VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

May 7, 2004

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No.	04-078A
NLOS/GDM	R1
Docket Nos.	50-280
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License Nos.	DPR-32
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VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
SURRY POWER STATION UNITS 1 AND 2
EVALUATION OF PRELIMINARY WHITE FINDING AND ASSOCIATED NRC RISK ANALYSIS CONTAINED IN NRC INSPECTION REPORT NOS. 05000280/2003008 AND 05000281/2003008
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

On February 2, 2004, the NRC issued Inspection Report Nos. 05000280/2003008 and 05000281/2003008. This report provided the NRC's findings, preliminary significance determination and associated evaluation related to an Appendix R fire in the Unit 1 Emergency Switchgear Room (ESGR) and opened an unresolved item (URI) for a similar Appendix R fire in the Unit 2 ESGR.

In a letter dated March 25, 2004 (Serial No. 04-078), Dominion presented its position on the NRC's findings including an evaluation of the NRC's preliminary White finding relative to a postulated Appendix R fire in the Unit 1 ESGR and the associated Phase 3 Significance Determination Process (SDP) analysis provided in the subject inspection report. We likewise reviewed the URI associated with an Appendix R fire in the Unit 2 ESGR. The results of these evaluations were included as an attachment to the March 25, 2004, letter and provided the basis for our presentation to the NRC during the regulatory conference held on April 1, 2004, at the NRC Region II office in Atlanta, Georgia.

As we noted during the regulatory conference, Dominion was in the process of obtaining a test report from Electricité de France (EdF) that addresses RCP seal performance in response to thermal shock conditions resulting from restoration of seal cooling after a prolonged interruption. This report has been received and is included in Enclosure 5 for your review and consideration. As indicated in the enclosed report, RCP seal integrity was maintained even after a prolonged loss of RCP seal cooling. Based on this report data, as well as the Haddam Neck and Sizewell B loss of seal cooling events, Dominion believes the probability of RCP seal failure assumed in the NRC Phase 3 SDP analysis is overstated.

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Furthermore, even though Dominion has made the decision not to contest the violations associated with a postulated loss of RCP seal cooling event, we believe that the thermal shock test results may have generic implications which are contrary to the NRC conclusions reached by reliance on existing RCP vendor information for determining the appropriate licensee response to such an event. The RCP seal thermal shock test report provided in Enclosure 5 is considered proprietary information to be withheld from public disclosure due to its confidential nature. The document does not include brackets around the information considered to be proprietary, nor is a redacted, non-proprietary version of the document being provided, since the entire document is considered proprietary. The basis for considering this information as proprietary is provided in the application for withholding and affidavit in accordance with the requirements of 10 CFR 2.390(b)(4) which is provided in Enclosure 6.

At the conclusion of the April 1, 2004, regulatory conference, the NRC requested certain additional information to assist in their assessment of the evaluation provided by Dominion, which took exception to certain assumptions made in the NRC's Phase 3 SDP analysis. Specifically, the NRC requested additional information regarding: 1) the design and testing of the floating ring seals installed in the Surry reactor coolant pumps (RCP), 2) the frequency of welding and the probability of a welding fire occurring in the ESGR, and 3) the fire suppression capability of the Halon system for a fire in the ESGR.

Pursuant to the NRC's request, we have prepared a calculation and assembled a considerable amount of supporting information that we believe adequately and thoroughly substantiate the positions that we presented at the April 1, 2004 regulatory conference for the areas noted above. The calculation, which is included as Enclosure 1, has been independently reviewed and validated by Science Applications International Corporation (SAIC).

The requested information associated with the subject areas noted above is provided in the enclosures attached hereto and is also summarized below. The associated risk impact of each item on the NRC's Phase 3 SDP analysis is also provided below.

RCP Floating Ring Seal

Section 4.2 of the Surry Power Station Updated Final Safety Analysis Report states, "The purpose of the floating-ring seals is to limit leakage of reactor coolant from the pump should the other seals fail."

Failure Probability

As noted in our March 25, 2004 letter and as discussed at the regulatory conference, the Surry RCPs contain a floating ring seal in addition to the typical seal arrangement installed in Westinghouse RCPs. In our assessment of the NRC SDP Phase 3 analysis, Dominion identified that the NRC analysis did not provide any credit for the floating ring seal to preclude RCP seal leakage. We provided delta CDF/yr values based on a range of floating ring seal failure probabilities from 10 to 50%. The NRC did not agree with

providing any credit for the floating ring seal during the regulatory conference and requested additional supporting information before they would consider allowing any credit for the seal. Consequently, we have performed a calculation that establishes the failure probability of the floating ring seal as 0.5 based on the Haddam neck event described in our March 25, 2004 letter. The calculation is included in Enclosure 1. The failure probability was determined in accordance with the guidance provided in NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995," dated February 1999. A standard method in PRA, consistent with the Jeffreys noninformative prior in a Bayes updated distribution, is to give at least 50% failure probability to any design feature which has demonstrated the capability to perform its assumed function and has not suffered any failures. The performance of the floating ring seals at Haddam Neck in their loss of cooling event constitutes a valid challenge with no failure, which is directly applicable to the Surry RCP seal model.

Applying a floating ring seal failure probability of 0.5 to the NRC Phase 3 SDP analysis in concert with any of the other conservatisms noted below results in a risk significance below 1.0E-06 (Green) for the subject Appendix R fire in the Unit 1 ESGR.

Test and Design Information

Supporting RCP floating ring seal design and test information was also requested by the NRC during the regulatory conference. We are still in the process of obtaining such information (e.g., the 1965 Westinghouse floating ring seal leakage test data referenced in the letter from Connecticut Yankee Atomic Power Company to the USNRC dated December 15, 1990). Due to the vintage of this information and the need to engage outside companies for support in obtaining such information, any pertinent RCP floating ring seal design and/or test information that can be reasonably obtained will be provided to the NRC by May 28, 2004.

Welding Frequency and Probability of a Welding Fire in the ESGR

In Dominion's March 25, 2004 letter, we noted that the generic combined severity for non-suppression probabilities for ESGR welding fires used in the NRC's SDP Phase 3 analysis did not reflect credit for the Halon suppression system, the type of welding that has actually occurred in the ESGRs or the presence of a continuous fire watch during welding activities. Specifically, the severity factor and non-suppression probabilities used in the NRC Phase 3 SDP for the welding fires in the ESGR were obtained from the EPRI Fire Data Base and were based on a generic 9% probability of fires lasting more than 20 minutes. We noted that due to: 1) the minimal amount of welding performed in the ESGRs during the period when the finding was applicable, 2) the lack of combustible material in the area where welding has occurred during the period when the finding was applicable, 3) the procedurally required fire watch posted whenever welding is performed, 4) the installed area smoke detection system, and finally, 5) the availability of the Halon suppression system during all of the welding events, the welding fire non-suppression probability in the NRC Phase 3 SDP should be no greater than the non-suppression probability used for electrical cabinet and transformer fires.

This would reduce the welding fire non-suppression probability included in the NRC Phase 3 SDP analysis from 0.09 to 0.005. This same reduction is considered applicable for transient fires since the Phase 3 SDP analysis did not credit the ESGR Halon system for transient fire suppression. We believe the failure to consider the ESGR Halon system in suppression of welding and transient fires in the Phase 3 SDP analysis was an oversight, not an analysis conservatism.

During the regulatory conference the NRC requested additional information from Dominion substantiating our position. Consequently, we have quantitatively determined the welding frequency and probability of a welding fire in the ESGR in the calculation provided in Enclosure 1. The frequency of welding events in the ESGR was calculated based on plant specific data over the period when the finding was applicable (i.e., since 1996). A query of the Surry Work Order system for work orders that required flame permits (which are procedurally required when welding occurs) only identified two work orders that involved welding inside the ESGR while the unit was at power since 1996. Both of these work orders were for repairing ESGR door hinges, which did not require removal of the door. This data results in a welding frequency of 1.1E-1/yr per ESGR. Furthermore, the probability of a fire starting from welding and spreading to electrical cables within the ESGR is considered negligible due to the location of the doors with respect to cabling and the general lack of combustibles near the doors where the welding took place.

Therefore, assuming a negligible probability of fire initiation due to welding in combination with the 0.5 failure probability of the floating ring seal in the NRC Phase 3 SDP analysis improves the identified risk significance to 7.0E-7 (Green).

Fire Suppression Capability – Halon System/Fire Brigade Response

While the Phase 3 SDP analysis did not credit the Fire Brigade suppression capability if the Halon system fails, our assessment concludes that there is sufficient basis to credit both the Halon system and the Fire Brigade before critical targets are impacted. Our basis, as discussed in our March 25, 2004 letter, includes the close proximity of the ESGR to the main control room, the rapid response time of the Fire Brigade (average 5 minutes) based on historical plant data and the availability of a large capacity portable carbon dioxide extinguisher in the ESGR area. Therefore, successful fire suppression in the ESGR is achieved by the success of the Halon system or the Fire Brigade. ESGR fire suppression (i.e., the Halon suppression system and fire brigade) is not modeled in the Surry fire probabilistic risk assessment (PRA) nor was credit taken for detection or suppression of ESGR fires in the Surry IPEEE. However, for the purpose of determining the overall unavailability of ESGR fire suppression and its impact on risk, a fault tree has been developed as requested by the NRC during the regulatory conference. The fault tree for ESGR fire suppression in the Surry ESGRs is included in the calculation provided in Enclosure 1. A discussion of the Halon system design and operation was provided in our March 25, 2004 letter and is also provided in Enclosure 1. The multiple means of activating the Halon system are noted, as well as a discussion of Halon system unavailability due to testing and maintenance. Completed surveillance tests

over the time period of interest are provided in Enclosure 2. Drawings of the Halon system, ESGR dampers and other associated fire protection features are provided in Enclosure 3. These tests demonstrate the high availability and reliability of the Halon system since 1996. Furthermore, Surry fire brigade drills are performed and documented in accordance with station procedure 0-LSP-FP-004, Fire Drills. The fire brigade drill response time is recorded in this procedure. The drills associated with simulated fires in the ESGR were reviewed for the time period of 1996 to the present. The mean response time obtained for the Fire Brigade to reach the ESGR and be prepared to respond to a fire is 5.1 minutes. This response time is considerably better than the 10-minute response time assumed in the NRC's Phase 3 SDP analysis. Copies of the completed fire drill procedures documenting the Fire Brigade response times are provided in Enclosure 4.

As determined in the calculation provided in Enclosure 1, the probability of failure of ESGR fire suppression is as follows:

- Unit 1 ESGR fire suppression failure probability = 5.1E-3
- Unit 2 ESGR fire suppression failure probability = 7.0E-3.

Using these values, in combination with the negligible welding fire initiation probability and the 0.5 failure probability of the floating ring seal, in the NRC Phase 3 SDP analysis improves the identified risk significance to 3.8E-7 for Surry Unit 1 (Green) and 4.0E-7 for Surry Unit 2 (Green).

Conclusion

Based on the above information and the attached documentation, in addition to the SAIC independent review, we believe the calculation and information provided herein clearly and conclusively demonstrate that the NRC's preliminary White finding was overly conservative when considering plant specific features unique to Surry. We therefore further conclude that the safety significance of the postulated Appendix R fire in the Surry Unit 1 ESGR (or Unit 2 ESGR) corresponds with the Green range in SDP findings (very low safety significance) as opposed to the NRC's preliminary White determination (low to moderate safety significance).

If you have any questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Very truly yours,

L. N. Hartz
Vice President – Nuclear Engineering

Enclosures

Commitments made in this letter:

1. Pertinent RCP floating ring seal design and/or test information that can be reasonably obtained will be provided to the NRC by May 28, 2004.

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