fault was installed with control bank A rods at 10 steps and outmotion requested, no rods withdrew; however, rods indicated inward motion.
- Reactor operator tripped reactor in accordance with test procedure.
- Test was revised to allow for inward motion, but was not performed due to potential delays of plant startup.

EXPLANATION OF WHY RODS MOVE IN WITH REVISED TIMING

- At the beginning of cycle, energizing the lift coil raises the moving gripper assembly prior to the moving gripper engaging the drive rod groove. This prevents the rod from withdrawing.
- At the end of cycle, deenergizing the lift coil lowers the moving gripper assembly prior to the stationary gripper engaging the drive rod groove. This lowers the rod one step.

EFFECTS ON SAFETY ANALYSES

Safety Analysis Assumption:

- Safety analysis evaluation conservatively assumes that the rod(s) of the affected group(s) insert asymmetrically.
- Two limiting asymmetric insertion scenarios:
 - One group affected by failure: one entire group moves OUT reliably, while individual rods in the other group move IN or do not move.
 - All groups affected by failure: All rods within a bank(s) selected for motion move IN or remain stationary for either an IN or OUT demand

EFFECTS ON SAFETY ANALYSES

Scenario A: One group affected by failure: One entire group moves OUT reliably, while individual rods in the other group move IN or do not move

- On an OUT demand where multiple rods insert, rods from the unaffected group move OUT and rod(s) from the affected group continuously move IN. Power stabilizes or drops and peaking factors increase.

BOUNDED BY DROPPED ROD (NO DNB)

EFFECTS ON SAFETY ANALYSES

Scenario B: All groups affected by failure: All rods within a bank(s) selected for motion move IN or remain stationary for either an IN or OUT demand

- On a demand for outward rod motion, no rods move out, but multiple rods could be driven into the core resulting in:
 - Power mismatch causing primary system cooldown and drop in secondary power.
(Drop in secondary power not credited in evaluation)
 - Primary power stabilizing if a conservatively negative moderator temperature coefficient is present
 - Drop in secondary and primary pressures potentially resulting in reactor trips on low pwr pressure or low steam pressure
(Not credited in evaluation)

EFFECTS ON SAFETY ANALYSES

Scenario B: All groups affected by failure: All rods within a bank(s) selected for motion move IN or remain stationary for either an IN or OUT demand
(CONTINUED)

- Increased peaking factors
- No power overshoot since rods do not move OUT

DROPPED ROD ANALYSIS GIVES
MORE LIMITING RESULTS

CONDITION II ACCEPTANCE CRITERIA
SATISFIED (NO DNB)

EFFECTS ON SAFETY ANALYSES

CONCLUSIONS:

- All Condition II acceptance criteria (DNB) satisfied for failure scenarios using licensed methods
- C-11 bank D automatic rod withdrawal stop would significantly minimize any rod movement/misalignment if credited

WOG POSITION ON NEED FOR WCAP-13803 REV 1 REVIEW

- WCAP-13803, REV 1, GENERATED TO DOCUMENT ASSESSMENT/EVALUATION OF ASYMMETRIC ROD WITHDRAWAL ON CONDITION II DNBR LIMIT
- WCAP USED METHODOLOGY/CODES NOT LICENSED IN U.S. BUT DEMONSTRATED THAT CONDITION II SATISFIED
- WOG POSITION THAT WE COMPLY WITH GDC 25 WAS MADE AT 9/13/93 MEETING
- MOST 90 DAY LICENSEE RESPONSES MADE TO NRC CONCLUDED THAT GDC 25 WAS MET
- NO NEED TO SUBMIT WCAP FOR REVIEW
- WOG RECOMMENDATION PROVIDES THE FOCUS ON ENHANCING OPERATIONAL SAFETY AND RELIABILITY, RATHER THAN ON ANALYTICAL COMPLIANCE.

FUTURE ACTIVITIES

OBJECTIVES

- NORMAL ROD OPERATION WITHOUT FAILURE
- PRECLUDE OUTWARD MOTION WITH SALEM-TYPE FAILURE

IDENTIFICATION AND SCHEDULE OF NEW TESTING

☞ ROCHESTER GAS & ELECTRIC GINNA

☞ WEEK OF APRIL 13, 1994

REVISION OF WCAP-13864, RCS EVALUATION PROGRAM

☞ ONCE TESTING IS COMPLETE (TIMING CHANGES ARE FINAL),
REVISION OF WCAP WILL BE ISSUED

FUTURE ACTIVITIES

(CONTINUED)

SCHEDULE FOR ISSUANCE OF CURRENT ORDER SURVEILLANCE TESTING

- ☐ INSTRUCTIONS ON SURVEILLANCE TESTING TO BE ISSUED BY END OF MARCH

SCHEDULE OF TECHNICAL BULLETIN

- ☐ FINAL TECH BULLETIN TO BE ISSUED ONCE TIMING CHANGES ARE FINAL, EXPECTED BY END OF SECOND QUARTER 1994
- ☐ FINAL TECH BULLETIN TO INCLUDE GENERIC 50.59 SAFETY EVALUATION

CLOSING WOG SUMMARY

- NEW TIMING ORDER CHANGES WILL PRECLUDE ROD WITHDRAWAL IN THE PRESENCE OF A SALEM-TYPE FAILURE
- NEW TIMING ORDER CHANGES WILL NOT AFFECT NORMAL ROD OPERATIONS
- INWARD ROD MOTION HAS NO SAFETY IMPACT
- WOG DOCUMENTATION TO UTILITIES WILL BE COMPLETED ONCE TESTING IS SATISFACTORILY COMPLETED
- THE WOG CONTINUES TO BELIEVE THAT GDC 25 IS MET