VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

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

Serial No. 04-078
NLOS/GDM R5
Docket Nos. 50-280
50-281
License Nos. DPR-32
DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY
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

On February 2, 2004, the NRC issued Inspection Report Nos. 05000280/2003008 and 05000281/2003008. This report provided the NRC's 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 for a similar Appendix R fire in the Unit 2 ESGR.

The report noted that prior to the NRC making a final decision on the preliminary finding and the unresolved item, Virginia Electric and Power Company (Dominion) had the option of requesting a Regulatory Conference. The purpose of the Regulatory Conference is to present Dominion with the opportunity to provide its perspectives on the significance of the NRC's findings, the bases for its position, and whether it agrees with the apparent violation. Consequently, Dominion requested a Regulatory Conference in a telephone call with Mr. Charles Ogle of the NRC Region II Office. The NRC subsequently informed Dominion that a Regulatory Conference had been scheduled for April 1, 2004. The NRC encouraged Dominion to provide its written evaluation and any differences with the NRC's evaluation at least one week prior to the conference in an effort to make the conference more efficient and effective.

Accordingly, we have reviewed the NRC's preliminary White finding relative to an Appendix R fire in the Unit 1 ESGR and the associated Phase 3 Significance Determination Process (SDP) evaluation provided in the subject Inspection Report. We have likewise reviewed the URI associated with an Appendix R fire in the Unit 2 ESGR. Dominion's perspective on the significance of the NRC findings is discussed in the attachment and addresses several SDP evaluation assumptions with additional considerations, clarifications, corrections and alternative assumptions. Application of this perspective demonstrates that the NRC's preliminary White finding was overly

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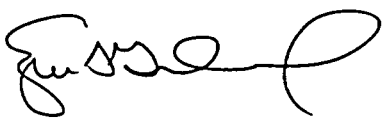
conservative when considering plant specific features unique to Surry. We conclude that the safety significance of the postulated Appendix R fire in the Surry Unit 1 ESGR (or Unit 2 ESGR) would better correspond with the Green range in SDP findings (very low safety significance) as opposed to the NRC's preliminary White determination (low to moderate safety significance). The bases of our conclusion are provided in the attachment. We look forward to discussing this information with you in greater detail at the Regulatory Conference on April 1, 2004.

Dominion will not contest the violations as received in the inspection reports noted above. If you have any questions or require additional information prior to the Regulatory Conference, please contact Mr. Gary Miller at (804) 273-2771.

Very truly yours,



E. S. Grecheck
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Attachment

Commitments made in this letter: None.

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Attachment

Evaluation of an NRC's Significance Determination Process Phase 3 Analysis for an Appendix R Fire in the Unit 1 (or Unit 2) Emergency Switchgear Room

Surry Power Station Units 1 and 2

Virginia Electric and Power Company
(Dominion)

Attachment

Evaluation of an NRC's Significance Determination Process (SDP) Phase 3 Analysis for an Appendix R Fire in the Unit 1 (or Unit 2) Emergency Switchgear Room

Surry Power Station Units 1 and 2

NRC Inspection Report 05000280/2003008 and 05000281/2003008 dated February 2, 2004, includes a Phase 3 Significance Determination Process (SDP) evaluation that assesses the safety significance of a finding associated with a fire in the Surry Power Station Unit 1 Emergency Switchgear Room (ESGR). The results of the evaluation assigned a preliminary safety significance of White to the finding.

Virginia Electric and Power Company (Dominion) has reviewed the NRC's preliminary White finding relative to an Appendix R fire in the Unit 1 ESGR and the Phase 3 Significance Determination Process (SDP) evaluation. We have likewise reviewed the unresolved item (URI) associated with an Appendix R fire in the Unit 2 ESGR. Dominion's perspective on the significance of the findings addresses several SDP evaluation assumptions with additional considerations, clarifications, corrections and alternative assumptions. Application of this perspective demonstrates that the NRC's preliminary Phase 3 SDP evaluation was overly conservative, and that the safety significance of the postulated Appendix R fire in the Surry Unit 1 ESGR (or Unit 2 ESGR) would better correspond with the Green range of SDP findings (very low safety significance) as opposed to the NRC's preliminary White determination (low to moderate safety significance). The results of our evaluation are provided below.

Plant Specific Features Affecting the Unit 1 ESGR Phase 3 SDP

The NRC Phase 3 SDP Evaluation for the Surry Power Station Unit 1 finding was reviewed to identify any significant differences between Dominion's assessment and the NRC's. The review identified a number of generic assumptions in the NRC Phase 3 SDP which are believed overly conservative based on the Surry plant specific design. These conservatisms include:

- The generic probability of non-suppression (i.e., Halon and fire brigade) for electrical cabinet and transformer fires does not reflect the multiple, diverse proceduralized means to actuate the Halon System, the reliability of the Halon System, the close proximity of the ESGR to the Main Control Room and the close proximity of the fire brigade's equipment to the ESGR.
- The generic combined severity for non-suppression probabilities for ESGR welding fires used do not reflect credit for a continuous fire watch, the type of welding which has historically occurred in the ESGR over the past five years, or credit for use of the

Halon System in suppressing the fire. Also, generic factors for non-suppression of ESGR transient fires were used which do not reflect credit for the Halon System in suppressing the fire. The Halon System would be used in any transient or welding fire in the ESGR which could not be extinguished by portable carbon dioxide extinguishers.

- The generic RCP seal leakage probabilities do not reflect the additional floating ring seals found in the Surry RCPs, which have been credited by the NRC at another nuclear plant for their capability to limit RCP seal leakage in loss of seal cooling events. Most Westinghouse pressurized water reactors (PWRs) do not utilize floating ring seals.

Each of these conservatisms is discussed below in more detail.

Generic Probability of Non-Suppression

The non-suppression factor used in the NRC Phase 3 SDP for the scenarios involving electrical cabinet and transformer fires was based on generic Halon System unavailability. Credit was not given for manual fire suppression by the fire brigade to prevent a loss of RCP seal cooling for these types of fires. A generic Halon System unavailability of 0.05 was taken from EPRI TR-100370.

Surry plant specific features associated with the Halon System, the close proximity of the ESGRs to the Main Control Room, and the close proximity of fire brigade equipment to the ESGR suggests that a generic non-suppression probability of 0.05 for this analysis is overly conservative. When credit is given for the multiple means to manually actuate the Halon System, the non-suppression probability should be at least a factor of 10 lower. In addition, credit should be given for the close proximity of the Main Control Room and fire brigade equipment to the ESGR.

The ESGR is located immediately below the Main Control Room and the Technical Support Center. Each compartment in the ESGR has approximately 2500 ft^2 of floor space and adjoins with each other in an L-shaped configuration, with open passageways between them. There is also an open passageway with a 3-hour fire-rated sliding door between the Unit 1 and Unit 2 ESGR areas. The sliding fire door is normally open and will automatically close upon actuation of either the Unit 1 or Unit 2 Halon System or a dedicated smoke detector located near the door in each ESGR. Plant records indicate no failures of the sliding fire door to close in testing over the past five years.

The Unit 1 ESGR is accessed through either: (1) a 3-hour fire-rated set of double doors from the turbine building through the Unit 2 ESGR; (2) a 3-hour fire-rated door to a stairwell from the Main Control Room immediately above through the Unit 2 ESGR; or (3) a 3-hour fire-rated door from the Unit 1 cable vault. The Unit 1 ESGR floor space is sufficiently clear to permit access by fire fighters, and smoke can be exhausted through the turbine building roof fans or into the cable vault and tunnel area to the motor control center rooms and outside. Each ESGR is provided with a separate smoke detection system which annunciates in the Main Control Room at a common panel. The Surry

Appendix R report estimates the time for the fire brigade to arrive at a scene and deploy fire fighting equipment to be 10 minutes from the start of the fire. However, the close proximity of the Main Control Room, the fire brigade equipment, and the portable air breathing devices to the ESGR would likely result in a deployment time of less than 10 minutes. Fire drill results for the past five years indicate a response time range from 3 to 10 minutes for ESGR fires.

Portable carbon dioxide extinguishers and a 150-lb wheeled, carbon dioxide extinguisher are located in the ESGR. A 1.5-inch hose station is located in the turbine building just outside the entrance to the Unit 1 area, and there is also a hose rack on the other side of the fire door located in the cable tunnel for U1. Each ESGR is protected by its own manually actuated Halon fire suppression system. Each system is capable of flooding an ESGR with an adequate concentration of Halon for 10 minutes. The bottles supplying the Halon System are located in the turbine building nearby the ESGRs.

Alarm Response Procedure 0-VSP-M2 Rev. 4 entitled "EMERG SWGR RM HALON SYS FIRE/TRBL" is utilized when a Main Control Room alarm actuates indicating a possible fire in the ESGR. An operator is dispatched to the ESGR to confirm the fire and is instructed to report back within 5 minutes. If a fire is confirmed or no communication is established with the operator within 5 minutes, then the procedure instructs the operators to discharge the Halon System remotely from the Main Control Room or locally at the Halon discharge station near the ESGR. Failure of the Halon System to actuate from the Main Control Room or the local Halon discharge station in the ESGR would be evident to the operator and fire brigade. If the Halon System fails to discharge, the operators initiate Attachment 1 of the procedure, which provides instructions for isolating the ESGR Unit 1/Unit 2 door and fire dampers, and manually discharging the Halon at the bottles by pulling the pins and operating the discharge trip levers on the bottles. The manual Halon actuation process at the bottles bypasses all power and instrumentation dependencies that could fail the discharge. Operators are trained on manual actuation of the ESGR Halon system.

The Halon System is very reliable based on plant specific data. System surveillance requirements are contained in the Technical Requirements Manual Section 3.7. Once every 31 days, all manual, power-operated, and automatic valves are verified to be in their correct position. Once every 6 months, the charge weight of each individual Halon tank is verified to be within specifications. Once every 18 months, the Halon System is verified to actuate automatically upon receipt of a simulated signal, the headers and nozzles are verified to pass flow in a flow test, and the system is verified to be capable of being initiated manually. A review of plant specific data over the past 5 years indicates negligible unavailability and satisfactory completion of all surveillance tests.

Based on the plant specific features of the Halon System, including high reliability and multiple means of actuation, it is concluded that use of the generic Halon failure probability from the EPRI FIVE guidance is overly conservative. The ability to bypass all electrical and instrumentation dependencies in manual actuation is worth a recovery factor of 0.1 by itself. Therefore, a Halon failure probability of 0.005 (which includes the

0.1 recovery factor) is assumed appropriate for the Surry ESGRs. This reduced failure probability remains a conservative assumption because it does not credit the plant specific features of the fire brigade, including close proximity of the Main Control Room to the ESGRs, the close proximity of the fire brigade equipment to the ESGRs, or availability of the 150-lb wheeled, carbon dioxide extinguisher located in the ESGR area.

Generic Severity Factors and Non-Suppression Probabilities for ESGR Welding Fires

The severity factor and non-suppression probabilities used in the NRC Phase 3 SDP for the welding fires in the ESGR was based on a generic 9% probability of fires lasting more than 20 minutes from the EPRI Fire Data Base.

While this value may be appropriate for areas of the plant where welding can occur without a continuous fire watch or where fixed suppression systems are not installed, this is not appropriate for the ESGR. Plant procedures require use of a continuous fire watch for all welding activities in the ESGR. The fire watch is trained in detection as well as fighting of a welding fire using a portable carbon dioxide extinguisher. Based on a review of welding permits for the ESGRs at Surry over the past 5 years, the only welding work which has occurred in the ESGRs with the reactor at power was for door latches and a 4160/480V transformer support washer (in the Unit 2 ESGR with Unit 1 at power and Unit 2 shutdown). Due to the lack of combustibles in the room near the ESGR doors, this type of welding has a very limited potential to initiate fires or spread to the primary combustion inventory in the room, i.e., the cables. Furthermore, if a fire started that could not be extinguished by the fire watch, the Main Control Room would be notified of the fire by either the smoke detection system or the fire watch, and the Halon System would be used to suppress the fire. The welding fire non-suppression probability in the NRC Phase 3 SDP should be no greater than the Halon non-suppression probability used for electrical cabinet and transformer fires. Even with this adjustment, the analysis remains conservative based on the limited type of welding which occurs in this area and the presence of a continuous fire watch.

Generic RCP Seal Leakage Probabilities

The probability of an RCP seal LOCA used in the NRC Phase 3 SDP was taken from WCAP-15603 Rev. 1-A. The probability (20%) was applied to scenarios where RCP seal cooling was lost for greater than 13 minutes and where RCP seal injection was re-established to "hot" RCP seals.

The RCP seal LOCA model described in WCAP-15603 Rev. 1-A is a conservative, generic consensus model that is applicable to the majority of Westinghouse RCPs. However, Surry, North Anna, and a few other Westinghouse PWRs still utilize RCP seal packages which incorporate floating ring seals. Floating ring seals were specifically designed by Westinghouse to provide additional leakage control in scenarios where the No. 1 or 2 seals failed. The floating ring seals are sized to leak at approximately 50 gpm under normal operating conditions if the other seals fail. The floating ring seals were

originally designed to address the temperature susceptibility of the No. 2 O-ring seals, which have subsequently been replaced by high-temperature seals at almost all PWRs including Surry and North Anna. However, Surry and North Anna continue to utilize floating ring seals in their RCPs.

Each floating ring seal is a radial-clearance seal comprised of a series of individual stationary housings with floating rings, an end ring, lock segments, a retaining ring, and a journal. The floating ring seals consist of a stack of eight labyrinth seals on the pump shaft below the seal package, but above the lower (radial) bearing. The seals are made of carbon graphite (Graphitar 14) material in 304 stainless steel holders with split rings to maintain the parts in place. The floating rings and the journal have a clearance of .010 inch, which restricts the flow of injection water upward into the seal section. There are a series of 8 carbon graphite seals in the Surry RCP. They are stacked one on top of another to form a labyrinth flow path of fluid going up the shaft. The lower 2 stacks use O-rings that are fit into a bore and must seal against a gap.

The floating ring seals in the Surry RCPs have larger clearances than the other seals and are not designed to be periodically replaced. During normal seal package inspection and replacement, the floating ring seals are not normally removed from the pump since they are below the seal package. The floating ring seals installed in the Surry RCPs are the original seals from initial plant operation. No floating ring seals have been replaced due to unsatisfactory inspection results. When Unit 1 RCP 1A was replaced in 1990, the floating ring seals from the original pump were inspected per procedure and re-installed in the replacement pump.

When the floating ring seals are removed from the pump, they are inspected for degradation per Surry Maintenance Procedure 0-MCM-0102-02, which specifies:

> "If seal performance is satisfactory and minor grooving, scoring, and pitting is found, indications should be recorded but floating ring seals may be reused...Check each ring seal carbon surface for chipping, cracking, grooving, scoring, or spalling...If ring seal is Unsat or seal performance was unsatisfactory before disassembly, then replace ring seal."

The NRC has previously credited floating ring seals as providing additional leakage control in loss of seal cooling events (Letter, NRC to Connecticut Yankee Atomic Power Company, "NRC Safety Evaluation Report on Reactor Coolant Pump Seal Integrity Following Loss of Offsite Power," June 26, 1991). The NRC Safety Evaluation Report (SER) closed out NUREG-0737 Item II.K.3.25 "Reactor Coolant Pump Seal Integrity Following a Loss of Offsite Power" for the Haddam Neck Plant by concluding that restoration of RCP seal cooling following a loss of offsite power complies with the requirements of the TMI Action Plan. In the SER, the NRC credited the floating ring seals as capable of withstanding full system pressure and limiting RCP leakage to 50 gpm in loss of seal cooling events. The NRC acknowledges that "This is not standard on Westinghouse RCP seals and provides enhanced protection from excessive seal leakage." Further, the SER described an event at the Haddam Neck Plant where all RCP

seal cooling was lost to all four RCPs for a period of approximately 30 minutes. Seal cooling was restored to the RCPs at 30 minutes, which should have resulted in a thermal shock of the seals. Three of the four RCPs suffered no seal degradation. The No. 4 RCP experienced some seal failure, but this damage was attributed to an operator attempt to restart that RCP to assist in the cooldown. Post event examinations revealed failure of the No. 1 and 2 seals in the No. 4 RCP. However, the floating ring seal functioned as designed, did not fail, and limited RCP seal leakage to approximately 15 gpm after failure of the No.1 and 2 seals.

The NRC credit for the floating ring seal design at Haddam Neck Plant is directly applicable to Surry. The RCP seal packages at Surry and Haddam Neck are essentially the same. Furthermore, restart of an RCP following a loss of all RCP cooling would not occur at Surry in the severe fire scenarios contemplated in the NRC ESGR fire model. Surry Fire Response Procedure 1-FCA-4.00 for fires in the ESGR requires tripping of RCPs in the event of an ESGR fire. Although at the time of the Surry Triennial Fire Inspection, Fire Recovery Procedure, 0-FCA-17.00, "Limiting Fire Cooldown," did not specifically preclude pump operation, it did contain a caution directing consideration of pump "availability and support equipment." This caution needs to be understood within the context of operator training on operating and abnormal procedures.

Surry Operating Procedure 1-OP-RC-001 "Starting and Running any Reactor Coolant Pump" contains numerous restrictions and prerequisites for starting an RCP which could not be met in the severe fire scenarios assumed in the NRC Phase 3 SDP fire model. Furthermore, Abnormal Procedure AP-9.02 "Loss of RCP Seal Cooling" gives guidance on restoration of seal cooling if both seal injection and thermal barrier flow are lost. If it is desired to run an RCP for forced cooldown, the mechanics are required to manually rotate the pump shaft.

Since the NRC Triennial Fire Inspection, Fire Recovery Procedure 0-FCA-17.00 has been modified to more explicitly restrict restart of an RCP only if "RCP seal injection and thermal barrier cooling have remained inservice throughout event." This procedure modification removes any ambiguity regarding the potential for restart of an RCP in fire scenarios where RCP seal cooling has been lost.

The RCP seal LOCA event tree in WCAP-15603 Rev. 1-A can be modified to consider credit for the RCP floating ring seals. Credit for the floating ring seals is assumed to range from 0.1 to 0.5 based on the following considerations:

- Potential common cause failure mechanisms between the seals would tend to limit credit to a generic common cause factor of 0.1 without additional test data.
- In the Haddam Neck Plant event, the floating ring seals did not degrade in a 30 minute loss of cooling event, the floating ring seals did not degrade during restoration of RCP seal cooling at 30 minutes, and floating ring seals did not degrade following restart of an RCP that resulted in failure of the No. 1 and 2 seals in RCP No. 4, and seal leakage was limited to 15 gpm by the floating ring seals where No. 1 and 2 seals failed.

- The robust nature of the floating ring seals (original floating ring seals in use in Surry RCPs, no degradation noted from inspection during 1990 pump replacement)
- NRC credit for floating ring seals in Haddam Neck Plant SER

The conditional likelihood of RCP seal leakage events beyond 50 gpm per RCP was calculated from the modified RCP seal LOCA model event tree in Figure 1 for various floating ring seal failure probabilities between 0.1 and 0.5. These results were utilized in the sensitivity cases described below.

Assumed RCP Floating Ring Seal Failure Probability	**Conditional RCP Seal Leakage Rate Greater than Charging Makeup Capability (>50 gpm/RCP)[1]**
0.1	0.021
0.2	0.042
0.3	0.063
0.5	0.10

[1]RCP leakage rates much greater than 50 gpm/RCP would require transition to post-LOCA recirculation. RCP leakage rates of 50 gpm/RCP or less would result in normal unit cooldown to shutdown cooling without need to transition to post-LOCA recirculation.

Sensitivity Calculations Using NRC Phase 3 SDP Model

Sensitivity calculations were performed to evaluate the impact of crediting the above Surry plant specific features in the NRC Phase 3 SDP model. No changes were made in the NRC Phase 3 SDP fire or PRA model with the exception of those specifically indicated in the sensitivities.

Table 1
Sensitivity Cases Reflecting Surry Plant Specific Design Features

Case	**Changes to NRC Phase 3 SDP**	**Delta CDF/yr**	**SDP Color**
Base (NRC Phase 3 SDP)	N/A	2.3E-06	WHITE
Credit for multiple means to manually actuate Halon for all fires & credit Halon for transient and welding fires	• Non-suppression (Halon & fire brigade) probability changed from generic 0.05 to 0.005 for electrical cabinet and transformer fires • Non-suppression (Halon & fire brigade) probability changed from generic 0.09 to 0.005 for welding and transient fires	5.5E-07	GREEN

Credit for RCP floating ring seal (10% failure probability)	• Revised branch points RP2 and RP3 in event trees from 0.20 to 0.021	2.6E-07	GREEN
Credit for RCP floating ring seal (20% failure probability)	• Revised branch points RP2 and RP3 in event trees from 0.20 to 0.042	5.2E-07	GREEN
Credit for RCP floating ring seal (30% failure probability)	• Revised branch points RP2 and RP3 in event trees from 0.20 to 0.063	7.7E-07	GREEN
Credit for RCP floating ring seal (50% failure probability)	• Revised branch points RP2 and RP3 in event trees from 0.20 to 0.10	1.2E-06	WHITE
Credit for multiple means to manually actuate Halon per procedure & RCP floating ring seal (50% failure probability)	• Non-suppression (Halon & fire brigade) probability changed from generic 0.05 to 0.005 for electrical cabinet and transformer fires • Revised branch points RP2 and RP3 in event trees from 0.20 to 0.10	8.9E-07	GREEN
Credit Halon for transient and welding fires & RCP floating ring seal (50% failure probability)	• Non-suppression (Halon & fire brigade) probability changed from generic 0.09 to 0.005 for welding and transient fires • Revised branch points RP2 and RP3 in event trees from 0.20 to 0.10	6.2E-07	GREEN
Partial credit for multiple means to manually actuate Halon for all fires, partial credit Halon for transient and welding fires & RCP floating ring seal (50% failure probability)	• Non-suppression (Halon & fire brigade) probability changed from generic 0.05 to 0.01 for electrical cabinet and transformer fires • Non-suppression (Halon & fire brigade) probability changed from generic 0.09 to 0.01 for welding and transient fires • Revised branch points RP2 and RP3 in event trees from 0.20 to 0.10	3.7E-07	GREEN

Credit for multiple means to manually actuate Halon for all fires, credit Halon for transient and welding fires & RCP floating ring seal (50% failure probability)	• Non-suppression (Halon & fire brigade) probability changed from generic 0.05 to 0.005 for electrical cabinet and transformer fires • Non-suppression (Halon & fire brigade) probability changed from generic 0.09 to 0.005 for welding and transient fires • Revised branch points RP2 and RP3 in event trees from 0.20 to 0.10	3.0E-07	GREEN

All the sensitivity cases resulted in delta CDFs less than 1E-6/yr (i.e., GREEN), with the exception of the case where the floating ring seals are given only a 50% probability of successfully limiting RCP seal leakage to 50 gpm or less. Based on the sensitivity calculations, if at least two of the three conservatisms are removed from the NRC Phase 3 SDP, the overall risk result is always less than 1E-06/yr (i.e., GREEN). Based on the results of the sensitivities, there is reasonable confidence with conservatism that the NRC SDP Phase 3 results modified to reflect plant specific design features result in an overall GREEN risk significance.

Applicability to Unit 2 ESGR

Dominion has analyzed the Surry Unit 2 Emergency Switchgear Room (ESGR) to determine the applicability of the Surry Unit 1 ESGR findings to the Surry Unit 2 ESGR. The analysis included cable tracing and fire modeling similar to that performed for the Unit 1 ESGR.

The overall room dimensions and equipment layout in the Unit 1 and Unit 2 ESGRs are similar. The fire response procedures, equipment locations and cable routing in the Unit 2 ESGR pertaining to reactor coolant pump (RCP) seal cooling functions are also similar to the Unit 1 ESGR, with the exception that the critical RCP seal injection and component cooling thermal barrier cooling cables in the Unit 2 ESGR are generally routed in higher cable trays than those in the Unit 1 ESGR. In the Unit 1 ESGR, most of the critical RCP seal cooling cables are routed in the first two trays above the switchgear. In the Unit 2 ESGR, the component cooling component cables affecting RCP thermal barrier cooling are routed in the third and higher trays. This difference results in a longer time before a fire causes a loss of all RCP seal cooling in the Unit 2 ESGR in comparison to the Unit 1 ESGR.

In the most limiting type of fire, a high-energy arcing fault from a 4160V bus, the flow path for component cooling to the RCP thermal barrier coolers is not assumed impacted in the first 10 minutes of the fire since these cables are located in the upper trays.

Thus, there is a higher likelihood in the Unit 2 ESGR that the fire brigade would also be successful in suppressing the fire prior to a loss of RCP seal cooling.

The impact of this difference on the methodology used in the NRC Phase 3 SDP for the Surry Unit 1 ESGR is that credit could be given for fire brigade use of hand-held and the 150-lb wheeled carbon dioxide extinguishers to mitigate the fire prior to loss of RCP seal cooling. In the NRC Phase 3 SDP for the Unit 1 ESGR, no credit was given for fire brigade success due to the short time available to prevent damage to the 2nd level of cable trays above the electrical cabinets/transformers. A reduction in the non-suppression probability by a factor of 10 to credit the fire brigade would result in a delta CDF below 1E-6/yr. Therefore, the Unit 1 ESGR finding is applicable to Unit 2 ESGR; however, the risk significance is lower due to the differences in cable routing.

Figure 1
Surry RCP Seal LOCA Model Reflecting Floating Ring Seals
(50% Probability Floating Ring Seal Failure)