# DRAFT SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

## TOPICAL REPORT WCAP-17100-P/NP, REVISION 1,

## "PRA MODEL FOR THE WESTINGHOUSE SHUT DOWN SEAL" (PA-RMSC-0499)

## PRESSURIZED WATER REACTOR OWNERS GROUP

## PROJECT NO. 694

## 1.0 INTRODUCTION AND BACKGROUND

By letter dated July 17, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092170346), the Pressurized Water Reactor (PWR) Owners Group (PWROG) requested U.S. Nuclear Regulatory Commission (NRC) staff review of Topical Report (TR) WCAP-17100-P/NP, Revision 0, "PRA Model for the Westinghouse Shutdown Seal." A meeting between the PWROG representatives and the NRC staff was held on July 29, 2009, for the PWROG to explain the information contained within TR WCAP-17100-P/NP, Revision 0. By letter dated September 29, 2009 (ADAMS Accession No. ML092660201), the NRC staff accepted TR WCAP-17100-P/NP, Revision 0, for review. In a letter dated November 30, 2009 (ADAMS Accession No. ML093140165), the NRC staff transmitted a Request for Additional Information (RAI) to the PWROG. On January 13, 2010, the PWROG representatives met with NRC staff to explain the draft RAI responses and officially submitted the RAI responses by letter dated January 27, 2010 (ADAMS Accession No. ML103160275). By letter dated March 4, 2010 (ADAMS Accession No. ML101020571), the PWROG submitted TR WCAP-17100-P/NP, Revision 1, which incorporated the RAI responses previously submitted on January 27, 2010. A telephone call was held with the PWROG on April 1, 2010, to answer additional questions concerning TR WCAP-17100-P/NP, Revision 1, and the PWROG submitted answers to the additional questions by letter dated May 19, 2010 (ADAMS Accession No. ML103160276).

The Westinghouse Electric Company (Westinghouse) has developed a reactor coolant pump (RCP) shut down seal (SDS) that, when actuated, is expected to restrict reactor coolant system (RCS) inventory losses to very small leakage rates during plant events that arise from the loss of all RCP seal cooling. The SDS is a thermally actuated, passive device that is to be physically installed in existing seal packages between each RCP No. 1 seal and the No. 1 seal leak-off line to provide a leak-tight seal in the event of existing seal failure due to elevated temperature conditions following the loss of RCP seal cooling. Westinghouse anticipates that installation of the SDS will provide a basis for a new RCP seal behavior model.

The TR reported, in part, on the testing and analysis to verify the performance of the SDS. The testing has included individual component tests as well as tests of the entire seal assembly. A Probabilistic Risk Assessment (PRA) model was developed for the SDS that is based on the failure modes and effects analysis (FMEA) and the subsequent testing and analysis. The statistically based failure probability for the SDS to fail to actuate and seal to very low leakage is derived from the test data. Plants installing the Westinghouse SDS will likely change its PRA to credit this enhanced safety capability. However, this safety evaluation (SE) does not approve the installation of the SDS.

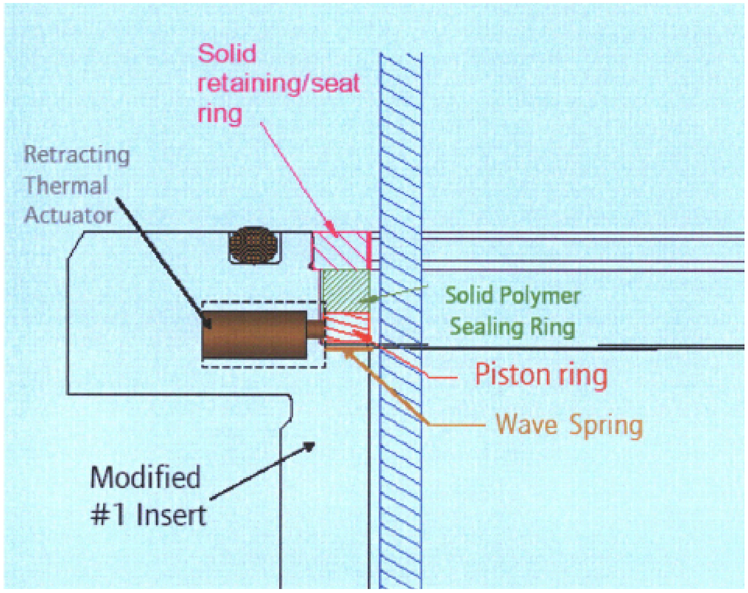
### 1.1. Discussion

For PWRs using Westinghouse RCPs, the potential for the loss of all RCP seal cooling resulting in seal failure-induced loss-of-coolant accidents (LOCAs) increases the likelihood of core damage. Seal LOCA has been a dominant contributor in several NRC and licensee PRA models. Most of these events are initiated by either a loss of alternating current (AC) power impacting seal cooling or other events contributing to the loss of component cooling and service water systems. For Westinghouse RCPs, the loss of all seal cooling is the combined loss of thermal barrier cooling and seal water injection. In many plants, component cooling water (CCW) provides RCP thermal barrier cooling as well as cooling to charging pumps which in turn provide seal injection. For such plants, a loss of CCW alone would result in a potential loss of seal cooling and injection which has the potential to cause a seal LOCA. For RCPs with high temperature (“improved”) O-ring seals, the NRC staff has found it acceptable to evaluate potential seal failure-induced LOCAs using the Westinghouse Owners Group (WOG) 2000 seal leakage model presented in WCAP-15603, Revision 1 (Reference 1). The WOG 2000 model assumes the onset of seal failure within 13 minutes following the loss of cooling and apportions four discrete failure probabilities based on flow rates with 480 gallons per minute (gpm) being the maximum rate from each RCP seal package. To use the WOG 2000 model, licensees had to justify timely trip of running RCPs and perform cooldown/depressurization to less than 1710 pounds per square inch differential within two hours following the loss of cooling. With the inclusion of the SDS described in TR WCAP-17100-P/NP, Revision 1, licensees will be allowed to use a new seal cooling failure model that greatly reduces leakage of reactor coolant following a loss of seal cooling.

### 1.2. Summary of Design of SDS

The RCP SDS is located between the No. 1 and No. 2 seals, just upstream of the No. 1 seal leak-off line in the housing of the No. 1 insert, encircling the shaft. The No. 1 seal insert is modified by machining out a portion of the inner diameter at the top flange. Until activated, the SDS is completely contained within the space once taken by the No. 1 insert prior to modification. Thus the annulus between the No.1 insert and the shaft is unaltered. The leak-off through the No. 1 seal is expected to be unimpeded on its way to the No. 1 seal leak-off line and should not be affected during normal operation of the rotating equipment.

The SDS is composed of an actuating device and a sandwich composed of a wave spring, a piston ring, a polymer ring, and a retaining ring. The actuating device holds the piston ring "open" permitting No. 1 seal leak-off to flow up the shaft to the No. 1 seal leak-off line. The polymer ring is sandwiched between the piston ring and the retaining ring. The retaining ring is shrink-fitted and retains all of the SDS components. When assembled in the pump, the retaining ring is further retained in place by the RCP seal housing located directly above it. The wave spring is designed to maintain contact between the three rings.




The activating portion of the seal is made up of a retractable spacer holding the ends of a piston ring open. The retractable spacer is activated by a thermally responsive piston device. When the fluid coming through the No.1 seal increases to the temperature that causes the actuator to retract the spacer from the piston ring, the piston ring snaps closed against the shaft, providing a significant flow restriction and causing the pressure to build on the back side of the polymer ring. With the flow severely restricted, the pressure at the piston ring approaches the RCS pressure which forces the polymer ring against the shaft, creating a leak-tight seal. While the piston ring provides a substantial flow restriction, the primary sealing ring is a polymer material that, when acted upon by the very high pressure drop induced by the piston ring interrupting the flow through the annulus, is constricted around the shaft and upwards against a retaining ring. As the primary sealing ring constricts, it creates greater pressure drop which in turn further constricts the ring tighter around the shaft and upwards. This pressure drop also forces the piston ring and retaining ring upwards, ensuring a tight seal between all the sealing surfaces. The polymer ring design is expected to conform to pump shaft out-of-roundness, scratches, dents, debris, roughness, and other surface anomalies. Westinghouse maintains that an advantage of the polymer is its ability to slip along the shaft axially and shift with it radially and still maintain a tight seal. This is because it is a continuous ring with a low coefficient of friction. The piston ring, once it initiates sealing, is no longer required for the polymer ring to seal.

The piston ring provides a secondary method to reduce No. 1 leak-off flow in the event of a polymer ring failure caused by a poorly sealing polymer ring or an inadvertent actuation. If the SDS actuates on a stationary sealing surface and the polymer ring fails to seal, the piston ring restricts flow to 1.5 gpm. If the polymer ring is removed, i.e. RCP is allowed to continue to operate and the polymer ring is completely worn away, analysis states that the piston ring will wear a gouge into the sealing surface until the ring's two ends meet. The leak-off flow through the RCP shaft/retaining ring annulus will be restricted to 19 gpm.

Installation of the SDS is projected to reduce RCS inventory losses through the RCP seals, following a loss of seal cooling, to a negligible amount requiring no additional RCS makeup to achieve a stable state with the reactor core being cooled. The design basis for the SDS is contained in Section 3.1.2 of TR WCAP-17100-P/NP, Revision 1. In Westinghouse's development of the design basis, an 8-hour station blackout (SBO) coping time and 72-hour fire cold shutdown time were considered with a seal leakage rate of under 1 gpm.

## 2.0 REGULATORY EVALUATION

The NRC's policy statement on the use of PRA methods in nuclear regulatory activities (Reference 2) encourages greater use of PRAs to improve safety decision-making and improve regulatory efficiency. Examples of where elements of risk-informed decision-making are currently used include: the reactor oversight process, the significance determination process, the implementation of several risk-informed rules, backfit and generic safety issue analyses, and modifying an individual plant's licensing basis. The NRC's policy statement also states that the PRAs used in support of regulatory decisions should be as realistic as practicable.

Regulatory programs which will be directly impacted by a change in modeling potential seal LOCAs include Title 10 of the *Code of Federal Regulations* Part 50.48 (10 CFR 50.48), "Fire Protection;" Appendix R to 10 CFR Part 50, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979;" 10 CFR 50.63, "Loss of all alternating current power;" and 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." The regulation at 10 CFR 50.63 states that all plants holding a license under 10 CFR Part 50 shall be able to withstand for a specified duration and recover from a SBO. The regulation at 10 CFR 50.48 states that all plants holding a license under 10 CFR Part 50 or 10 CFR Part 52 must have an NRC-approved fire protection plan. Appendix R to 10 CFR Part 50 requires that pressurizer level indication be maintained on-scale in the event of a fire to allow for RCS pressure control and allow for a means to obtain safe shutdown. Appendix R to 10 CFR 50 also requires that a plant be able to maintain hot shutdown conditions following a design basis fire and then achieve cold shutdown within 72 hours.

Other programs and processes which are impacted by the SDS are the Reactor Oversight Process (ROP), Mitigating Systems Performance Indicators (MSPI), and Risk-informed Technical Specifications initiatives 4b and 5b submittals. Installation of the SDS is made to an existing RCP seal package and therefore constitutes a change, test, or experiment to the facility. Therefore, it is expected that licensees perform a 10 CFR 50.59, "Changes, tests, and experiments," assessment.

The NRC staff reviewed the models presented in TR WCAP-17100-P/NP, Revision 1, and compared it with the existing models for Westinghouse high temperature O-ring seals as described in WCAP-15603, Revision 1. The SDS represents a significant departure in modeling seal failure since successful actuation of the SDS with timely trip of RCPs is expected to preclude any substantial leakage. With the issuance of TR WCAP-17100-P/NP, Revision 1, as modified with additional NRC staff conditions identified in this SE, an alternative RCP seal package model will be recognized by the NRC for those plants that opt to install the SDS in existing Westinghouse seal packages with high-temperature O-rings.

## 3.0 TECHNICAL EVALUATION

The NRC staff review of TR WCAP-17100-P/NP, Revision 1 was evaluated from a safety and reliability basis. The NRC staff's evaluation included verification that the applicant followed the applicable regulatory guidance, performed independent calculations, and validated that the appropriate assumptions were made. Westinghouse performed testing and statistical analysis of test data, directed by a FMEA, to determine the reliability of the SDS to limit flow to design basis levels. The following were major areas of consideration for the NRC staff in evaluating the risk aspects of the SDS.

3.1 Statistical Analysis of Failure of SDS to Seal

In Section 3.2.3.1.2 of TR WCAP-17100-P/NP, Revision 1, in evaluating the ability of the SDS to remain sealed for the assumed 8-hour SBO coping time, Westinghouse used a One Sample T-test methodology on test leakage data. The observed leak rates were less than the precision of the flow measurement instrumentation. Westinghouse proposed treating the observed data as normal where the mean was determined to be that of the flow detectable by the most precise instrument. Westinghouse concluded that the level of conservatism used in the data resulted in estimated mean flow rates that were projected to be 10,000 times greater than the lowest detectable flow. The NRC staff had a concern about using the behavior of the instrumentation itself as a surrogate in developing a statistical model and probability distribution. The NRC staff believes that this may not accurately reflect conditions of flow from a failed SDS that would behave independent of test instrument precision. Westinghouse responded by performing a Bayesian analysis described in Section 3.2.3.1.2 of TR WCAP-17100-P/NP, Revision 1. A Jeffreys non-informative prior distribution was applied to the data from the 21 tests which yielded a failure rate of 0.0227 failures per demand of the SDS. In Section 3.2.3.1.2 of TR WCAP-17100-P/NP, Revision 1, Westinghouse described the conservatism of using a Bayesian approach to analyze test data. The NRC staff recognizes that components of the SDS were tested in environmental conditions approaching those seen in RCPs. However, the NRC staff believes that it would be prudent to adopt the higher failure rate until better data can be collected from operating experience.

In evaluating the longevity of the SDS, Westinghouse observed no failures. With no observed failures, Westinghouse estimated mean time to failure using a Weibull analysis approach with the assumption of failure at the conclusion of the two longest successful tests. The NRC staff agrees with this conservative assumption given no data for the long-term life of the SDS.

3.2 Parametric Uncertainty and the Common Cause Failure Treatment of Multiple Reactor Coolant Pumps

For modeling simplicity, Section 3.3.4 of TR WCAP-17100-P/NP, Revision 1, assumes that all RCPs for the affected unit experience the same leakage scenario for a failed SDS. It states that this modeling approach is likely conservative, but that to rigorously address multiple RCP leakage scenarios would make the model very complicated. The NRC staff concurs with the assessment that to address the RCPs individually would involve a greater level of complexity, including the need to address the potential common cause conditions (e.g., RCP seal inlet temperatures) and common cause failure modes between RCPs. The NRC staff agrees with the simplification in approach to assessing common cause failure. The NRC staff also agrees with the assumption for parametric uncertainty that, absent of operating data, an error factor of 10 is reasonable. However, the NRC staff differs on use of the WOG 2000 model alone for assessing the consequence of SDS failure to actuate. Instead, licensees should use the appropriate RCP seal leakage model which was applicable to the type of seal package installed in their RCPs prior to modification to the SDS. For example, the WOG 2000 model should only be applicable to those RCP seals with Westinghouse high-temperature O-rings.

## 3.3 Inadvertent Actuation of SDS

A concern was raised by the NRC staff that inadvertent actuation of the SDS on a fully rotating RCP shaft while seal cooling is available might create a new, previously unanalyzed condition which could result in failure of the existing RCP seals. As described in Section 3.2.3.11.5 of TR WCAP-17100-P/NP, Revision 1, Westinghouse performed two 1200 revolutions per minute (rpm) tests to model the impact of inadvertent actuation of a SDS while a RCP is operating at full speed. Inadvertent actuation of seals is assumed by Westinghouse to be detected by licensees since the decrease in the seal leak-off rate will trigger an alarm due to reaching the low flow alarm setpoint. This alarm requires tripping of the RCP. Based on results from these tests and the assumption that licensees will trip pumps upon receipt of the low flow alarm, Westinghouse concluded that there will be no damage to the existing RCP seals since any large debris from a catastrophically failed SDS will be contained within the area of the SDS. Small debris is assumed by Westinghouse to safely pass through to the No. 1 seal leak-off line strainer. The NRC staff noted that these tests did not adequately prove that an inadvertent SDS actuation without an RCP trip would not have a detrimental impact on the existing RCP seal package. Additionally, the NRC staff determined that the description and analysis of the effects to the RCP seal package, plant systems, and RCS from the debris of an inadvertently actuated SDS was not complete. More information is needed on the effects of an inadvertent actuation to fully determine the impacts on the SDS PRA model or the plant-wide PRA model.

For model 100 RCPs, Westinghouse noted that there was insufficient time to trip the RCPs on a non-SBO loss of seal cooling. A recommendation should be developed by Westinghouse to address this issue.

## 3.4 Trip of RCPs and Use of the PRA Model

The NRC staff reviewed the illustrative event tree model in Figure 3-13 and failure probabilities presented in Section 3.3 of TR WCAP-17100-P/NP, Revision 1. The top events that Westinghouse considered in modeling the SDS are summarized below:

- SDS Actuates - This top event represents the successful operation of the retracting actuator to retract the spacer from the piston ring and allow the piston ring to close on the RCP shaft. SDS successful actuation is defined as the withdrawal of the spacer from the piston ring when the fluid temperature in the SDS region is in the range of 250 °F to 290 °F and the clamping of the piston ring on the shaft (or sleeve) to constrict flow from the No. 1 RCP seal such that RCS pressure builds on the back side of the polymer ring.

- Pump Shaft Stops Rotating - This top event represents a stopped RCP shaft prior to or shortly after SDS actuation such that an effective seal can be made by the polymer ring. The shaft is considered to stop rotating if the pump motor is tripped (either manually or by a loss of power) upon a loss of all RCP seal cooling. A loss of all seal cooling is characterized by a loss of seal injection and a loss of thermal barrier cooling (CCW), both of which are alarmed in the control room. A manual trip can be assumed to occur if the pump is tripped within the expected operator response time shown in TR WCAP-17100-P/NP, Revision 1, Table 3-20, after the loss of all RCP seal cooling event occurs. If the pump has not been tripped within the allowable time window, Westinghouse assumes that the piston ring will still clamp tightly on the shaft but the polymer may degrade sufficiently such that it does not seal at its design basis leakage rate of less than 1 gpm.

- Polymer Ring Initially Seals – This top event is the probability that the polymer ring initially seals and limits leakage from the RCS for the first eight hours of the event. The tests performed to measure the leak-tightness and survivability of the polymer ring on a static shaft provide a statistical failure probability in the first eight hours of less than 0.02271 percent at an average leak rate of less than 1 gpm level.

- Polymer Ring Remains Sealed – This top event is the probability that the polymer ring initially seals and limits leakage from the RCS for the 8- to 24-hour time period. The tests performed to measure the leak-tightness and survivability of the polymer ring on a static shaft provide a statistical failure probability in the 8- to 24-hour period of less than 10 percent at the average leakage rate of less than 1 gpm. Failure to remain sealed for the 24-hour period would introduce a leakage rate of less than 2 gpm through the seal package as limited by the actuation of the piston ring.

Westinghouse used the following outcomes in its event tree analysis:

- <u>Less than 1 gpm leakage</u> - For the smooth surface tests of the SDS assembly sealing capability, the polymer ring formed a leak-tight seal against the shaft. However, in the case of scratches on the shaft, a leakage rate as high as 0.73 gpm was observed. For the Model 93A pumps, a new shaft sleeve will be installed along with the SDS and modified No. 1 insert to preclude initial scratches. However, to allow for minor scratches during installation of the SDS, a leakage rate of less than 1 gpm was assumed. For the Model 93, 93A1, and 100 pumps where the SDS will seal against the shaft that may be scratched during previous pump maintenance activities, larger scratches may be present. The Westinghouse criterion for scratches will assure that any scratches in excess of that predicted to result in leakage greater than 1 gpm will be repaired with a qualified repair process.

- <u>2 gpm leakage</u> - For the cases in which the piston ring actuates but the polymer ring does not seal leak-tight against the pump shaft or the polymer ring suffers from long term degradation, the leakage rate will be in excess of 1 gpm. For those cases in which the faces of the SDS seal components remain in contact (e.g., no break-up of the polymer ring), a limiting value of 2 gpm is used. The 2 gpm flow is rounded-up from the maximum design flow of 1.5 gpm for conditions of an actuated piston ring with the polymer ring in its original position. Westinghouse indicated that there are no known mechanisms for break-up of the polymer ring as long as rotation of the pump shaft has stopped within a short time after SDS actuation.

- <u>19 gpm leakage</u> - For cases in which the SDS actuates but the pump shaft continues to rotate because the pump motor is not tripped in a timely manner, the polymer ring would overheat and begin to degrade. The Westinghouse analysis showed that even if the polymer ring completely disappears and the piston ring wears to its maximum extent possible, the leakage would be limited to 19 gpm. This assumes that the entire pressure differential is carried across the SDS and no credit is taken for the No. 1 seal in limiting RCS inventory losses. Westinghouse assumed that leakage rates will not increase to those levels in the WOG 2000 model.

- <u>WOG 2000 Model</u> - For cases in which the SDS fails to actuate, the flow past the SDS will be unimpeded since it fits entirely within the volume of the No. 1 insert that was machined for SDS installation. The 3-stage RCP seal will behave as described in TR WCAP-10541 (Reference 3) and TR WCAP-15603, Revision 1-A (Reference 4).

### 3.5 Documentation Requirements

The RCP seal leakage model, including any related bases and analyses, used by licensees must be documented in the licensee-controlled PRA documentation. This documentation must include the licensee's evaluation of and determination that the plant-specific procedures and conditions support the applicability of the model used.

If, on a plant-specific basis, the SDS model is used in a manner different than described in TR WCAP-17100-P/NP, Revision 1, as modified by the conditions, limitations, and modifications imposed by this SE, or if it is used for plant-specific conditions and procedures that are different than typically assumed for Westinghouse plants, then the licensee must provide a justification for that model, including its supporting analyses and related bases, in their licensee-controlled PRA documentation. In addition, a summary discussion of these differences in the plant-specific model used by the licensee must be included in any risk-informed license applications submitted to the NRC for review and approval.

## 4.0 LIMITATIONS AND CONDITIONS

The NRC staff finds that the models and parameters in Section 3.4 of this SE are acceptable for use in plant-specific PRAs and in support of risk-informed applications provided they are supplemented and used in accordance with the following limitations, conditions, and modifications:

1. The model can only be used to describe the consequence of loss of reactor seal cooling in PRAs after the SDS is installed on Model 93A RCPs. The NRC staff does not approve the use of PRA models with the SDS installation on any pumps other than Model 93A RCPs.

2. The RCP seal packages with floating ring seals shall be removed prior to installation of the SDS.

3. Licensees shall consider additional sequences that might be introduced in the Level 2 PRA model for changes in high pressure core melt progressions.

4. A plant-specific Human Error Probability must be developed for failure to trip RCPs in a timely manner as described in Table 3-20 of TR WCAP-17100-P, Revision 1. A seal leakage rate of 19 gpm shall be assumed for failure resulting in a SDS leakage through a rotating shaft (i.e., after a fail to trip RCPs in a timely manner event).

5. Licensees should initially assume a failure rate of 0.0227 failures per demand for the SDS failing to actuate which may be updated with Bayesain methods as operational data is gained.

6. Any impact of SDS debris on the RCP seal package or the RCS from an inadvertent actuation should be included in each plant-specific SDS PRA model.

7. A recommendation should be developed by Westinghouse to address the insufficient time to trip the model 100 RCPs, on a non-SBO loss of seal cooling.

8. This SE does not approve the installation of the SDS.

In developing revised procedures, the NRC staff expects that licensees shall adhere to the following Westinghouse restrictions:

- Re-establishing seal injection or thermal barrier cooling if RCP seal cooling has been lost and the temperatures exceed the criteria for RCP shutdown.

- Cooling down (at less than or equal to 100 °F per hour) and depressurize the RCS following a loss of all seal cooling event to prevent thermal shock to the RCP seal package, to minimize RCS inventory loss through the RCP seals, and maximize recovery time.

- Consider the rapid diagnosis of a loss of seal cooling event followed by tripping of the RCPs based on high temperatures or low flow due to loss of charging pump and CCW flow.

- Provide training on diagnosing and taking action on any indication of abnormal seal behavior.

- Do not start oil lift pumps to aid in natural circulation cooling of the reactor core when all RCP seal cooling is lost.

## 5.0 CONCLUSION

The NRC staff has found that the analysis of test data is reasonable because it relies on accepted statistical analysis of observed test data. The NRC staff has found that associated PRA and deterministic models in Section 3.4 above are acceptable because they appropriately reflect the failure modes and scenarios of the SDS during normal, abnormal, and accident conditions.

With the limitations and conditions listed in Section 4.0, TR WCAP-17100-P/NP, Revision 1, may be referenced in plant-specific PRA.

## 6.0 REFERENCES


1. Letter from Herbert Berkow, Director Project Directorate IV Division of Licensing Project Management to Robert Bryan, Chairman Westinghouse Owners Group, Safety Evaluation of Topical Report WCAP-15603, Revision 1, "*WOG 2000 Reactor Coolant Pump Seal Leakage Model for Westinghouse PWRs (TAC No. MB1714),*" May 20, 2003.

2. U.S. Nuclear Regulatory Commission, "*Use of Probabilistic Risk Assessment Methods in Nuclear activities: Final Policy Statement,*" Federal Register, Volume 60, page 42622 (60 FR 42622), dated August 16, 1995.

3. WCAP-15041, Revision 2, "*Reactor Coolant Pump Seal Performance Following a Loss of All AC Power*," Westinghouse Electric Company, November 1986.

4. WCAP-15603, Revision 1-A, "*WOG 2000 Reactor Coolant Pump Seal Leakage Model for Westinghouse PWRs*," Westinghouse Electric Company, June 2003.

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