November 30, 2009

Mr. W. Anthony Nowinowski, Program Manager
PWR Owners Group, Program Management Office
Westinghouse Electric Company
Mail Stop ECE 5-16
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RE: PRESSURIZED WATER REACTOR OWNERS GROUP TOPICAL REPORT WCAP-17100-P/NP, REVISION 0, "PRA MODEL FOR THE WESTINGHOUSE SHUT DOWN SEAL" (TAC NO. ME1785)

Dear Mr. Nowinowski:

By letter dated July 17, 2009 (Agencywide Documents Access and Management System Accession No. ML092170348), the Pressurized Water Reactor Owners Group (PWROG), submitted for U.S. Nuclear Regulatory Commission (NRC) staff review topical report (TR) WCAP-17100-P, Revision 0, "PRA Model for the Westinghouse Shut Down Seal." Upon review of the information provided, the NRC staff has determined that additional information is needed to complete the review. On November 10, 2009, Mr. Chad Holderbaum, PWROG project manager, and I agreed that the NRC staff will receive your response to the enclosed Requests for Additional Information (RAIs) questions by January 29, 2110. If you have any questions regarding the enclosed RAI questions, please contact me at 301-415-4053.

Sincerely,

/RA/

Jonathan Rowley, Project Manager
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 694

Enclosure: RAI questions

cc w/encl: See next page

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ADAMS ACCESSION NO.: ML093140165 **NRR-088**

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DATE	11/30/09	11/24/09	11/30/09	11/30/09

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REQUEST FOR ADDITIONAL INFORMATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

WCAP-17100-P/NP, REVISION 0

PRESSURIZED WATER REACTOR OWNERS GROUP

PROJECT NO. 694

By letter dated July 17, 2009, the Pressurized Water Reactor Owners Group requested review and acceptance of WCAP-17100-P/NP, Revision 0, for referencing in regulatory actions. The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing the submittal and has the following questions:

1. The highest temperature that the Shut Down Seal (SDS) is exposed to is 570°F. Please provide the basis for that temperature.

2. Please explain why the material of each component in the SDS was selected.

3. The amount of particulate that will gather on the SDS is a major concern to the NRC. Several questions arise for the SDS on this issue.

    a. Please describe the level of filtering of the seal injection water.

    b. As stated on Table 3-2, the particulate found on the seal after crud testing was of a greasy consistency. Please provide more information about this particulate.

    c. Please describe the levels of particulate that are expected to be found inside of the Reactor Coolant Pump (RCP) seal packages when the RCP seal package is opened for maintenance in a current operating plant.

    d. In Table 3-2, what does “Sample testing of iron plating out shows micro thin” mean?

4. Please provide the temperature at which the RCP seal package o-rings fail. If they fail at less than 570°F, describe any material changes that occur.

5. The primary sealing ring has a melt temperature of 600°F. The maximum reactor coolant system temperature exposure of the primary sealing ring will be 570°F. Please explain why a 30°F margin is acceptable.

6. In section 3.2.3.3.1, it is stated that the piston ring has a preload (closing force when ring is closed, without a spaces) of 2 pounds. Please explain how a closed piston ring can achieve a “pre-load”.

7. Is it possible that the compression force provided by the wave spring would cause the primary sealing ring to conform to the surface of the piston ring, resulting in the piston ring “sticking” to the primary sealing ring and preventing in the piston ring from snapping shut upon SDS actuation?

ENCLOSURE

8. In section 3.2.3.12.2, please explain why a duration of 2-4 hours was chosen for the scratch tests and why the tests were run at 400°F, not 570°F. Additionally, it was determined that no material had eroded from the rings during the scratch tests. Please describe the inspection methods for this determination.

9. There is very little description as to how the crud test machine operates and/or performs the crud tests. Please provide a more thorough explanation about the crud test machine operation and the simulated crud that is used in the tests.

10. Section 3.2.3.10 states, "in any case, any leakage would only serve to heat the polymer [ring] which would then allow it to seal leak-tight" with respect to a leak during lateral movement tests. Section 3.2.3.12.2 states "inspection of the polymer rings that were subjected to a scratched sleeve show neither a removal of material from steam cutting nor a raised area implying the material flowed". Please explain the inconsistency of the assumed primary sealing ring (polymer ring) leak response compared to the test result.

11. In section 3.2.3.12.2, it is stated that "A scratch of this magnitude [1/8 inch] would not escape detection." Please explain proposed RCP shaft scratch detection inspection methods for normal outages/maintenance.

12. Explain the effects on the RCP seal package and/or any other consequences of an SDS inadvertent actuation. Since each set of components making up a shutdown seal in each reactor coolant pump is subject to the same manufacture, design, and internal operating environment, the potential for common cause failure exists. However, it was not accounted for in the report.

    Please provide a discussion of how the contribution of common cause failure was considered, or the rationale of why it was not considered, for components of the shutdown seal. The common cause groupings should include those within each reactor coolant pump and between shutdown seal assembly components in other reactor coolant pumps in the plant. Failure modes to address should include, but not be limited to, failing to seal below Westinghouse Owners Group (WOG) 2000 leakage range levels and inadvertent actuation on a fully rotating shaft.

13. In section 3.3.4, Discussion of Uncertainties, it was stated that tests of the shutdown seal under a rotating shaft are planned. The NRC staff is concerned that inadvertent actuation of the shutdown seal has not been addressed with regard to the potential for further pump damage and excessive seal leakage past WOG 2000 range levels.

    Please provide a timeframe for those planned tests along with their details.

14. In section 3.2.3.1.2, Statistical Analysis, the 8-hour coping test for leakage found that leakage could not be detected by the instrumentation. Thus, the behavior of the instrumentation itself was used as a surrogate to develop a statistical model and probability distribution. The NRC staff feels that this may not accurately reflect conditions of flow from a failed seal that would behave independent of test instrument precision.

    Please provide a further statistical evaluation using an appropriate approach.